
# *Maintenance Series Handbook*
# *MS-56*

## *Fire Prevention and Control*

***TL-5, January 22, 2021***

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UNITED STATES POSTAL SERVICE

**Maintenance Series Handbook MS-56**
**Fire Prevention and Control**

**Transmittal Letter 5**
**January 22, 2021**

## A. Explanation

This handbook is a complete revision of the MS-56 Handbook, Fire Prevention and Control. It provides necessary information to maintenance and safety managers on fire prevention and protection in postal owned or leased buildings. It will be available on the MTSC web site at https://www1.mtsc.usps.gov/ in PDF.

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## C. Rescissions

Please discard all previous TLs of this handbook.

## D. Comments and Questions

Suggestions for improving this handbook are solicited from all sources. To provide comments and suggestions, or to report handbook errors, use the Handbook Comment selection on the MTSC Feedback link at https://www1.mtsc.usps.gov/. This handbook will be updated as future needs demand.

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# SECTION 1
# EMERGENCY PLANNING

## 1.1 GENERAL

The purpose of this chapter is to provide necessary information to maintenance and safety managers on fire prevention and protection in postal owned or leased buildings. It also provides general information for maintenance and safety managers regarding the organization, training, and function of postal Emergency Evacuation Teams (EETs) as required by the Employee and Labor Relations Manual (ELM) Chapter 8, and the minimum life safety aspects required for each postal installation. In installations where Integrated Emergency Management Plan (IEMP) protocols are present, EETs will be superseded by Emergency Management Teams (EMTs) and the IEMP.

## 1.2 EMERGENCY PLANNING

### 1.2.1 Types of Emergencies

a. Emergency planning is necessary to recognize the potential effect of an emergency before it happens. The type of emergencies that may require action from Emergency Management Teams (EMT)/EETs, and necessitate advanced planning, including, but not limited to:

b. Fire and explosion.

c. Floods.

d. Hurricanes and tornadoes.

e. Severe winter storms.

f. Hazardous material spill and leak control.

g. Earthquakes.

h. Work place accidents.

### 1.2.2 Emergency Action Plan

An Emergency Action Plan (EAP) must be developed for every postal owned or leased facility. The EAP must include designated actions which management and employees take to ensure the safety of employees and the protection of the property. The Senior Postal Official (SPO) is responsible for ensuring the development of the EAP. More specific guidelines for content and format are found in the Employee and Labor Relations Manual (ELM), Chapter 8. For an Emergency Action Plan Checklist see Exhibit 1-1.

**Exhibit 1-1. Emergency Action Plan (EAP) Checklist**

| | | |
|---|---|---|
| 1. Is the EAP written and available if there are over ten (10) employees? | YES | NO |
| 2. Are graphic illustrations of exits, routes, and fire extinguishing equipment posted in prominent locations? | YES | NO |
| 3. Are the names or job titles of persons who can be contacted for information posted? | YES | NO |
| 4. Do all employees know what procedures to follow in case of an evacuation? | YES | NO |
| 5. Do all employees know how to report a fire or other emergency? | YES | NO |
| 6. Is the procedure for reporting a fire or other emergency posted? | YES | NO |
| 7. If the facility has an alarm system, do employees know if it will summon the fire department? Does it state so near the alarm? Are other emergency telephone numbers posted? | YES | NO |
| 8. Are safe or assembly areas established? Do employees know to which area they are to report? | YES | NO |
| 9. Is there an adequate number of employees assigned to the various duties of the EET in order to ensure the safe, orderly, and complete evacuation of the building? | YES | NO |
| 10. Has the EET been trained in how to respond to emergencies other than fire, such as bomb threats, power outages, explosions, or natural disasters? | YES | NO |
| 11. Are procedures for managing various types of emergencies outlined? | YES | NO |
| 12. Have procedures for employees who will act as floor wardens or handicap “buddies” been established? | YES | NO |
| 13. Has there been an emergency preplanning meeting? | YES | NO |
| 14. Has the local fire department been invited to become familiar with the facility layout? | YES | NO |
| 15. Are different exit routes used by employees during drills? | YES | NO |
| 16. Have contingency plans been established for emergencies other than fire, such as hazardous material released? Power outages, floods, bomb scares, explosions, etc.? | YES | NO |
| 17. Are exit drills monitored by observers for efficiency? | YES | NO |
| 18. Are post-exit drills conducted to discuss irregularities and problems? | YES | NO |
| 19. Is follow-up monitoring conducted to ensure that corrective actions have been taken? | YES | NO |
| 20. Are reviews conducted when the plan changes? | YES | NO |
| 21. With new employees | YES | NO |

### 1.2.3 Fire Prevention Plan

A Fire Prevention Plan (FPP) must be developed for every postal facility larger than 10,000 square feet. The plan must include designated action management and employees must take to ensure safety of employees and the protection of property. Specific procedures should be developed for each part of the FPP. Items such as notifying employees of emergencies, evacuation procedures, and pre-fire planning information must be included in the plan. Plan development must not be limited to only the facility fire protection needs, but must satisfy the requirement of the local fire codes and standards, laws and local ordinances. The installation head must ensure the development of the FPP. More specific guidelines for content and format are found in the Employee and Labor Relations Manual (ELM), Chapter 8.

### 1.2.4 Emergency Action Plan and Fire Prevention Plan Training

The emergency action and fire prevention plans must be reviewed with each employee of the installation at the following times:

a. When the plans are first developed.

b. Whenever there is a change in the employee responsibility or designated action under the plan.

c. Whenever the plans are revised, or annually, if there have been no revisions during the previous year.

d. The immediate supervisor must review with all newly assigned employees those parts of the plan, which the employees must know to protect themselves in an emergency.

e. The plan must be posted at the work place and be available for employee review.

### 1.2.5 Employee Alarm Systems (Evacuation)

Every postal owned or leased facility must have an established general employee alarm system to provide the warning necessary to start emergency action. The system must comply with Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910.165 which includes:

**NOTE**

If questions arise over OSHA standards, contact the servicing safety office.

a. A warning that provides adequate reaction time for employees to evacuate the danger area or work place.

b. Signals and alarms that can be perceived (seen or heard) above ambient noise or light levels by all employees in the affected areas of the work place. Tactile methods must be used to alert employees who are unable to recognize the audible or visual signals.

c. The procedures must include evacuation for all employees, including handicapped.

d. A distinctive and recognizable signal to evacuate the work area or to perform designated actions under the EAP.

e. Procedures for informing each employee of the means of reporting emergencies, such as manual pull boxes, public address systems, radios, or telephones.

f. Where a communication system also serves as the employee alarm system, all emergency messages must have priority over all non-emergency messages.

g. Emergency telephone numbers must be conspicuously posted near all telephones, on employee bulletin boards, and at other locations where telephones serve as a means of reporting emergencies.

h. Direct voice communication, bells, gongs, air horns, etc., may sound the alarm in installations with fewer than ten employees, provided employees can hear the alarm.

### 1.2.6 Pre-fire Planning

#### 1.2.6.1 Purpose

The purpose of pre-fire planning is to:

a. Identify fire problems in the facility

b. Develop appropriate emergency medical and fire prevention plans.

c. Prepare EET members to effectively control incipient stage fires.

#### 1.2.6.2 Considerations

Emergency planning for fire protection begins with a survey of the facility to gather information about safety, fire control, and property conservation. Items to consider during pre-fire planning include:

a. Building security, entry, egress, and accessibility.

b. Heating, Ventilating, and Air Conditioning (HVAC) equipment.

c. Water supplies.

d. Fire equipment.

e. Municipal resources.

f. Exposures to adjacent property.

g. Explosion hazards.

h. Storage areas.

i. Critical operations.

j. Utilities.

k. Safety.

l. Medical resources.

m. Any special rescue problems.

**NOTE**

The local fire department can assist in the development of a pre-fire plan for your particular installation.

### 1.2.7 Cooperation and Coordination with Other Agencies

#### 1.2.7.1 Local Fire Department

In developing EAPs and FPPs, local fire departments must be familiar with the facility's general layout, its processes or operations, and the types and locations of hazardous materials and any other special hazards. Regular pre-emergency planning sessions with the local fire department will provide current information on any changes, and allow for more effective coordination. The installation head is also encouraged to seek assistance from local fire officials, and permit them to conduct periodic fire inspections.

**NOTE**

If questions arise over local fire citations contact your local safety office.

#### 1.2.7.2 Other Local Agencies

Liaison with law enforcement agencies must be established in advance of emergencies to develop plans to control traffic and the public. Emergency medical services available at the postal installation will determine the need for interaction with local emergency medical services. Postal installations should keep an up-to-date list of all cooperating agencies conspicuously posted in the maintenance area (Emergency Phone Number list example Table 1-1).

**Table 1-1. Emergency Phone Numbers**

| AGENCY | NUMBER |
|---|---|
| Fire | 555 1111 |
| Police | 555 1112 |
| Ambulance | 555 1113 |
| | |
| | |
| Civil Defense | 555 1115 |
| Water Company | 555 1116 |
| Electric Company | 555 1117 |
| Environmental Protection Agency | 555 1118 |
| Spill Recovery Company | 555 1119 |
| Security System Company | 555 1110 |
| Gas Company | 555 1121 |
| Guard Company | 555 1122 |
| Hospital | 555 1123 |
| Chemtrec | 555 1124 |
| Health Department | 555 1126 |
| Sprinkler Contractor | 555 1127 |

**Exhibit 1-2. References and Standards**

**OSHA General Industry Standards**

29 CFR 1910.165, Employee Alarm Systems

**US Postal Service Documents**

Employee and Labor Relation Manual (ELM), Chapter 8

**NOTE**

If questions arise over OSHA standards, contact the servicing safety office.

# SECTION 2
# EMERGENCY EVACUATION TEAMS (EET) AND MEANS OF EGRESS

## 2.1 EMERGENCY EVACUATION TEAMS (EET)

### 2.1.1 Organization

All postal installations having 10,000 square feet or more must maintain an organized and trained EET on each work tour. EETs may be maintained in smaller facilities when warranted by the type of operations conducted and the availability of municipal fire departments. The number of members, scope of responsibility, physical characteristics of the building and specific needs will determine how the EET is organized into functional teams.

### 2.1.2 Objectives

The objectives of EETs are:

a. Respond quickly to a fire or other emergency in order to evaluate the situation and take appropriate action until the arrival of the local fire department or other emergency assistance.

b. Control the orderly evacuation of the building.

### 2.1.3 Incipient Stage Fires

Postal EETs are not allowed to fight fires beyond the incipient stage. An incipient stage fire is in its initial stage and can be controlled, contained, or extinguished by portable extinguishers, without the use of personal protective clothing or self-contained breathing apparatus (SCBA), and within the means and capability of the EET. The EET shall comply with the fire extinguisher training requirements set forth in 29 CFR 1910.157.

### 2.1.4 Duties of the EET

The duties of the EET may include but are not limited to:

a. Shutting down building HVAC systems

b. Stopping conveyor belts

c. Closing doors to rooms and dump hole covers and conveyor openings.

d. Directing the fire department to the location of the fire.

e. Evacuating injured and handicapped personnel.

f. Inspecting the fire site with the fire department to determine that the fire is completely extinguished and that there is no possibility of rekindling.

g. Moving vans and trucks from loading docks.

h. Shutting down all electrical power to the building or sections as directed by the municipal fire department.

**NOTE**

This activity requires the person taking the action to be knowledgeable on proper shutdown of a building's electrical system.

i. Maintaining perimeter security to prevent re-entry until officially instructed to permit it.

j. Assisting the fire department or police in maintaining crowd control.

k. Completing all procedures to account for all employees after emergency evaluation has been completed.

### 2.1.5 Membership

#### 2.1.5.1 General

Facility Emergency Management team personnel where applicable or building maintenance and security personnel should form the nucleus of the EET. Additional personnel may be assigned to ensure adequate coverage on all work tours. The EET is composed of a leader, an assistant leader, and team members.

##### 2.1.5.1.1 Installations without EETs (Less Than 10,000 Square Feet)

In installations that do not have EETs, the installation head is responsible for ensuring that supervisors or employees are assigned the following functions in case of fire or other emergency:

a. Notification of fire department, police, ambulance, or other emergency services.

b. Prompt evacuation of personnel including injured or handicapped employees.

c. Procedures to account for all employees after emergency evacuation has been completed.

d. Security of mail, monies, receipts, and accountable and valuable papers.

e. Use of fire extinguishers.

#### 2.1.5.1.2 Emergency Evacuation Team Leader

The installation head appoints the manager responsible for building maintenance or someone equally familiar with the building operations to be the EET leader. The EET leader is given the authority to take full charge in emergencies and is responsible for EET activities, including training. The EET leader sets up the team, maintains the roster of members and their training, develops plans of action to cope with anticipated fires (the EET Plan), and other emergencies at the installation. Further, the leader selects team members to cover all parts of the building on all work tours. The leader conducts critiques after each drill or emergency. The leader must establish a procedure to provide quarterly review of the program to ensure operational efficiency.

##### *2.1.5.1.2.1 Exposure*

At no time should EET members or alternates perform a task that exceeds their level of skill, ability, or training, or expose themselves or other employees to unnecessary dangers and risks, including hazardous materials emergencies.

##### *2.1.5.1.2.2 Special Hazards*

The EET leader must inform EET members and alternates about special hazards such as storage and use of flammable liquids and gases, toxic chemicals, radioactive sources, and water reactive substances to which they may be exposed during fire or other emergencies. The EET members also must be advised of any changes that occur in relation to the special hazards. The EET leader must develop and make available for inspection by EET members written procedures that describe the actions to be taken in situations involving the special hazards and must include these in the training and education program (your local hazard communication program).

#### 2.1.5.2 Assistant Emergency Evacuation Team Leader

The assistant EET leader serves as the leader at the fire or other emergency until the EET leader arrives or, in his absence, assumes command.

#### 2.1.5.3 Emergency Evacuation Team Member

EET members attend meetings, drills, and training sessions relative to fire control, prevention, and safety. They perform functions relative to employee evacuation, fire protection, fire safety, fire extinguishment, and other emergencies.

### 2.1.6 Physical Requirements

The EET leader must ensure that all members of the EET are physically capable of performing the task assigned to the team during training or actual emergencies. Employees with known heart disease, epilepsy, or chronic obstructive pulmonary diseases must not be permitted to participate in any EET activity unless they present a medical certificate of fitness from their personal physician stating that they are physically capable of performing such duties. Employees with physical disabilities are permitted to be EET members; however, their job assignments must be governed by their ability to perform certain tasks.

### 2.1.7 Training

All EET members are required to complete an initial basic level of training and annual refresher training. Such training and education must be provided to each member of the EET before performing any activity as a member of the EET. EET leaders and training instructors must be provided with training and education more comprehensive than that provided to the general EET membership.

### 2.1.8 Emergency Evacuation Team (EET) Plan Reviews

A review to determine that various objectives of a sound EET Plan are met should be conducted at least once a year in each office having an EET. It is recommended that the EET Plan be reviewed by the District Emergency Management Team manager (where applicable), maintenance manager, and the safety manager at least once each year. Other station and branch or associate office plans must be reviewed by the local safety office as part of the annual or semiannual safety inspections. Deficiencies must be corrected immediately. The EET Plan Check List will help in evaluating various EET plans (Exhibit 2-1).

**Exhibit 2-1. Emergency Evacuation Team Plan Check List**

| | | |
|---|---|---|
| 1. Are the trained EETs maintained on each work tour in facilities with more than 10,000 square feet? | YES | NO |
| 2. Is there a written organizational policy statement? | YES | NO |
| 3. Are there enough EET members assigned for each tour? Are all positions filled? | YES | NO |
| 4. Do all EET members understand their duties? | YES | NO |
| 5. Have all EET members been provided with hands-on training? | YES | NO |
| 6. Are annual refresher programs given to members? | YES | NO |
| 7. Are all EET members and employees instructed that they should not fight fires that go beyond the incipient stage? | YES | NO |
| 8. Have EET members been instructed on any special hazards? | YES | NO |
| 9. Has the local fire department been contacted for equipment coordination purposes? | YES | NO |
| 10. Is all fire control equipment in good working condition? | YES | NO |
| 11. Has all fire control equipment been tested or inspected as required? | YES | NO |
| 12. Do all employees in each facility know what they are to do in case of fire? | YES | NO |
| 13. Do all employees in each facility know how to properly notify the fire department? | YES | NO |
| 14. Do all employees know where to report after evacuating the building for employee head counts? | YES | NO |
| 15. Have all employees in each facility been given at least general training in the following: | | |
| a. Evacuation procedures? | YES | NO |
| b. Preferred and alternate means of egress? | YES | NO |
| c. Good housekeeping? | YES | NO |
| d. Fire prevention? | YES | NO |
| e. Smoking regulations? | YES | NO |
| f. Other relevant items for that specific office? | YES | NO |

## 2.2 MEANS OF EGRESS

### 2.2.1 General

This section establishes general requirements for the means of egress in postal installations. Actual requirements are determined by the occupancy classification of the building and whether the building is considered new construction or is an existing structure. For more specific requirements, refer to the current editions of the National Fire Protection Association (NFPA) Life Safety Code or to particular NFPA standards as appropriate (Exhibit 2-2).

**Exhibit 2-2. References and Standards**

**National Fire Protection Association Codes and Standards**

NFPA-101, Life Safety Code

NFPA-101A, Guide on Alternate Approaches to Life Safety

NFPA-101B, Code for Means of Egress for Buildings and Structures

**OSHA General Industry Standards**

29 CFR 1910.35, Compliance with Alternate Exit-Route Codes.

29 CFR 1910.36, Design and Construction Requirements for Exit Routes

29 CFR 1910.37, Maintenance, Safeguards, and Operational Features for Exit Routes

29 CFR 1910.157, Portable Fire Extinguishers

29 CFR 1910.165, Employee Alarm System

**US Postal Service Documents**

Employee and Labor Relations Manual, Chapter 8

**NOTE**

For questions concerning OSHA standards and/or National Fire Protection Association Codes, contact your servicing safety office.

NFPA publications are available from:

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269-7471

Or NFPA.org

### 2.2.2 Definition

A means of egress is a continuous and unobstructed way of exit travel from any point in a building to a public way. It consists of three separate and distinct parts: the way of exit access, the exit, and the exit discharge. A means of egress comprises the vertical and horizontal ways of travel and includes intervening room spaces, doorways, hallways, corridors, passageways, balconies, ramps, stairs, enclosures, lobbies, escalators, horizontal exits, courts, and yards.

The following are specific definitions:

a. Exit access is that portion of a means of egress that leads to an entrance to an exit (Figure 2-1).

b. Exit is that portion of a means of egress that is separated from all other spaces of the building, structure construction, or equipment to provide a protected way of travel to the exit discharge (Figure 2-1).

c. Exit discharge is that portion of a means of egress between the termination of an exit and a public way (Figure 2-1).

d. Public way: A street, alley or similar parcel of land that is:

   1) Open to the outside air,

   2) Dedicated to the public use,

   3) Has a clear width and height equal to or greater than 10 feet.

### 2.2.3 Width of Means of Egress

The minimum width of any way of exit access shall not be less than 36 inches in new construction and 28 inches in existing buildings.

*Exception - NFPA 101 7.3.4.1.1 Life Safety Code allows a minimum width of exit access of 18 inches if that access is formed by furniture and movable partitions, serves not more than six persons, does not exceed a height of 38 inches and the length of the exit access does not exceed 50 feet.*

### 2.2.4 Headroom

Means of egress must be designed and maintained so as to provide adequate headroom. In no case may the ceiling height be less than 7 feet 6 inches or any projections from the ceiling be less than 6 feet 8 inches from the floor.

*Exception - NFPA 101 7.1.5 Life Safety Code provides an exception to the headroom requirement for existing buildings, requiring a ceiling height of 7 feet.*

### 2.2.5 Doors

Every door and every principal entrance that serves as an exit must be designed and constructed so that the way of exit is obvious and direct. Any door in a means of egress must be side-hinged, swinging type. It shall swing in the direction of exit travel when the room is occupied by more than 50 persons or used for a high hazard occupancy. No exiting doors (a door on the path to or to the outside) may be less than 32 inches wide (clear width) nor may a single door in a doorway exceed 48 inches in width. The force required to fully open any door in the means of egress must not exceed:

1. 15 foot-pounds to release the latch
2. 30 foot-pounds to set the door in motion
3. 15 foot-pounds to open to minimum required width

*Exception – Exiting doors may be no less than 28 inches wide (clear width) in existing buildings.*

*In existing buildings, the force to open the door may not exceed 50 foot-pounds applied to the latch stile.*

### 2.2.6 Hardware for Doors in Means of Egress

When the building is occupied, exit doors must be arranged so they can be readily opened from the side where egress is made. A latch or other fastening device on a door must be provided with a panic bar, knob, handle, or other simple type of releasing device, so that even in darkness the method of operation is obvious. For special locking arrangements, refer to NFPA-101, Life Safety Code.

### 2.2.7 Arrangement of Means of Egress

Exits must be located and exit access must be arranged so that exits are accessible at all times. Means of egress must be arranged so that there are no dead end pockets, hallways, corridors, passageways, or courts whose depth exceeds 50 feet. Access to an exit must not be through storerooms, rest rooms, closets, or similar spaces or rooms that may be locked except where the exit is required to serve only the room subject to locking.

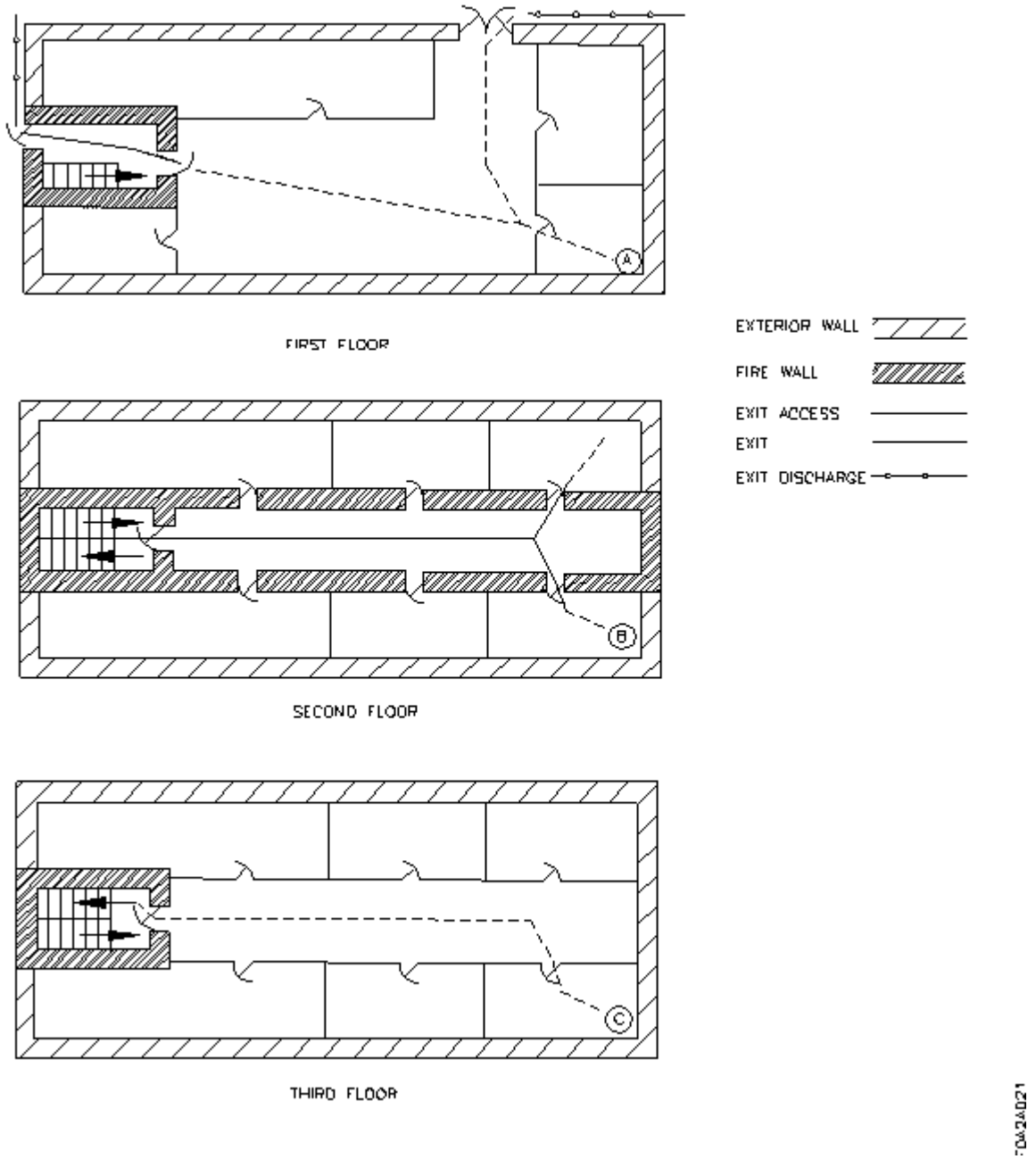


**Figure 2-1. Exits**

### 2.2.8 Travel Distances to Exits

The maximum allowable travel distance for office areas in new or existing facilities that are sprinklered (equipped with a sprinkler system) is 300 feet, and 200 feet in unsprinklered facilities. The maximum allowable travel distance to an exit in a plant workroom, which is classified by NFPA as a Special Purpose Industrial Occupancy must not exceed 400 feet in a sprinklered building and 300 feet in unsprinklered buildings. For exceptions to these travel distances, or for particular problems, refer to NFPA-101, Life Safety Code.

### 2.2.9 Illumination of Means of Egress

The means of egress must be illuminated in every postal owned or leased building. This includes all designated stairs, aisles, corridors, ramps, and passageways leading to an exit. Illumination must be continuous and provided along the natural path of egress, including angles and intersections of corridors and passageways, stairs, landings of stairways, and designated exit doors (Figure 2-2). Illumination must be at least 1 foot-candle measured at the floor. The failure of any single lighting unit, such as a burnt out bulb, must not leave any area in darkness.

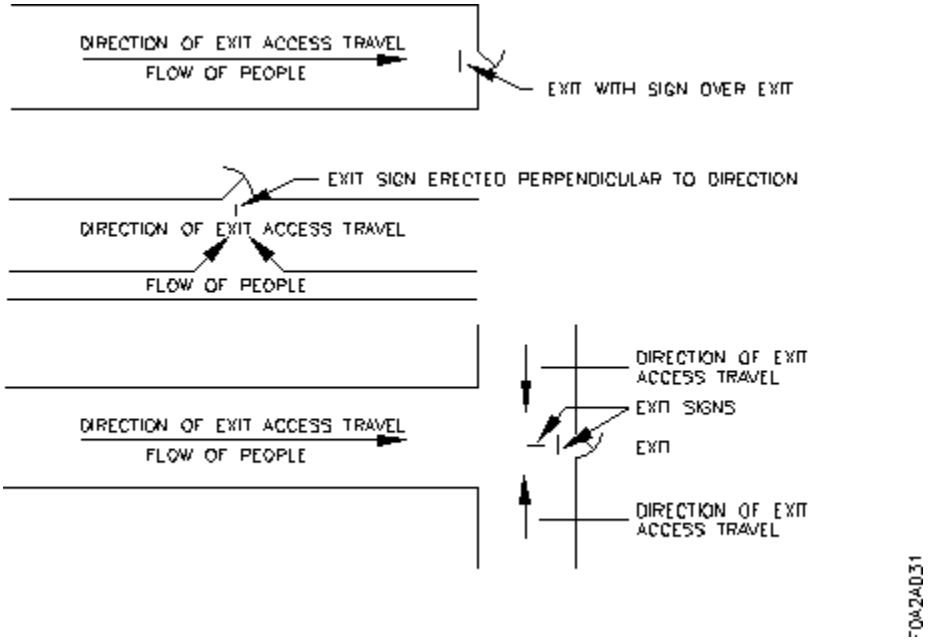


**Figure 2-2. Illumination**

## 2.3 EXIT MARKING

### 2.3.1 Types of Signs

- Exit signs – Indicate actual location of exit (Figure 2-3)
- Directional Exit signs – indicate direction to exit
- No Exit signs – required when a door, stair, or passage does not lead to an exit or exit access, and could be mistaken as such.

### 2.3.2 Sign Specifications

Exit and directional exit signs shall be of such size, color, and design to be readily visible and contrast with background. Letters shall be 6 inches high, except for existing signs, which may be at least 4 inches in height. All letters except “I” shall be 2 inches wide with a 3/4 inch stroke width and have 3/8 inch spacing between letters.

The NO EXIT sign shall have the word **NO** in letters 2 inches high with a stroke width of 3/8 inch, and the word **EXIT** in letters 1 inch high, with the word **EXIT** below the word **NO**.

### 2.3.3 Sign Placement

#### 2.3.3.1 Exit Signs

Exit signs shall be mounted at a vertical distance of not more than 80 inches above the top edge of the egress opening, nor vertically not more than the required width of the egress opening, as measured from the edge of the egress opening.

Directional signs with a directional indicator showing the direction of travel shall be placed in every location where the direction of travel to reach the nearest exit is not apparent.

#### 2.3.3.2 Exits

Exits must be marked with an approved sign visible from any direction (Figure 2-3). Sign placement must be such that no point in the exit access is more than 100 feet from the nearest visible sign. The lettering may be either red or green with a white matte background, depending on local building codes, but must contrast with decorations, interior finish, or other signs. Every exit sign must be suitably illuminated by a reliable and continuous light source. No sign, curtain, drapery, poster, etc., that obscures or confuses the location of the exit, may be placed at or near any designated exit.

#### 2.3.3.3 Multi Storied Buildings

Stairs serving five or more stories shall be provided with special signage within the enclosure at each floor landing. The signage shall indicate the floor level, the terminus of the top and bottom of the stair enclosure, and the identification of the stair enclosure. The signage also shall state the floor level of, and the direction to, exit discharge. The signage shall be located inside the enclosure approximately 1,525 mm (60 in.) above the floor landing in a position that is visible when the door is in the open or closed position. Signs must be mounted approximately 5 feet above the floor landing.

Wherever an enclosed stair requires travel in an upward direction to reach the level of exit discharge, special signs with directional indicators showing the direction to the level of exit discharge shall be provided at each floor level landing from which upward direction of travel is required. Such signage shall be visible when the door is in the open or closed position.

Stairs that continue more than one-half story beyond the level of exit discharge shall be interrupted at the level of exit discharge by partitions, doors, or other effective means.


**Figure 2-3. Exit Marking**

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# SECTION 3
# FLAMMABLE AND COMBUSTIBLE MATERIALS

## 3.1 GENERAL

### 3.1.1 Scope

This chapter identifies and consolidates the applicable parts of 29 CFR 1910 (OSHA) and NFPA standards pertaining to the storage, handling, and dispensing of flammable and combustible materials. These operations include service stations and spray application operations. Detailed information on any of the topics in Chapter 3 can be obtained by referring to the documents cited in Exhibit 3-2.

Please note that this chapter does not apply to ordinary combustible materials, such as wood and paper.

### 3.1.2 Purpose

This chapter provides USPS personnel with basic information as to storage, handling and dispensing of flammable and combustible materials in all postal owned or leased facilities.

### 3.1.3 Mailability and Transportation

This chapter does not apply to the transportation of and mailing requirements for flammable and combustible materials. These requirements are contained in the following documents:

U.S. Department of Transportation Regulations (49 CFR)

NFPA-385, Recommended Regulatory Standard for Tank Vehicles for Flammable and Combustible Liquids

USPS HBK EL-812, Hazardous Materials

Publication 52, Acceptance of Hazardous, Restricted, or Perishable Matter

DMM, Domestic Mail Manual.

### 3.1.4 Safety Data Sheets

Safety Data Sheets (SDS) (OSHA Form 174 or equivalent pursuant to 29 CFR 1910.1200) serve as a reference for clarifying hazardous materials status and assist in determining necessary fire protection measures. SDSs are supplied by the manufacturer or supplier, and should be provided with the Bill of Materials when the material is delivered to the facility. If an SDS is not provided, the manufacturer of the product should be contacted and an SDS requested. The SDS should be kept on file and accessible for reference.

## 3.2 DEFINITIONS

### 3.2.1 Aerosol

An aerosol is material that is dispensed from its container as a mist, spray, or foam by a propellant under pressure.

### 3.2.2 Approved (Labeled or Listed)

Device, or item that is sanctioned, endorsed, accredited, certified, listed, labeled, or accepted by a duly constituted and nationally recognized authority or agency as satisfactory for use in a specified manner (such as Underwriters Laboratories and Factory Mutual approved).

### 3.2.3 Boiling Point

The point at which liquid at a pressure of 14.7 pounds per square inch absolute (PSIA) boils. The boiling point of the liquid is the temperature of the liquid at which its vapor pressure equals the atmospheric pressure. The lower the boiling point of the material the greater the vapor pressure and, consequently, the greater the fire potential.

### 3.2.4 Closed Container

A container that is sealed by means of a lid or other device that neither liquid nor vapor will escape from at ordinary temperatures.

### 3.2.5 Container

Any vessel of 60 U.S. gallons or less capacity used for transporting or storing liquids. The definition of container shall apply to any can, barrel, or drum.

### 3.2.6 Fire Area

An area of a building separated from the remainder of the building by construction having a fire resistance of at least 1 hour, the communicating openings of which are properly protected by an assembly having a fire resistance rating of at least 1 hour. Such construction must completely separate the area from all other building portions with fire resistance construction from the floor through the roof completely enclosing the area.

### 3.2.7 Flammable Aerosol

Flammable aerosol is defined as any aerosol that is labeled “Flammable.”

### 3.2.8 Flash Point

“Flashpoint” means the minimum liquid temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.

### 3.2.9 Lot

An outside storage area consisting of two or more piles.

### 3.2.10 Lower Flammable Limit (LFL)

The LFL is a numerical value that indicates the percent of vapor to air composition at which point the mixture will burn if an ignition source is present. When the percent composition is lower than the LFL the mixture will not burn.

### 3.2.11 Pile

Single continuous arrangement of containers bound by an aisle.

### 3.2.12 Portable Tank

A closed container having a liquid capacity over 60 U.S. gallons, that is not intended for fixed installation.

### 3.2.13 Safety Can

An approved container, of not more than 5 U.S. gallons capacity, that has a spring closing lid and a spout cover and is designed to safely relieve internal pressure when subjected to fire.

### 3.2.14 Service Station

An automotive service station shall mean that portion of property where flammable or combustible liquids used as motor fuels are stored and dispensed from fixed equipment into the fuel tanks of motor vehicles. This shall include any facilities available for the service of tires, batteries, and accessories, or used for the performance of minor automotive maintenance work. Major automotive repairs, painting, body and fender work are excluded.

### 3.2.15 Upper Flammable Limit (UFL)

The UFL is a numerical value that indicates the percent of vapor to air composition at which point the mixture will burn if an ignition source is present. When the percent composition is greater than the UFL the mixture will not burn.

### 3.2.16 Ventilation

Ventilation is the circulation of air to alleviate the potential for fire. It is considered adequate if it is sufficient to prevent accumulation of significant quantities of vapor-air mixtures in concentration over one-fourth of the Lower Flammable Limit (LFL).

## 3.3 COMBUSTIBLE AND FLAMMABLE LIQUID

### 3.3.1 Combustible Liquid

A combustible liquid is defined as any liquid having a flashpoint at or above 100 ˚F (Table 3-1).

**Table 3-1. Classifications of Combustible Liquids**

| CLASS | FLASH POINT (˚F) | EXAMPLES |
|---|---|---|
| II | 100 - 140 | Kerosene, Acetic Acid, Formaldehyde |
| IIIA | 140 - 200 | Fuel Oil, Phenol, Benzene |
| IIIB | above 200 | Paraffin, Tar, Lube Oil |

### 3.3.2 Flammable Liquid

A flammable liquid is defined as any liquid having a flashpoint below 100 ˚F (Table 3-2).

**Table 3-2. Classifications of Flammable Liquids**

| CLASS | FLASH POINT (˚F) | BOILING POINT (˚F) | EXAMPLES |
|---|---|---|---|
| IA | below 73 | below 100 | Butane, Ethyl Ether, Ethane |
| IB | below 73 | at or above 100 | Acetone, Ethanol, Gasoline |
| IC | at or above 73 | below 100 | Xylene, Formic Acid, Turpentine |

### 3.3.3 Aerosols Labeled as Flammable

All aerosols identified by the manufacturer as flammable are considered Class IA liquids.

## 3.4 STORAGE

### 3.4.1 Inside Storage

This section applies to the storage of flammable and combustible materials in postal owned or leased facilities. Items that would be expected to be stored indoors include solvents and lubricating oils.

#### 3.4.1.1 Containers

Flammable and combustible materials must be stored in approved tanks, safety cans or other containers.

The quantity for each type of container (glass, safety can, and tank) is shown in Table 3-3.

**Table 3-3. Maximum Container Volume**

| Container Type | Flammable Liquids | | | Combustible Liquids | |
|---|---|---|---|---|---|
| | Class IA | Class IB | Class IC | Class II | Class III |
| Glass or Approved Plastic | 1 pint | 1 quart | 1 gallon | 1 gallon | 1 gallon |
| Metal (not DOT drums) | 1 gallon | 5 gallon | 5 gallon | 5 gallon | 5 gallon |
| Safety Can | 2 gallon | 5 gallon | 5 gallon | 5 gallon | 5 gallon |
| Metal Drums (to DOT Specifications) | 60 gallon | 60 gallon | 60 gallon | 60 gallon | 60 gallon |
| Approved Portable Tanks | 660 gallon | 660 gallon | 660 gallon | 660 gallon | 660 gallon |

If the material is used outside of an indoor storage room, or a storage cabinet in a building, or in any one fire area of a building, the quantity must not exceed the following:

1. 25 gallons of Class IA materials in approved containers.
2. 120 gallons of Class IB, IC, II, or III liquids in containers.
3. 660 gallons of Class IB, IC, II, or III liquids in a single portable tank.

### 3.4.1.2 Labeling

Each container should be labeled as per the contents and other pertinent information. Every container that is in the original manufacturer's container should contain a written label as described in Labeling Examples (Figure 3-1).

Each container that is not manufacturer supplied should be labeled with the contents name and the appropriate NFPA information. The NFPA labeling information is usually contained in the "diamond." A description of this label is included in Labeling Examples (Figure 3-1).

If a written or NFPA label is not on the container, an HMIS label is acceptable. A description of this label is included in Labeling Examples (Figure 3-1).

| |
|---|
| **The "Written" Label**<br>This label provides comprehensive information on the chemical in the container in a written format. It includes hazard warnings, precautions for use, and appropriate first aid measures. |
| **The "NFPA" Label**<br>The National Fire Protection Association (NFPA) label is a diamond, divided into four smaller diamonds with each one representing a color-coded hazard category. Red represents flammability. Blue is health. Yellow is reactivity. White is used for special hazards. These hazards are rated on a scale of zero to four, with zero being a non-hazard and four being extremely hazardous. |
| **The "HMIS" Label**<br>The Hazardous Material Identification System (HMIS) label is similar to the NFPA label, but uses colored bands instead of diamonds to represent the type of hazard being described. The type of hazard is printed within each band with the zero to four NFPA rating for physical hazards. There is a band for personal protective equipment which uses alphabetic codes ranging from A to K. Each code is geared to specific personal protective gear. |

**Figure 3-1. Labeling Examples**

Great care must be taken to ensure that containers are labeled as indicated above. Individuals transferring materials into containers must ensure that the appropriate container is used for each material being transferred.

The contamination of a material with the residual contents of an otherwise empty container will affect the Flammable or Combustible classification of the container's contents.

### 3.4.1.3 Transfer Area

Areas where flammable and combustible materials are transferred from one tank or container to another must be separated from other operations or processes in the building by either adequate distance or by construction having adequate fire resistance.

Containment or safe drainage must be provided to control spills. Do not drain materials into the sewer system.

Adequate natural or mechanical ventilation must be provided.

### 3.4.1.4 Storage Cabinets

#### 3.4.1.4.1 Location

Multiple cabinets may be located in the same fire area. Cabinets can be grouped in groups of three. Groups of cabinets must be separated by at least 100 feet (Figure 3-2 and Figure 3-3 for details).

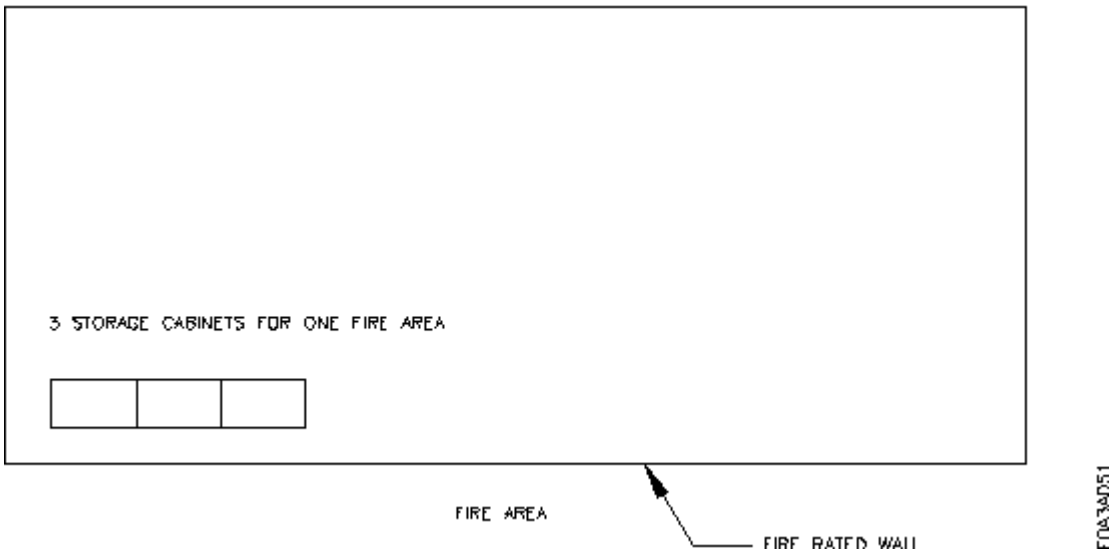


**Figure 3-2. Storage Cabinet Locations**

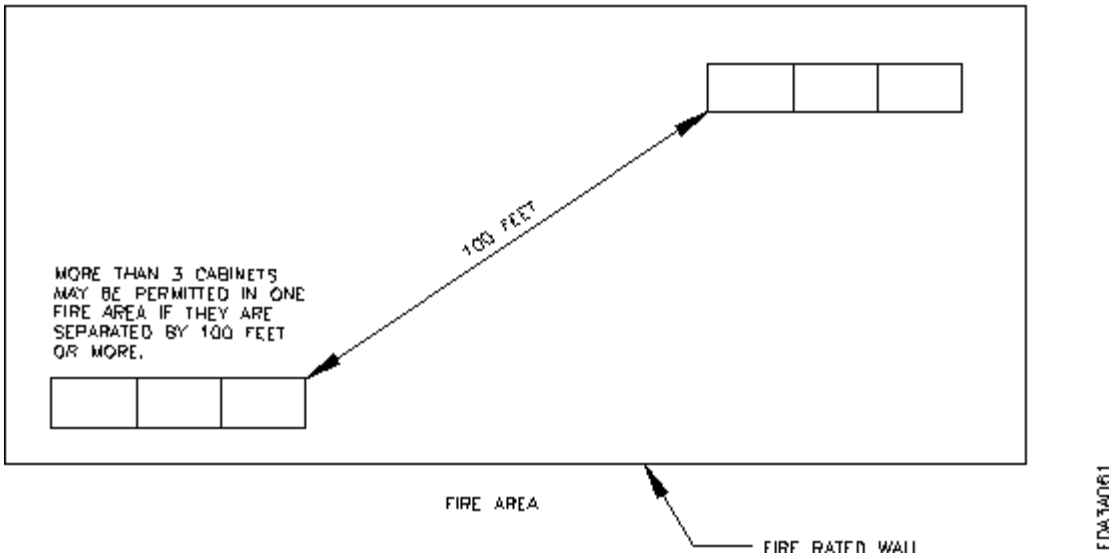


**Figure 3-3. Storage Cabinet Locations**

### 3.4.1.4.2 Storage Cabinet Specifications

Only approved storage cabinets may be used in USPS occupied facilities (Figure 3-4).

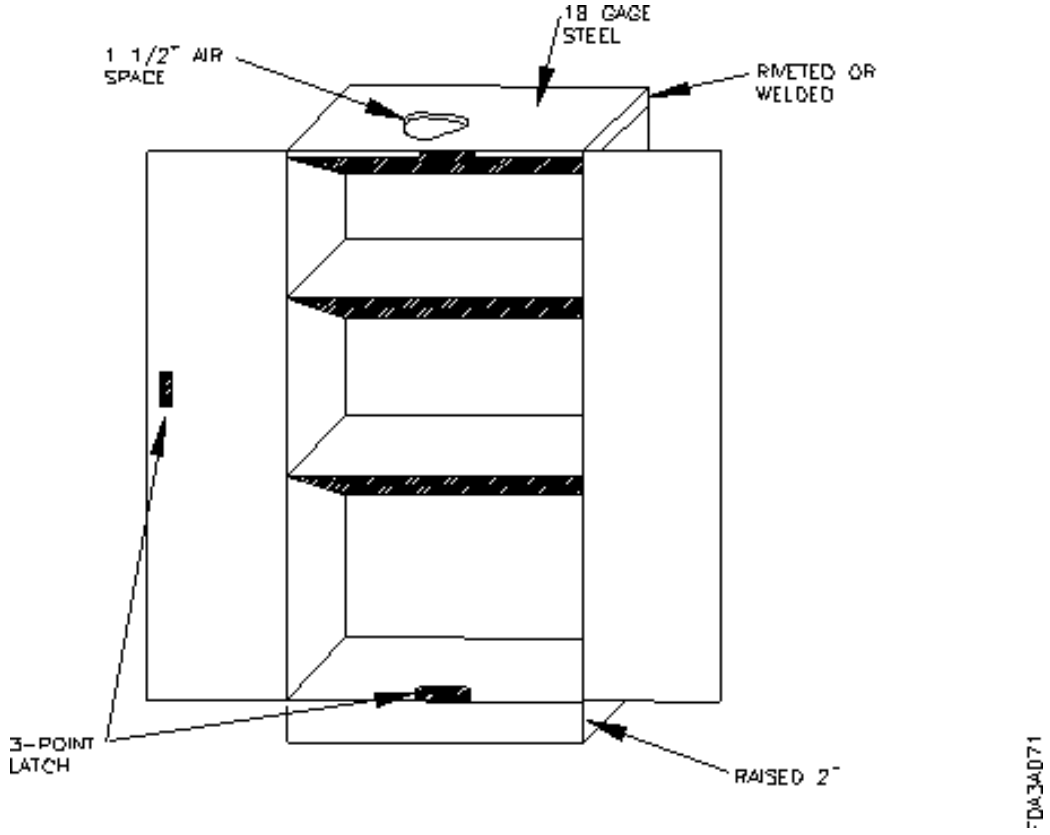


**Figure 3-4. Design and Construction of Storage Cabinets**

#### 3.4.1.4.3 Construction

Storage cabinets shall be designed and constructed to limit the internal temperature to not more than 325 ˚F when subjected to a 10-minute fire test using the standard time-temperature curve as set forth in NFPA 251-1999, Standard Methods of Tests of Fire Endurance of Building Construction Materials. All joints and seams shall remain tight and the door shall remain securely closed during the fire test.

#### 3.4.1.4.4 Labeling

Storage cabinets for flammable and combustible materials must be labeled in conspicuous lettering, “FLAMMABLE - KEEP FIRE AWAY.”

#### 3.4.1.4.5 Venting

Some building codes mandate that the interior of the storage cabinet be vented to minimize the accumulation of vapors. Accordingly, some manufacturers provide cabinets with knockouts that allow venting.

Venting a storage cabinet may defeat the purpose of protecting any container of flammable or combustible liquid from involvement in a standard room fire for up to 10 minutes, the estimated time for a particular room or area to become involved in a fire.

When storage cabinets are provided with vents by manufacturers, the vents must be covered and sealed unless local codes mandate otherwise.

#### 3.4.1.4.6 Fire Control

At least one portable fire extinguisher having a rating of not less than 12-B units shall be located outside of, but not more than 10 feet from, the door opening into any room used for storage.

At least one portable fire extinguisher having a rating of not less than 12-B units must be located not less than 10 feet, nor more than 25 feet, from any Category 1, 2, or 3 flammable liquid storage area located outside of a storage room but inside a building.

The numerical rating for a class B fire extinguisher refers to the number of cubic feet that the fire extinguisher will be able to extinguish.

### 3.4.2 Storage Rooms

#### 3.4.2.1 General Requirements

Inside storage rooms shall be constructed to meet the required fire-resistive rating for their use. Such construction shall comply with the test specifications set forth in ASTM E119 and UL 263.

The room shall be liquid-tight where the walls join the floor.

An inside storage room is not permitted to be located on floors below ground level or basements.

In every inside storage room, there shall be maintained one clear aisle at least 3 feet

wide. Containers over 30 gallons capacity shall not be stacked one upon the other. Dispensing shall be by approved pump or self-closing faucet only.

Where other portions of the building or other properties are exposed, windows shall be protected as set forth in NFPA No. 80-2019, Standard for Fire Doors and Windows, which is incorporated by reference as specified in 29 CFR 1910.6(q)(18), for Class E or F openings.

Exhibit 3-1 contains a checklist for Flammable Liquids Storage Room Safety.

**Exhibit 3-1. Check List for Flammable Liquid Storage Room Safety**

(Refer to NFPA 30 Flammable and Combustible Liquids Code for details)

1. Maximum capacity of storage room not exceeded.
2. Aisles clear (main aisle at least 36 inches wide).
3. Ventilation OK (if forced air, check blowers, motors, switches).
4. Explosion proof switches intact, guards on all fixtures inside of storage rooms.
5. Fusible links intact on self-closing doors.
6. Self-closing doors operational, still intact.
7. Grounding integrity to earth ground.
8. Provision for bonding to containers being filled.
9. Approved faucet or pump on each drum being drained.
10. Approved drip can under each drum faucet (check liquid level in can, empty as necessary).
11. Approved filler/vent on each drum being filled.
12. Sprinkler system operational.
13. Floor clean of drips, spills, trash.
14. Required cautionary signs in place and legible.
15. Type I safety cans for receiving liquids from drums available and in use throughout the plant.
16. Flexible hose attachments for easy pouring from Type I containers.
17. Fill vent and funnel to provide venting of waste disposal drums and safe, convenient emptying of small containers into the drums.

### 3.4.2.2 Doors

Approved self-closing fire doors are required for all openings in interior walls to adjacent rooms or areas of inside storage rooms.

The fire doors that are used in this application must support the fire rating of the interior walls. If an interior wall has a fire resistance rating of 2 hours or less, it must be provided with approved fire doors having a 2 hour fire resistance rating.

### 3.4.2.3 Spill Containment

Non-combustible sills or ramps at least 4 inches in height, or otherwise designed to prevent the flow of liquids to adjoining areas, must be provided in inside storage rooms. An open grated trench across the width of the opening inside the room is a viable alternative, if it drains to a safe location (Figure 3-5 for more details on drain trenches). If an open grated trench is used, it must be located on the inside of the room. The trench must also be designed to drain the collected spilled liquids to a safe location. This method may be desirable if there is an extensive need to transfer large quantities of flammable liquids in and out of the room with hand trucks.

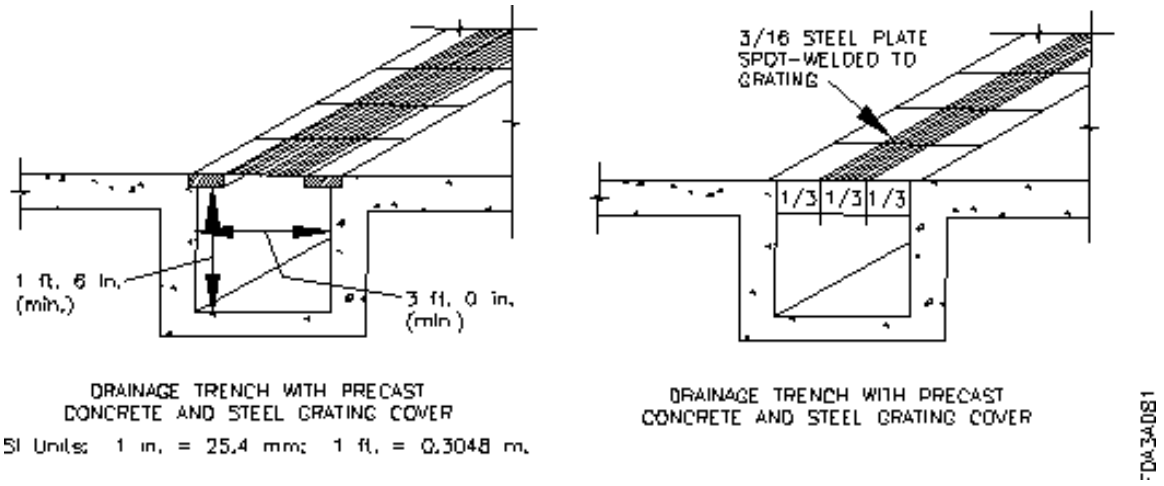


**Figure 3-5. Sill or Ramps**

### 3.4.2.4 Wood

Wood of at least 1 inch nominal thickness may be used for shelving, racks, dunnage, scuff boards, floor overlay, and similar applications. Although wood increases the potential for fire in the room, it does minimize the chances of mechanical damage and sparks.

### 3.4.2.5 Electrical

Electrical wiring and equipment located in inside storage rooms used for Class I liquids shall be approved under OSHA 1910 subpart S for Class I, Division 2 Hazardous Locations.

The wiring and equipment located in inside storage room used for Class II and Class III liquids shall be approved for general use under OSHA 1910 subpart S.

### 3.4.2.6 Quantities

The capacities for an inside storage room shall comply with Table 3-4.

**Table 3-4. Storage Inside**

| Fire[1] Protection Provided | Fire Resistance | Maximum Size | Total Allowable Quantities (Gals./Sq. Ft. /Floor Area) |
|---|---|---|---|
| Yes | 2 Hours | 500 Sq. Ft. | 10 |
| No | 2 Hours | 500 Sq. Ft. | 5 |
| Yes | 1 Hour | 150 Sq. Ft. | 4 |
| No | 1 Hour | 150 Sq. Ft. | 2 |

[1]Fire protection system shall be a sprinkler, water spray, carbon dioxide or other system. Further information on fire protection systems can be found in SECTION 8 and SECTION 9.

### 3.4.2.7 Ventilation

Every inside storage room must have either a gravity or a mechanical exhaust ventilation system. Such a system must provide for a complete change of air within the room at least 6 times per hour.

If a mechanical system is used to exhaust air, it must be controlled by a switch located outside of the room and near the door. The ventilating equipment and any lighting fixtures must be operated by the same switch. A pilot light shall be installed adjacent to the switch if Class I flammable liquids are dispensed within the room.

If gravity ventilation is provided, the fresh air intake, as well as the exhaust outlet from the room, must be on the exterior of the building in which the room is located.

### 3.4.2.8 Control of Ignition Sources

Precautions must be taken to prevent the ignition of flammable vapors. Sources of ignition include, but are not limited to, open flames, smoking, cutting and welding, hot surfaces, frictional heat, static, electrical and mechanical sparks, spontaneous ignition, radiated heat, and chemical reactions.

### 3.4.2.9 Fire Control

At least one multipurpose dry chemical portable fire extinguisher with a rating of not less than 20-B must be located outside of, and not more than 10 feet from, each door opening that leads into an inside storage room.

## 3.4.3 Outdoor Storage

If it is necessary for any postal owned or leased facilities to maintain large quantities of flammable or combustible materials, outdoor storage is preferable.

### 3.4.3.1 Quantities

When two or more classes of materials are stored outside in a single pile, the maximum amount in that pile must be no greater than the maximum gallon allowance for the most hazardous material in the pile (Table 3-5).

**Table 3-5. Outdoor Container and Portable Tank Storage**

| Class | Container Storage-Maximum Per Pile | Portable Tank Storage Maximum Per Pile | Distance Between Piles | Distance To Property Line That Can Be Built Upon | Distance To Street, Alley, Or Public Way |
|---|---|---|---|---|---|
| | Gallons | Gallons | Feet | Feet | Feet |
| IA | 1,100 | 1,100 | 5 | 50 | 10 |
| IB | 2,200 | 2,200 | 5 | 50 | 10 |
| IC | 4,400 | 4,400 | 5 | 50 | 10 |
| II | 8,800 | 8,800 | 5 | 25 | 5 |
| III | 22,000 | 22,000 | 5 | 10 | 5 |

### 3.4.3.2 Maximum Storage

A maximum of 1,100 gallons of flammable and combustible materials may be located adjacent to a building.

Where the quantity stored exceeds 1,100 gallons, a minimum distance of 10 feet between buildings and the nearest container of flammable or combustible liquid shall be maintained.

#### 3.4.3.3 Spill Containment

The outside storage area must be graded in a manner to divert spills away from buildings and other exposures, or it must be surrounded by a curb at least 6 inches high. When curbs are used, provisions must be made for draining accumulations of ground water, rainwater, or liquid spills. Drains must end at a safe location and be accessible to operation in a fire.

#### 3.4.3.4 Security

The storage area must be protected to prevent against tampering or trespassers, and it must be kept free of weeds, debris, and accumulation of combustible materials.

#### 3.4.3.5 Fire Control

At least one multipurpose dry chemical portable fire extinguisher, having a rating of not less than 12-B units, must be located not more than 10 feet away from the storage area.

Open flames, smoking, and hot work are prohibited within 50 feet of the outside storage area, and appropriate signs must be installed.

## 3.5 HANDLING MATERIALS

### 3.5.1 Scope

The following general provisions apply to the handling and use of flammable and combustible materials in all postal owned and leased buildings.

### 3.5.2 Covered Containers

Class I and Class II materials must be kept in approved covered containers when not in use. Covered containers must be sealed by means of a lid or other device that prevents liquid or vapor from escaping at ordinary temperatures.

### 3.5.3 Spills and Leakage

If flammable and combustible materials are used or handled, means must be provided to properly absorb or contain spills or leaks, and to properly dispose of residual materials.

### 3.5.4 Dispensing

**NOTE**

Transferring by means of positive or negative (vacuum) pressure on the container or portable tanks shall be prohibited.

Precautions must be taken to prevent ignition of vapors during dispensing of flammable and combustible materials. Class I and Class II liquids must be drawn from, or transferred into, vessels, containers, or portable tanks only from the following:

a. Original shipping container with a capacity of five gallons or less.
b. Safety cans.
c. A closed piping system or from a portable tank or container by means of an approved and listed device drawing through an opening in the container or tank.
d. By gravity through a listed self-closing valve or self-closing faucet.

### 3.5.5 Drip Cans

A safety drip can, or pan capable of containing at least one gallon, should be positioned below each drum faucet to catch spills or drips. Drip cans must be approved, lidless, and have a perforated fire baffle over the opening. All drip cans and pans must be emptied at least daily. At least 50 pounds of absorbent material must be available in each storage area.

### 3.5.6 Vents

Approved and listed pressure/vacuum vents should be installed on all drums containing a self-closing valve or faucet.

### 3.5.7 Labeling

Any safety can or other container of flammable liquids having a flash point at or below 80° F must be painted red with clearly visible identification of the contents, conspicuously stenciled, or painted in yellow.

For more information on labeling, please refer to Paragraph 3.4.1.2.

### 3.5.8 Grounding and Bonding

Adequate precautions must be taken to prevent ignition of flammable vapors. Class I liquids must not be dispensed into containers unless the nozzle and container are electrically interconnected. If the metallic floor plate on which the container stands while filling is electrically connected to the fill stem, or if the fill stem is bonded to the container during filling operations by means of a bond wire, then the container is adequately grounded/bonded. Bonding wire should be 10 gauge and stranded, and clamps should be screw-type.

## 3.6 SERVICE STATIONS

### 3.6.1 General

The dispensing, storing and transferring of flammable and combustible materials is an inherent part of postal fleet operations. This section contains specific provisions for automotive service stations where fuel is pumped into postal vehicles. These are general provisions only. For detailed information, refer to NFPA and OSHA standards (Exhibit 3-2).

### 3.6.2 Storage

Flammable and combustible materials must be stored in approved closed containers, underground tanks, specially enclosed tanks, or above ground tanks. No Class I liquids may be stored within any service station building except in closed containers of an aggregate capacity not to exceed 60 gallons. However, only one container not exceeding 60 gallons capacity is permitted to be equipped with an approved pump.

Class II and Class III liquids may be stored and dispensed inside service station buildings from tanks of not more than 120 gallons capacity each.

### 3.6.3 Piping, Valves, and Fittings

Only approved and listed piping, valves, and fittings may be used. All piping shall be located and installed in such a manner as to protect it from physical damage.

### 3.6.4 Delivery System (Fuel Pump System)

Only approved and listed pumps may be used. Pumps installed above ground, outside of buildings, must be located not less than 10 feet from any adjoining property or buildings and at least 5 feet from any building opening.

All pumps must be anchored and protected against physical damage by mounting on concrete islands and barricades. The pump must be provided with a control device allowing the pump to operate only when the nozzle is removed from its bracket and the device is manually activated. This control device must also stop the pump when the nozzle has been returned to the bracket. The dispensing hose must not exceed 18 feet in length, and must have a listed automatic closing type nozzle. The automatic closing valve may be used in conjunction with a latch open device.

An approved impact valve, incorporating a fusible link, designed to close automatically in the event of severe impact or fire exposure shall be properly installed in the dispensing supply line at the base of each individual dispensing device.

### 3.6.5 Electrical

Electrical wiring and equipment located in service stations used for Class I liquids shall be approved under 29 CFR 1910.106(g)(5) and subpart S.

The wiring and equipment located in service stations used for Class II and Class III liquids, shall be approved for general use under 29 CFR 1910.307.

### 3.6.6 Vapor-Recovery System

Existing pumps may be modified for vapor recovery; or whenever a pump is replaced, a vapor-recovery system must be provided. All newly constructed automotive service stations on postal owned or leased installations must be provided with an approved and listed vapor-recovery system.

Hose nozzle valves used on vapor recovery systems must be listed for the purpose. Means shall be provided in the vapor return path from each dispensing outlet to prevent the discharge of vapors when the hose nozzle valve is in its normal non-dispensing position.

### 3.6.7 Emergency Power Shutoff

To shut off power in an emergency, clearly identified and easily accessible switch(es) or circuit breaker(s) must be provided at a remote location from dispensing pumps, within 100 feet but no less than 20 feet. A sign must be posted indicating where the shutoff switch is located. The temporary or permanent storage of materials and equipment must not block access to the shutoff switch. Attendants and pump operators must know the location of the emergency shutoff switch.

### 3.6.8 Control of Ignition Sources

Smoking, or open flame, within 25 feet of all areas used for fueling, storage, or dispensing Class I liquids is prohibited. Signs prohibiting smoking must be posted so as to be readily visible from various directions. The motors of all vehicles being fueled must be shut off.

### 3.6.9 Fire Control

Each service station must be provided with at least one approved fire extinguisher having a minimum classification of 6-B:C. Each extinguisher must be located within 75 feet of each pump, dispenser, fill pipe opening, storage, lubrication, or service room.

## 3.7 SPRAYING FLAMMABLE AND COMBUSTIBLE MATERIALS

### 3.7.1 General

This section refers to the spraying of flammable or combustible materials by compressed air, “airless”, “hydraulic atomization,” stem, electrostatic methods, or any other method in a continuous or intermittent process. This section covers only the minimum requirements to assure reasonable safety under normal conditions. For detailed information, please refer to the OSHA and NFPA standards cited in Exhibit 3-2. This section does not apply to outdoor spraying of buildings, tanks, or other structures.

### 3.7.2 Spraying Area

Any area in which dangerous quantities of flammable vapors or mists, or combustible residues, dust, or deposits are present due to the operation of spraying processes.

### 3.7.3 Design and Construction

Spray booths must be designed and constructed in accordance with applicable OSHA and NFPA standards. Spray booths must be substantially constructed of securely and rigidly supported steel, concrete, or masonry. Aluminum or other substantial, noncombustible materials may be used for intermittent or low volume spraying. Spray booths must be designed to sweep air currents towards the exhaust outlet. The interior surfaces of spray booths must be smooth and continuous without edges and must be designed to prevent pocketing of residues and to ease cleaning. Floor surfaces must be noncombustible material and easy to clean. If baffle plates are installed to promote an even airflow or to trap overspray, the plates must be of noncombustible material, readily removable, and easy to clean. Baffle plates must not be located in the exhaust ducts.

In conventional dry type spray booths, overspray dry filters, or filter rolls, if installed, shall conform to 29 CFR1910.107.

Each spray booth having a frontal area larger than 9 square feet shall have a metal deflector or curtain not less than 2-1/2 inches deep installed at the upper outer edge of the booth over the opening.

Each spray booth shall be separated from other operations by not less than 3 feet, or by such partition or wall as to reduce the danger from the spraying operation.

A clear space of not less than 3 feet on all sides shall be kept free from storage or combustible construction.

Spraying areas that are illuminated through glass panels or other transparent materials, placed over fixed lighting units, shall be used as a source of illumination. These panels shall effectively isolate the spraying area from the lighting unit, and shall be of a noncombustible material and break resistant. The panels shall be arranged such that normal accumulations of residue on the exposed surface of the panel will not be heated to a dangerous temperature by radiation or conduction from the source of illumination.

### 3.7.4 Cleaning

All portions of spray booths must be easy to clean. Spray booths shall be installed such that all portions are readily accessible for cleaning.

### 3.7.5 Sources of Ignition

All electrical equipment, open flame, and other sources of ignition must conform to the requirements found in applicable NFPA and OSHA standards.

There shall be no open flame or spark producing equipment in any spraying area nor within 20 feet of the spraying area, unless separated by a partition.

Space-heating appliances, steam pipes, or hot surfaces shall not be located in a spraying area.

Electrical wiring and equipment shall conform to the provisions of 29 CFR 1910.107 and 307 as referenced in Exhibit 3-2.

All metal parts of spray booths, exhaust ducts, and piping systems conveying flammable or combustible liquids or aerated solids shall be properly electrically grounded in an effective and permanent manner.

### 3.7.6 Fire Prevention

In buildings with automatic sprinkler systems, the automatic sprinkler system in rooms containing spray finishing operations shall conform to the requirements specified by 29 CFR 1910.107 and subpart L. In buildings without automatic sprinkler systems, where sprinklers are installed only to protect spraying areas, the installation shall conform to such standards as they are applicable. Sprinkler heads shall be located so as to provide water distribution throughout the entire booth.

Sprinklers protecting spraying areas must be cleaned and protected against overspray residue. Polyethylene or cellophane plastic bags having a thickness of 0.003 inches or thinner, or thin paper bags may be used to protect the sprinkler head. The bags must be replaced and heads cleaned frequently so that heavy deposits of residue do not accumulate.

Spraying must not be conducted in the vicinity of open flames or other sources of ignition.

### 3.7.7 Ventilation

Ventilation and exhaust systems shall be in accordance with NFPA-91, Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids.

All spraying operations in postal owned and leased buildings must be provided with mechanical ventilation adequate to remove flammable vapors, mist, or powders to a safe location, and to confine and control combustible residues.

Consult the OSHA standards (Exhibit 3-2) for additional ventilation requirements.

### 3.7.8 Special Precautions

#### 3.7.8.1 Spray Area

Spraying must not be conducted outside of predetermined spraying areas; however, operation of small portable spraying apparatus for spraying building interiors and similar uses is allowed.

#### 3.7.8.2 Containers

Containers should be kept tight at all times, unless they are being used to replenish the supply materials such as cans or other containers of paint, thinners, or other protective coatings.

### 3.7.8.3 Rags

Because of the danger of spontaneous ignition, oily or paint-laden rags or other combustible waste must be stored in closed metal waste cans and disposed of at the end of each day's operation.

### 3.7.8.4 Residue

Paint residue powder can cause spontaneous combustion. Therefore, the residue must be stored in closed metal cans, and all spraying areas must be kept as free as practical from the accumulation of deposits of combustible residues.

### 3.7.8.5 Tools

Only non-sparking tools may be used in the spraying area or for cleaning purposes.

### 3.7.8.6 Signs

“No Smoking” signs must be posted in all spraying areas. The signs must be in large letters on contrasting color background and shall be conspicuously posted at all spraying areas.

### 3.7.8.7 Cleaning Solvents

The use of solvents for cleaning operations shall be restricted to those having flashpoints not less than 100 ˚F.

When cleaning spray nozzles and auxiliary equipment, solvents having flashpoints not less than those normally used in spray operations may be used. Such cleaning shall be conducted inside spray booths and ventilation equipment operated during the cleaning.

### 3.7.8.8 Transition of Coating Materials

Spray booths shall not be alternately used for different types of coating materials, unless all deposits of the first used material are removed from the booth and exhaust ducts prior to spraying with the second used material.

### 3.7.8.9 Filters

Check and replace as necessary all filters.

**Exhibit 3-2. References and Standards**

**National Fire Protection Association (NFPA) Standards**

NFPA-30, Flammable and Combustible Liquids Code

NFPA-30A, Code for Motor Fuel Dispensing and Repair Garages

NFPA-33, Spray Application of Flammable and Combustible Materials

NFPA-80, Fire Doors and Windows

NFPA-251, Standard Methods of Tests of Fire Endurance of Building Construction and Materials

NFPA-HAZ, Fire Protection Guide to Hazardous Materials

NFPA-91, Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids

NFPA, Fire Protection Handbook

**OSHA General Industry Standard**

29 CFR 1910.94, Ventilation

29 CFR 1910.106, Flammable and Combustible Liquids

29 CFR 1910.107, Spray Finishing Using Flammable and Combustible Materials

**US Postal Service Documents**

HBK EL-812, Hazardous Materials and Spill Response

Publication 52, Acceptance of Hazardous, Restricted, and Perishable Matter

**NOTE**

For questions concerning OSHA standards, contact servicing safety office.

NFPA publications are available from:

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269-7471

Or NFPA.org

# SECTION 4
# PORTABLE FIRE EXTINGUISHERS

## 4.1 GENERAL

### 4.1.1 Scope

This chapter applies to the classification of fires and fire extinguishers, and to the proper selection, installation, inspection, maintenance and testing of the portable fire extinguishing equipment used in postal owned and leased facilities. These requirements are minimum. Portable fire extinguishers are intended for use by employees with a limited amount of training as a first-line defense against incipient fires. Portable extinguishers are needed in addition to automatic systems and fixed protection equipment.

### 4.1.2 Purpose

This chapter provides maintenance and safety personnel with sufficient information to select, purchase, install, and maintain portable fire extinguishers. For detailed information regarding portable extinguishers, consult NFPA standards (Exhibit 4-1).

## 4.2 THE COMBUSTION PROCESS

### 4.2.1 The Fire Triangle

The "fire triangle" is a three-sided figure that has been used to explain and describe fire combustion and extinguishment. The triangle (Figure 4-1) illustrates that oxygen, heat, and fuel, in proper proportions, create a fire and that if any one of the three elements is removed a fire cannot exist.

### 4.2.2 The Fire Tetrahedron

In recent years, many new chemicals and materials have been produced that burn and react in a manner that is not explained completely by the use of the fire triangle. There have been several theories to address this problem. The "fire tetrahedron" is the one most generally accepted (Figure 4-2). The tetrahedron is a transition from the plane geometric triangle to a four-sided solid geometric pyramid. One of the four sides serves as a base and represents the chemical chain reaction. The three standing sides of the pyramid represent heat, fuel, and oxygen. This theory has not preempted the fire triangle; it has simply added a fourth component or condition.

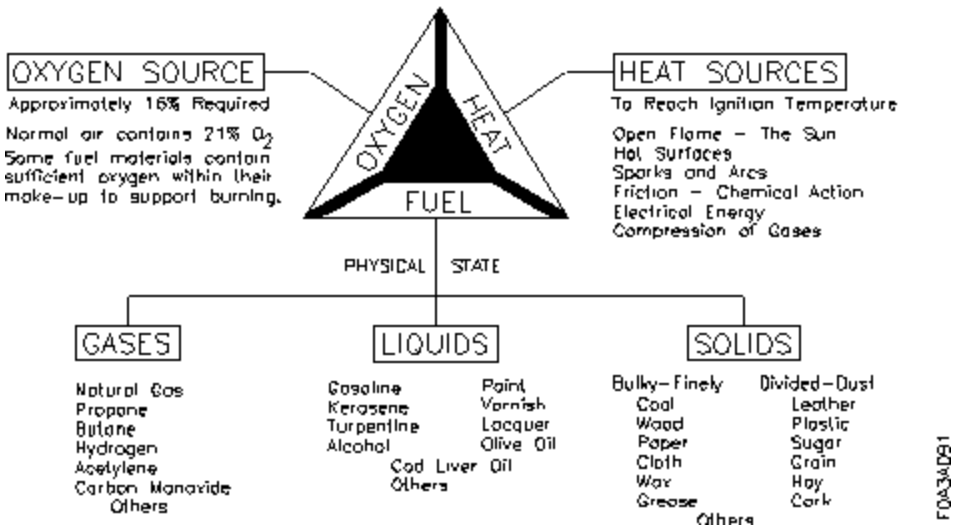


**Figure 4-1. Oxygen, Heat, and Fuel**

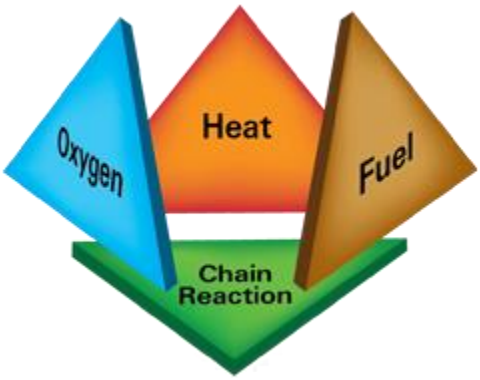


**Figure 4-2. Fire Tetrahedron**

## 4.3 CLASSES OF FIRES

### 4.3.1 General

Fire extinguishers are designed to extinguish fires involving various types of fuels. Fires are classified as A, B, C, or D or in combination.

### 4.3.2 Class A Fires

Class A fires are fires involving ordinary combustible materials (wood, paper, cloth, plastics, rubber). Class A fires are extinguished by the heat absorbing effects of water, certain dry chemicals which retard combustion, or other agents which interrupt the chain reaction of fire development. Class A fires normally undergo surface burning and leave glowing embers and ashes.

### 4.3.3 Class B Fires

Class B fires are fires in flammable or combustible liquids (oil, kerosene, gasoline), flammable gases (acetylene, propane), and similar materials (naphtha, paint, styrene), that are extinguished by excluding oxygen, inhibiting the release of combustible vapors, or by interrupting the combustion chain reaction.

### 4.3.4 Class C Fires

Class C fires are fires in live electrical equipment and exposed metal surfaces where an electrical shock hazard exists (blower motors, control panels, conveyor motors, batteries, transformers, and generators). Extinguishers for Class A or B fires may be used if the electrical equipment has been safely de-energized. Water type extinguishers must not be used on energized electrical equipment fires.

### 4.3.5 Class D Fires

Class D fires are fires in certain combustible metals (magnesium, titanium, zirconium, etc.) that are extinguished by a heat-absorbing agent that does not react with the burning metal. Generally, inert materials such as sand or dry powder are used to smother such fires.

### 4.3.6 Class K Fires

Class K fires are fires in cooking appliances that involve combustible cooking media (vegetable or animal oils and fats).

## 4.4 EXTINGUISHER LABELING, NUMBERING, AND TAGGING

### 4.4.1 Conventional Labeling

Conventional labels for portable fire extinguishers are as follows:

1. Class A extinguishers are identified by a green triangle containing the letter A (Figure 4-3).
2. Class B extinguishers are identified by a red square containing the letter B (Figure 4-3).
3. Class C extinguishers are identified by a blue circle containing the letter C (Figure 4-3).
4. Class D extinguishers are identified by a yellow star containing the letter D (Figure 4-3).
5. Class K Extinguishers are identified for locations which cook using vegetable or animal oils and fats
6. Multipurpose extinguishers are designed for use on more than one class of fire. They are identified by multiple symbols placed in a horizontal sequence on the front of the extinguisher shell immediately visible to the user (Figure 4-3).

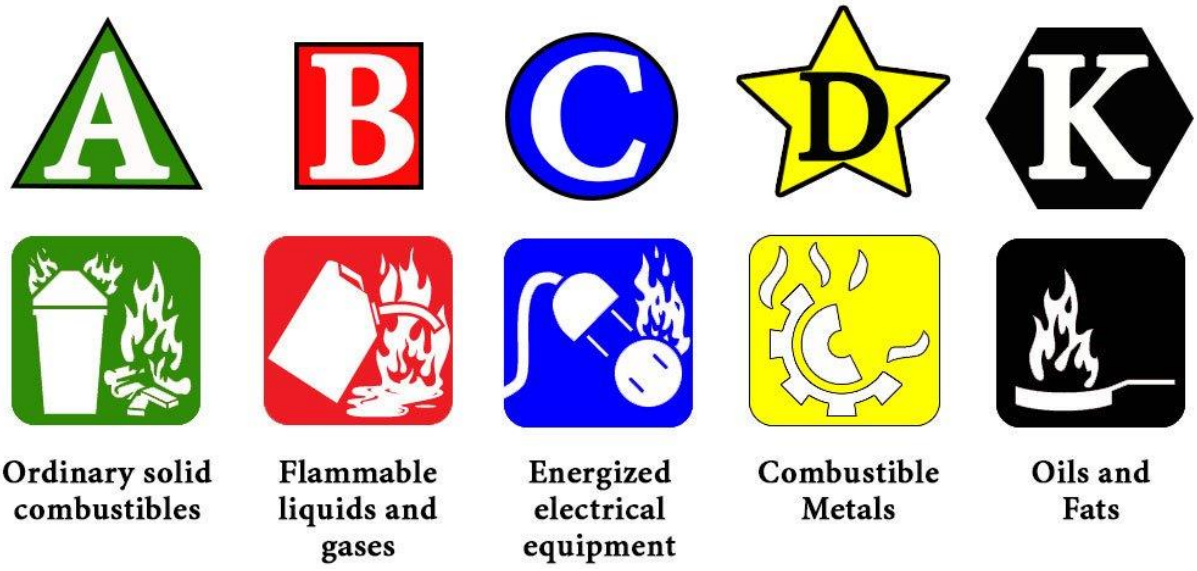


**Figure 4-3. Conventional Labeling**

### 4.4.2 Pictographic Labeling

The pictograph system is the most recent labeling system. It combines pictographs of both uses and non-uses on a single label. The new pictographs are designed so that their proper use may be determined at a glance. When an application is prohibited, the background is black and the slash is bright red. Otherwise, the background is light blue. Row "a" indicates an extinguisher for Class A, B, and C fires. Row "b" indicates an extinguisher for Class B and C fires. Row "c" indicates an extinguisher for Class A and B fires. Row "d" indicates an extinguisher for Class A fires. Conversion to this method is recommended (Figure 4-4).


**Figure 4-4. Pictographic Labeling**

### 4.4.3 Numbering

Location numbers must be applied to all extinguishers and the red background where the extinguisher is mounted to ensure accurate service and adequate inventory records. In multi-floor structures, the extinguisher number may be prefixed by the floor designation.

### 4.4.4 Tagging

Form 4705, Fire Inspection Tag, must be fixed to each portable extinguisher and have all information required on each tag completed. Use the reverse side of the tag for recording monthly inspections (Figure 4-5).

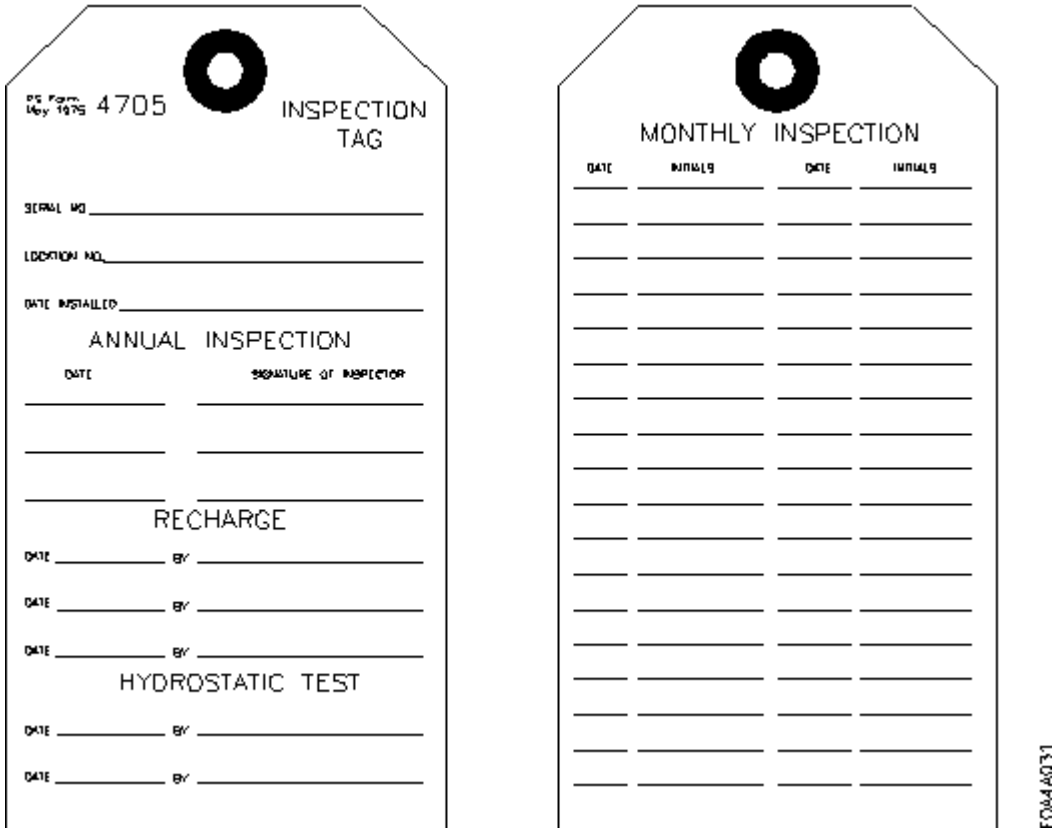


**Figure 4-5. Fire Inspection Tag**

## 4.5 MOUNTING EXTINGUISHERS

Extinguishers must be available when needed and employees must not be subjected to injury when obtaining an extinguisher. The locations of extinguishers must be immediately visible from several different directions. Access to extinguishers must be maintained at all times. Floor areas below the extinguisher and their approaches must be kept free of materials, and red lines must be applied to the floor.

Fire extinguishers having a gross weight not exceeding 40 pounds must be installed so that the top of the fire extinguisher is not more than 5 feet above the floor. Fire extinguishers having a gross weight greater than 40 pounds must be installed so that the top of the fire extinguisher is not more than 3 feet above the floor. The clearance between the bottom of the fire extinguisher and the floor must be at least 4 inches.

Portable fire extinguishers must be installed securely on the hanger, or in the bracket supplied by the extinguisher manufacturer, or in a bracket approved for such purpose, or placed in cabinets or wall recesses. If the possibility of damage to an extinguisher exists from rolling equipment, hampers, trucks, etc., suitable guards must be provided.

### 4.5.1 Wall Mounted

A solid red rectangle must be applied to the wall behind the extinguisher, extending at least six inches beyond each side of the extinguisher. In USPS workrooms, if the extinguisher is not readily visible from several directions, an additional rectangle at least 12 inches wider than the extinguisher must be painted on the wall above the extinguisher at least 12 feet from the floor. Use additional directional signs where necessary.

### 4.5.2 Column Mounted

In USPS workrooms, the location of column-mounted extinguishers is indicated by a solid red band extending six inches above and below the extinguisher, encircling the column. If the location of the extinguisher cannot be immediately determined, or is not readily visible from several directions, a red band at least 6 inches wide must be applied to the column at least 12 feet from the floor, encircling the column. Use additional directional signs where necessary.

## 4.6 SELECTION AND DISTRIBUTION OF PORTABLE EXTINGUISHERS

### 4.6.1 Selection

Due to the classification of potential workroom or office area hazards, the type of extinguisher to use in a given situation must be determined by the character of the fires anticipated, the surrounding construction, ambient temperatures, and other hazards. ABC multipurpose dry-chemical extinguishers should be used for general-purpose areas. ABC dry-chemical extinguishers must be a minimum of 10 pounds in size. Where Class B and C fires are anticipated, ABC dry-chemical extinguishers are recommended.

### 4.6.2 Distribution

It is the policy of the postal service to distribute portable fire extinguishers, regardless of size or class, so that the maximum travel distance to any extinguisher does not exceed 50 feet. This includes elevated work platforms, conveyor walkways, and catwalks.

Portable fire extinguishers are used most effectively when they are readily available in sufficient numbers and with adequate extinguishing capacity. If fire extinguishers are located along normal exit paths employees are more inclined to use them.

Placement of fire extinguishers is best accomplished by surveying the area to be protected. Selected locations should have the following characteristics:

1. Provide uniform distribution
2. Provide easy accessibility
3. Be relatively free from blocking by storage and equipment, or both
4. Be near normal paths of travel
5. Be near entrance and exit doors

6. Be free from the potential of physical damage
7. Be readily visible
8. Be installed on a floor-by-floor basis

## 4.7 OBSOLETE EXTINGUISHERS

All soldered or riveted shell, self-generating soda acid, self-generating foam, and gas cartridge water type portable extinguishers operated by inverting the extinguisher to rupture the cartridge or to initiate an uncontrollable pressure generating chemical reaction to expel the agent are prohibited for use in any postal owned or leased building and MUST BE REMOVED FROM SERVICE (Figure 4-6).

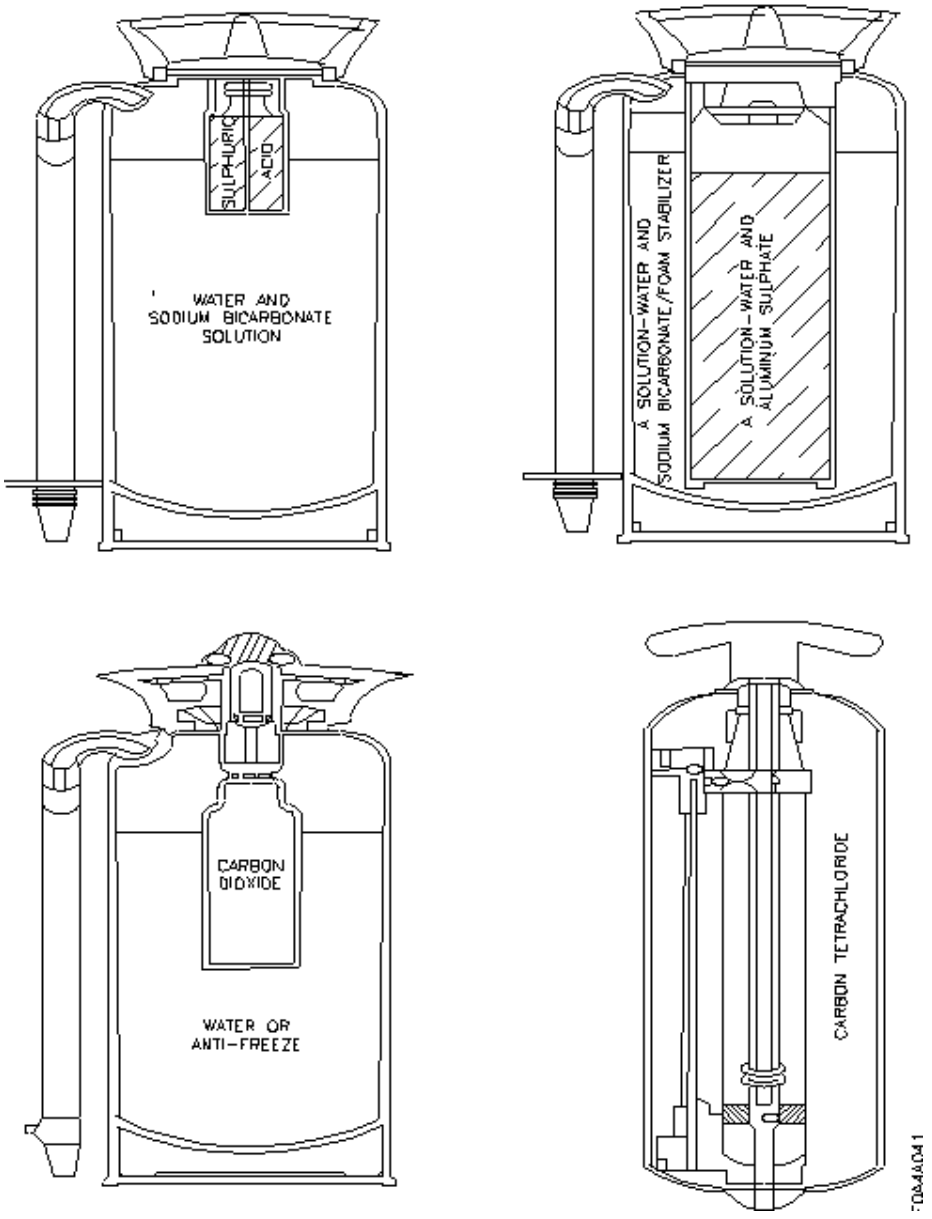


**Figure 4-6. Obsolete Extinguishers**

## 4.8 INSPECTION, MAINTENANCE, AND TESTING PORTABLE EXTINGUISHERS

### 4.8.1 Inspection

#### 4.8.1.1 Monthly Inspection

The monthly inspection of portable extinguishers is a visual check to ensure the extinguisher is available and will operate. All portable extinguishers must be visually inspected monthly at approximately 30-day intervals. Form 4705 must be signed by the inspector upon completion. At the minimum, monthly inspections ensure the following:

1. The proper extinguisher is in its designated place and correctly mounted. Appropriate signs are provided.
2. Access to, or visibility of, the extinguisher is not obstructed from several directions.
3. Operating instructions are on the extinguisher nameplate, are legible, and face outward.
4. Seals, tags, or tamper indicators are not missing or broken.
5. Gauges and dials indicate the extinguisher is fully charged. Extinguishers without gauges and dials must be inspected according to the manufacturer's specifications.
6. There is no physical damage, corrosion, leakage, dents, or cracked or clogged nozzles.

When an inspection reveals a deficiency in any of the conditions listed above the deficiency must be immediately corrected or the extinguisher replaced. However, repairs, parts replacements, or hydrostatic tests will not be performed by USPS personnel. Rather, they will be performed by the manufacturer or their representatives using certified personnel.

### 4.8.2 Maintenance

Fire extinguisher maintenance covers a variety of tasks including annual maintenance, recharging, 6-year maintenance, and hydrostatic testing. The procedure for performing these different levels of maintenance varies considerably. While minimal knowledge is necessary to perform a monthly inspection, all levels of maintenance require a person to be trained with access to tools and parts necessary to perform associated tasks.

The purpose of a maintenance program is to ensure extinguishers will:

- operate properly if needed
- not present a hazard to any employee who may need to operate the extinguisher
- not present a hazard to employees in the vicinity of an extinguisher

Fire extinguishers shall be subjected to maintenance at intervals of not more than 1 year, at the time of hydrostatic test, or when there is a need specifically indicated by a monthly inspection.

### 4.8.2.1 Annual Maintenance

When internal (invasive) maintenance is required, it must be performed by trained and certified persons who have the proper equipment and the manufacturer's service manuals. Trained and certified postal employees will not perform corrective actions during annual maintenance. Corrective actions involve specialized activities which must be performed by the manufacturer or their representatives using certified personnel to perform fire extinguisher servicing. Any replacement parts needed should be obtained from the manufacturer or their representative and confirmed as original equipment manufacturer (OEM) part.

Maintenance procedures shall include a thorough examination of the basic elements of a fire extinguisher including:

1. Mechanical parts
2. Extinguishing agent of cartridge- or cylinder-operated dry chemical, stored-pressure, and loaded stream extinguishers
3. Expelling means

Internal examination during annual maintenance is not required for non-rechargeable fire extinguishers, carbon dioxide fire extinguishers, or stored-pressure fire extinguishers, except for stored-pressure extinguishers containing a loaded stream agent or when it coincides with the five or six year internal examination.

Stored-pressure extinguishers containing a loaded stream agent must be disassembled on an annual basis and subjected to complete maintenance. This maintenance requirement is a specialized activity and must be performance by sources qualified to perform fire extinguisher servicing.

At the time of the maintenance, the tamper seal of rechargeable fire extinguishers shall be removed by operating the pull pin or locking device. After the applicable maintenance procedures are completed, a new tamper seal shall be installed.

All removable extinguisher boots, foot rings, and attachments shall be removed to accommodate thorough annual examinations. Removable extinguisher boots and foot rings are those that are not glued or welded on by the extinguisher manufacturer.

Table 4-1 (NFPA 10, Annex I Tables I.1(a) and (b)) provides a generic list of mechanical parts common to most fire extinguishers that should be checked during annual maintenance. The specific checks that must be performed on a fire extinguisher should be obtained for the manufacturer's manuals.

Fire extinguishers removed from service for maintenance shall be replaced by a fire extinguisher of at least equal rating.

### 4.8.2.2 Six-Year Maintenance

Every 6 years, those stored-pressure fire extinguishers that require a 12-year hydrostatic test must be emptied and subjected to the applicable maintenance procedures. Refer to manufacturer's manuals for specific procedures. Six-Year maintenance requirements are a specialized activity and must be performed by sources qualified to perform fire extinguisher servicing. USPS personnel will not perform internal (invasive) maintenance.

When the applicable maintenance procedures are performed during periodic recharging or hydrostatic testing, the 6-year requirement shall begin from that date.

Fire extinguishers that pass the applicable 6-year requirement must have the maintenance information recorded on a suitable label that is affixed to the shell. The label must include the following information:

1. Month and year the maintenance was performed
2. Name or initials of the person performing the maintenance and name of the agency performing the maintenance

### 4.8.2.3 Recharging Requirements

All rechargeable-type fire extinguishers must be recharged after any use or when identified as necessary during monthly inspections or annual maintenance. Each fire extinguisher must be labeled or tagged indicating the month and year recharging was performed and identifying the person performing the recharge. A "Verification of Service" collar must also be attached to the extinguisher.

Recharging must be performed by trained and certified persons having available the appropriate servicing manual(s), the proper types of tools, recharge materials, lubricants, and manufacturer's recommended replacement parts or parts specifically listed for use in the fire extinguisher. The recommendations of the manufacturer must be followed when recharging the extinguisher. USPS personnel will not recharge portable fire extinguishers.

Fire extinguisher recharging is a specialized activity and must be performed by sources qualified to perform fire extinguisher servicing.

Fire extinguishers removed from service for recharging must be replaced by a fire extinguisher of at least equal rating.

### 4.8.2.4 Verification of Service

A fire extinguisher that has undergone maintenance which included an internal examination, or that has been recharged, requires a “Verification of Service” collar located around the neck of the container. The collar provides convenient visual proof that the extinguisher was disassembled and that maintenance was performed. The collar shall include the month and year that maintenance or recharging was performed. To be valid, the date on the collar should always be the same or more recent than the date on the hydrostatic test label. The date is indicated by a perforation such as is done by a hand punch. Figure 4-7 shows a collar which depicts the method of dating.

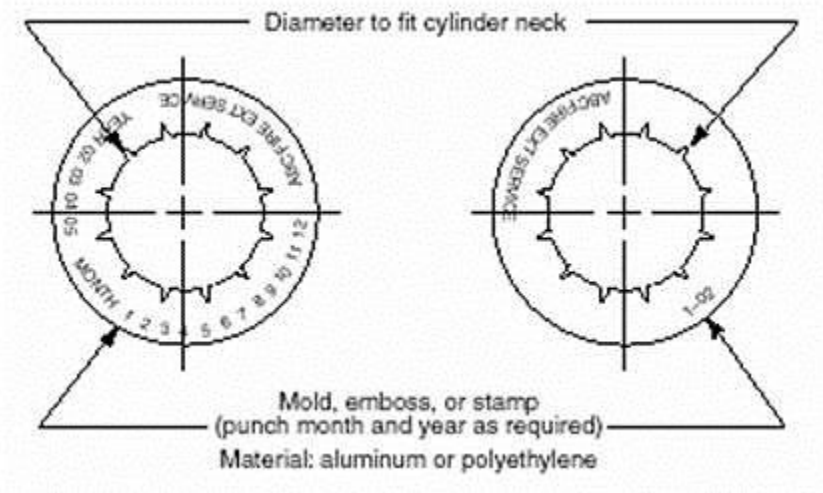


**Figure 4-7. “Verification of Service” Collar**

The collar must be a single circular piece of uninterrupted material forming a hole of a size that will not permit the collar assembly to move over the neck of the container unless the valve is completely removed. The collar must be installed so that it does not interfere with the operation of the fire extinguisher.

### 4.8.2.5 Hydrostatic Testing

Hydrostatic testing is required for fire extinguishers and includes an internal and external visual examination of the cylinder. Hydrostatic testing must be performed by individuals trained in pressure testing procedures and safeguards who have suitable testing equipment, facilities, and appropriate servicing manual(s) available. Hydrostatic testing is a specialized activity and must be performed by sources qualified to perform fire extinguisher servicing. All portable fire extinguishers must be hydrostatically tested at the intervals listed in Table 4-2 (NFPA 10, Hydrostatic Testing 8.3.1)

Non-rechargeable fire extinguishers do not need hydrostatic testing; they must be removed from service at a maximum interval of 12 years from the date of manufacture.

If, at any time, a fire extinguisher shows evidence of dents, mechanical injury, or corrosion to the extent as to indicate weakness, it shall be condemned or hydrostatically retested.

**Table 4-1. Maintenance Checks**

| | ITEM | | CORRECTIVE ACTION | WHO |
|---|---|---|---|---|
| | **Shell** | | | |
| 1. | Hydrostatic test date or date of manufacture | 1. | Retest, if needed | Manufacturer or representatives |
| 2. | Corrosion | 2. | Conduct hydrostatic test and refinish, or discard | Manufacturer or representatives |
| 3. | Mechanical damage (denting or abrasion) | 3. | Conduct hydrostatic test and refinish, or discard | Manufacturer or representatives |
| 4. | Paint condition | 4. | Refinish | Manufacturer or representatives |
| 5. | Presence of repairs (welding, soldering, brazing, etc.) | 5. | Discard or consult manufacturer | USPS |
| 6. | Damaged threads (corroded, cross threaded, or worn) | 6. | Discard or consult manufacturer | USPS |
| 7. | Broken hanger attachment, carrying handle lug | 7. | Discard or consult manufacturer | USPS |
| 8. | Sealing surface damage (nicks or corrosion) | 8. | Clean, repair, and leak test, or discard | Manufacturer or representatives |
| | | | | |
| | **Nameplate** | | | |
| 1. | Illegible wording | 1. | Clean or replace | Manufacturer or representatives |
| 2. | Corrosion or loose plate | 2. | Inspect shell under plate (see shell check points) and reattach plate | Manufacturer or representatives |
| | | | | |
| | **Nozzle or Horn** | | | |
| 1. | Deformed, damaged, or cracked | 1. | Replace | Manufacturer or representatives |
| 2. | Blocked openings | 2. | Clean | USPS |
| 3. | Damaged threads (corroded, cross threaded, or worn) | 3. | Replace | Manufacturer or representatives |
| 4. | Aged (brittle) | 4. | Replace | Manufacturer or representatives |

| | ITEM | | CORRECTIVE ACTION | WHO |
|---|---|---|---|---|
| | **Hose Assembly** | | | |
| 1. | Damaged (cut, cracked, or worn) | 1. | Replace | Manufacturer or representatives |
| 2. | Damaged couplings or swivel joint (cracked or corroded) | 2. | Replace | Manufacturer or representatives |
| 3. | Damaged threads (corroded, cross threaded, or worn) | 3. | Replace | Manufacturer or representatives |
| 4. | Inner tube cut at couplings | 4. | Repair or replace | Manufacturer or representatives |
| 5. | Electrically nonconductive between couplings ($CO_2$ hose only) | 5. | Replace | Manufacturer or representatives |
| 6. | Hose obstruction | 6. | Remove obstruction or replace | Manufacturer or representatives |
| | | | | |
| | **Valve Locking Device** | | | |
| 1. | Damaged (bent, corroded, or binding) | 1. | Repair and lubricate, or replace | Manufacturer or representatives |
| 2. | Missing | 2. | Replace | Manufacturer or representatives |
| | | | | |
| | **Gauge or Pressure-Indicating Device** | | | |
| 1. | Immovable, jammed, or missing pointer (pressure test) | 1. | Depressurize and replace gauge | Manufacturer or representatives |
| 2. | Missing, deformed, or broken crystal | 2. | Depressurize and replace gauge | Manufacturer or representatives |
| 3. | Illegible or faded dial | 3. | Depressurize and replace gauge | Manufacturer or representatives |
| 4. | Corrosion | 4. | Depressurize and check calibration, clean and refinish, or replace gauge | Manufacturer or representatives |
| 5. | Dented case or crystal retainer | 5. | Depressurize and check calibration, or replace gauge | Manufacturer or representatives |

| | ITEM | | CORRECTIVE ACTION | WHO |
|---|---|---|---|---|
| 6. | Immovable or corroded pressure-indicating stem (non-gauge type) | 6. | Replace head assembly, depressurize, and replace shell or complete extinguisher | Manufacturer or representatives |
| | | | | |
| | **Shell or Cylinder Valve** | | | |
| 1. | Corroded, damaged or jammed lever, handle, spring, stem, or fastener joint | 1. | Depressurize, check freedom of movement, and repair or replace | Manufacturer or representatives |
| 2. | Damaged outlet threads (corroded, cross threaded, or worn) | 2. | Depressurize and replace | Manufacturer or representatives |
| | | | | |
| | **Nozzle Shutoff Valve** | | | |
| 1. | Corroded, damaged, jammed or binding lever, spring, stem, or fastener joint | 1. | Repair and lubricate, or replace | Manufacturer or representatives |
| 2. | Plugged, deformed, or corroded nozzle tip or discharge passage | 2. | Clean or replace | Manufacturer or representatives |
| | | | | |
| | **Puncture Mechanism** | | | |
| 1. | Damaged, jammed, or binding puncture lever, stem, or fastener joint | 1. | Replace | Manufacturer or representatives |
| 2. | Dull or damaged cutting or puncture pin | 2. | Replace | Manufacturer or representatives |
| 3. | Damaged threads (corroded, cross threaded, or worn) | 3. | Replace | Manufacturer or representatives |
| | | | | |
| | **Gas Cartridge** | | | |
| 1. | Corrosion | 1. | Replace cartridge | Manufacturer or representatives |
| 2. | Damaged seal disc (injured, cut, or corroded) | 2. | Replace cartridge | Manufacturer or representatives |
| 3. | Damaged threads (corroded, cross threaded, or worn) | 3. | Replace cartridge | Manufacturer or representatives |

| | ITEM | | CORRECTIVE ACTION | WHO |
|---|---|---|---|---|
| 4. | Illegible weight markings | 4. | Replace cartridge | Manufacturer or representatives |
| | | | | |
| | **Gas Cylinders** | | | |
| 1. | Hydrostatic test date or date of manufacture | 1. | Retest if needed | Manufacturer or representatives |
| 2. | Corrosion | 2. | Conduct hydrostatic test and refinish, or discard | Manufacturer or representatives |
| 3. | Paint condition | 3. | Refinish | Manufacturer or representatives |
| 4. | Presence of repairs (welding, soldering, brazing, etc.) | 4. | Discard or consult manufacturer | USPS |
| 5. | Damaged threads (corroded, cross threaded, or worn) | 5. | Discard or consult manufacturer | USPS |
| | | | | |
| | **Wheel Cap or Fill Cap** | | | |
| 1. | Corroded, cracked, or broken | 1. | Replace | Manufacturer or representatives |
| 2. | Damaged threads (corroded, cross threaded, or worn) | 2. | Replace | Manufacturer or representatives |
| 3. | Sealing surface damage (nicked, deformed, or corroded) | 3. | Clean, repair, and leak test, or replace | Manufacturer or representatives |
| 4. | Blocked vent hole or slot | 4. | Clean | Manufacturer or representatives |
| | | | | |
| | **Non-rechargeable Shell** | | | |
| 1. | Corrosion | 1. | Discard shell | USPS |
| 2. | Damaged seal disc (injured, cut, or corroded) | 2. | Discard shell | USPS |
| 3. | Damaged threads (corroded, cross threaded, or worn) | 3. | Discard shell | USPS |
| 4. | Illegible weight markings | 4. | Discard shell | USPS |
| | | | | |
| | **Carriage and Wheels** | | | |

| | ITEM | | CORRECTIVE ACTION | WHO |
|---|---|---|---|---|
| 1. | Corroded, bent, or broken carriage | 1. | Repair or replace | Manufacturer or representatives |
| 2. | Damaged wheel (buckled or broken spoke, bent rim or axle, loose tire, low pressure, jammed bearing) | 2. | Clean, repair, and lubricate, or replace | Manufacturer or representatives |
| | | | | |
| | **Carrying Handle** | | | |
| 1. | Broken handle lug | 1. | Discard shell or valve, or consult manufacturer | Manufacturer or representatives |
| 2. | Broken handle | 2. | Replace | Manufacturer or representatives |
| 3. | Corroded, jammed, or worn fastener joint | 3. | Clean or replace | Manufacturer or representatives |
| | | | | |
| | **Seals or Tamper Indicator** | | | |
| 1. | Broken or missing | 1. | Check under agent and expelling means [Table I.1(b)] for specific action | Manufacturer or representatives |
| | | | | |
| | **Hand Pump** | | | |
| 1. | Corroded, jammed, or damaged pump | 1. | Repair and lubricate, or replace | Manufacturer or representatives |
| 2. | Improper adjustment of packing nut | 2. | Adjust | Manufacturer or representatives |
| | | | | |
| | **Pressurizing Valve** | | | |
| 1. | Leaking seals | 1. | Depressurize and replace valve or core | Manufacturer or representatives |
| | | | | |
| | **Gasket “O” Ring and Seals** | | | |
| 1. | Damaged (cut, cracked, or worn) | 1. | Replace and lubricate | Manufacturer or representatives |
| 2. | Missing | 2. | Replace and lubricate | Manufacturer or representatives |

| | ITEM | | CORRECTIVE ACTION | WHO |
|---|---|---|---|---|
| 3. | Aged or weathered (compression set, brittle, cracked) | 3. | Replace and lubricate | Manufacturer or representatives |
| | | | | |
| | **Brackets** | | | |
| 1. | Corroded, worn, or bent | 1. | Repair and refinish, or replace | USPS |
| 2. | Loose or binding fit | 2. | Adjust fit or replace | USPS |
| 3. | Worn, loose, corroded, or missing screw or bolt | 3. | Tighten or replace | USPS |
| 4. | Worn bumper, webbing, or grommet | 4. | Replace | USPS |
| | | | | |
| | **Gas Tube and Siphon** | | | |
| 1. | Corroded, dented, cracked, or broken | 1. | Replace | Manufacturer or representatives |
| 2. | Blocked tube or openings in tube | 2. | Clean or replace | Manufacturer or representatives |
| | | | | |
| | **Safety Relief Device** | | | |
| 1. | Corroded or damaged | 1. | Depressurize and replace or consult manufacturer | Manufacturer or representatives |
| 2. | Broken, operated, or plugged | 2. | Depressurize and replace or repair | Manufacturer or representatives |
| | | | | |
| | **Pressure Regulators** | | | |
| 1. | External condition | | | |
| | (a) Damage | | (a) Replace regulator | Manufacturer or representatives |
| | (b) Corrosion | | (b) Clean regulator or replace | Manufacturer or representatives |
| 2. | Pressure relief (corroded, plugged, dented, leaking, broken, or missing) | 2. | Disconnect regulator from pressure source, replace pressure relief | Manufacturer or representatives |
| 3. | Protective bonnet relief hole (tape missing or seal wire broken or missing) | 3. | Check regulator in accordance with manufacturer's regulator test procedures | Manufacturer or representatives |

| | ITEM | | CORRECTIVE ACTION | WHO |
|---|---|---|---|---|
| 4. | Adjusting screw (lock pin missing) | 4. | Check regulator in accordance with manufacturer's regulator test procedures | Manufacturer or representatives |
| 5. | Gauges | . | | |
| | (a) Immovable, jammed, or missing pointer | | (a) Disconnect regulator from pressure source, replace gauge | Manufacturer or representatives |
| | (b) Missing or broken crystal | | (b) Replace crystal | Manufacturer or representatives |
| | (c) Illegible or faded dial | | (c) Replace gauge | Manufacturer or representatives |
| | (d) Corrosion | | (d) Check calibration, clean and refinish, or replace gauge | Manufacturer or representatives |
| | (e) Dented case or crystal retainer | | (e) Check calibration or replace gauge | Manufacturer or representatives |
| 6. | Regulator hose | | | |
| | (a) Cut, cracked, abraded, or deformed exterior | | (a) Conduct hydrostatic test or replace hose | Manufacturer or representatives |
| | (b) Corroded or cracked coupling | | (b) Replace hose | Manufacturer or representatives |
| | (c) Corroded, cross threaded, or worn coupling threads | | (c) Replace hose | Manufacturer or representatives |

**Table 4-2. Hydrostatic Testing**

| EXTINGUISHER TYPE | TEST INTERVAL (years) |
|---|---|
| Soda Acid | Remove from service |
| Cartridge operated water and/or antifreeze | Remove from service |
| Stored pressure water and/or antifreeze | Remove from service |
| Wetting agent | Remove from service |
| Foam | Remove from service |
| Loaded Stream | 5 |
| Dry chemical with stainless steel shells or soldered brass shells | 5 |
| Carbon dioxide | 5 |
| Dry chemical, stored pressure, with mild steel shells, brazed brass shells, or aluminum shells, | 12 * |
| Dry chemical, cartridge operated, with mild steel shells, | 12 * |
| Bromotrifluoromethane - Halon 1301 | 12 * |
| Bromochlorodifluoromethane - Halon 1211 | 12 * |
| Dry powder, cartridge operated, with mild steel shells, | 12 * |

* see Section 4.8.2.2 for 6-year testing requirements

**NOTE**

Except for stainless steel and steel used for compressed gas cylinders, all other steel shells are defined as “mild steel” shells.

### 4.8.3 Contracted Maintenance Services

Fire extinguisher maintenance, particularly hydrostatic testing, is a specialized activity. Services for hydrostatic testing, recharging, or other specialized maintenance on portable extinguishers is procured by the Senior Postal Official (SPO) under local purchase authority in all buildings which are postal owned or leased.

### 4.8.4 Replacement of Extinguishers

A cost comparison between the costs of hydrostatic testing and the purchase cost to replace the extinguisher must be performed. If the total cost of testing exceeds 60 percent of the acquisition cost of a replacement extinguisher, the old extinguisher should be discarded and a new extinguisher procured. Serviceable extinguishers designated for disposal due to costs may be used for training purposes.

## Exhibit 4-1. References and Standards

**National Fire Protection Association Codes and Standards**

NFPA-10, Standards for Portable Fire Extinguishers

NFPA, Fire Protection Handbook

**OSHA General Industry Standards**

1910.157, Portable Fire Extinguishers

**US Postal Service Documents**

Employee and Labor Relations Manual (ELM), Paragraph 856

**NOTE**

For questions concerning OSHA standards, contact your servicing safety office.

NFPA publications are available from:

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269-7471

Or NFPA.org

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# SECTION 5
# HOT WORK FIRE PROTECTION

## 5.1 GENERAL

Hot work is maintenance work requiring the use of tools or equipment that generate sparks, flame, or heat. This chapter covers the procedures to follow when performing hot work.

## 5.2 FIRE AND EXPLOSION POTENTIAL

Cutting, welding using electric arcs or oxy-fuel gas flames, chipping, or grinding presents a high potential for fire and explosion. Globules of molten metal and sparks can scatter as far as 35 feet, igniting a fire in many kinds of combustible materials. These globules and sparks can fall through cracks, pipe holes, or other openings in floors and partitions starting a fire that could reach serious proportions before being noticed. Prevention of these types of fires or explosions is achieved by separating these combustibles from ignition sources or by shielding.

## 5.3 APPROVAL

A designated management representative, usually the maintenance supervisor responsible for the work, must approve all hot work in advance of work assignment. Use of a hot work permit is required. When hot work is performed in a specific area designated and approved for such work, such as a maintenance shop, prior approval is not required. For a suggested hot work permit, see Exhibit 5-1.

## Exhibit 5-1. Hot Work Permit

PERMIT FOR CUTTING AND WELDING WITH PORTABLE GAS OR ARC EQUIPMENT

**Section A**
(to be completed before work is begun)

**Location of work**

1. Building_____
2. Floor _____
3. Location within building _____

_____

**Time**

This permit is valid from (hour) _____
(date) _____ to (hour) _____
(date) _____

**NO HOT WORK IS TO BE PERFORMED UNDER THE AUTHORITY OF THIS PERMIT OUTSIDE OF THIS PERIOD**

**Description of Work** _____

_____

_____

**Special Precautions to be Taken**_____

_____

_____

**Is a Fire Watch Required?**
**(Yes)** _____ **No** _____

THE ANSWERS TO THE FOLLOWING QUESTIONS MUST BE YES OR NOT APPLICABLE.

- Are installed sprinklers and fire alarms in service?_____
- Are fire extinguishers readily available to personnel doing the hot work? _____
- Do workers know how to turn in a fire alarm? _____
- Are all combustible and flammable materials moved at least 50 feet away from the hot work, or protected from sparks by noncombustible blankets or guards? _____
- Are wall and floor openings covered? _____
- Are walls, within 50 feet, and floors made of noncombustible materials or covered with noncombustible blankets or guards? _____
- Are floors swept clean of combustible material, such as scraps of paper, within 50 feet? _____
- Is the work area roped off? _____
- Are employees nearby protected from heat, sparks, slag, and intense light?
- Are conveyors, towers, or other equipment that could bring combustible materials into work area either locked out or covered? _____
- Are covers suspended beneath work to collect sparks that could damage equipment below?
- Does the fire watcher have an extinguisher? _____

SIGNED _____

Designated Management Representative
(after inspection)

SIGNED _____

Mail Processing Tour Superintendent

SIGNED _____

Contractor's Representative

**Section B**
Final Check (to be completed after completion of work)

**FINAL CHECKUP**

Work area and all adjacent areas to which sparks and heat might have spread (including floors above and below and on opposite sides of walls) were inspected 30 minutes after the work was completed and were found fire safe.

SIGNED _____

Designated Management Representative
or Fire Watcher

SIGNED _____

Contractor's Representative

## 5.4 LOCATION

### 5.4.1 Authorized Hot Work Areas

In a building, hot work may be done in:

a. A specific area designated and approved for such work, such as a maintenance shop.

b. A detached outside location which must be of noncombustible or fire resistant construction suitably separated from adjacent areas.

c. An area made fire safe by removing or protecting combustibles from ignition sources, if the work (construction, repair, etc.) cannot be moved.

### 5.4.2 Unauthorized Hot Work Areas

Hot work may not be performed in:

a. Areas with an explosive atmosphere, such as flammable gases, vapors, liquids, or ignitable dusts.

b. Areas with potentially explosive atmospheres, such as tanks, drums or other containers that had contained such flammable materials and were improperly cleaned or prepared.

c. Areas near (closer than 50 feet) large quantities of exposed, readily ignitable materials.

d. A sprinklered area when the sprinkler system is out of order.

## 5.5 PROCEDURE

### 5.5.1 Inspection

Prior to performing hot work, the designated management representative inspects the job site and determines if hazardous and combustible materials are present or likely to be present. Combustible materials must be protected from ignition by:

a. Moving the hot work to a location free from dangerous combustibles.

b. If the hot work cannot be moved, moving the combustibles to a safe distance, or shielding them against ignition by use of flameproof covers or guards.

c. Scheduling hot work so that no other operations that might expose combustibles to ignition are begun during performance of the hot work.

### 5.5.2 Hot Work Permit

After a satisfactory inspection, the designated management representative completes and signs part A of the hot work permit. It must then be signed by the mail processing tour superintendent or his designee. If the hot work is being done by a contractor, the contractor's representative must also sign part A. Part B must be signed 30 minutes after completion of hot work.

### 5.5.3 Assignment

When employees are assigned to perform hot work, they:

a. Must be properly trained to do the work safely.

b. Must have fire extinguishing equipment readily available at the site.

### 5.5.4 Fire Watcher

**NOTE**

When a fire watcher is not required, the designated management representative makes a final checkup thirty minutes after the completion of hot work to assure that no fire potential exists.

#### 5.5.4.1 Need

A fire watcher must be present if any of the following conditions exist:

a. Appreciable combustible material in building construction or contents closer than 50 feet to the point of operation.

b. Appreciable combustibles are more than 50 feet away, but easily ignited by sparks.

c. Wall or floor openings within a 50-foot radius which expose combustible material in adjacent areas, including concealed spaces in walls or floor.

d. Combustible materials that are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs are likely to be ignited by conduction or radiation.

e. Other conditions, which, if in the judgment of the designated management representative, require a fire watch.

#### 5.5.4.2 Duties

The fire watcher's main function is to watch for fires in all exposed areas. The fire watcher must have the authority to stop the hot work operation if unsafe conditions develop. Fire extinguishing equipment must be readily available and the fire watcher must be trained in the use of the extinguishing equipment. In addition, the fire watcher must be familiar with the facility and the procedure for sounding an alarm in the event of a fire. The fire watcher remains in surveillance of the area for a period of 30 minutes after hot work is completed.

## 5.6 STORAGE AND USE OF OXYGEN AND ACETYLENE CYLINDERS

### 5.6.1 General

Oxygen and acetylene are widely used for hot work throughout the postal service. Acetylene is one of the most flammable substances used in industry. Oxygen, while not a fuel, supports combustion. Extreme care must be taken when handling these gases.

### 5.6.2 Storage

Oxygen and acetylene are usually stored in compressed gas cylinders. These cylinders must be stored in a designated and well-ventilated area, at least 20 feet from combustible materials and away from sources of heat. Oxygen must be stored at least 20 feet from acetylene. All cylinders must be stored securely with valves closed and valve protection covers in place. Acetylene cylinders must be stored and used with the valve end up. All inside storage areas must be dry and well protected. Cylinders must not be stored in mechanical equipment rooms or near access ways to exits.

### 5.6.3 Transportation

All cylinders must be transported in a secure position with valve caps in place. Acetylene cylinders must be secured with valve end up.

### 5.6.4 Inspection

Prior to acceptance, all cylinders must be inspected for defects. If a cylinder fails any of the following inspection steps, it must be returned to the supplier:

a. Valve protection caps must be in place.

b. There must be no dents exceeding 10 percent of the diameter or a dent wide and deep enough for a piece of material to lodge in, without rolling off the side of the cylinder.

c. There must be no deep gouges.

d. There must be no bulges.

e. There must be no fire damage.

f. There must be no deep pitting or corrosion.

g. All cylinders must be color coded or otherwise marked as to their contents.

### 5.6.5 Cylinder Use

#### 5.6.5.1 Moving

Cylinder valves must be closed before moving cylinders. Cylinders may be moved only with a hand truck, or other suitable means. Valve-protection caps must not be used for lifting cylinders and cylinders must never be dragged.

### 5.6.5.2 Tools and Fittings

Only approved tools and devices such as torches, regulators or pressure-reducing valves, and manifolds shall be used.

Only proper tools and handles may be used to install and operate valves and regulators. Pliers and crescent wrenches must not be used. Regulators may be left on cylinders provided:

a. Cylinders are located away from areas where they may be damaged.

b. Cylinders are secured in an upright position.

c. All cylinder valves are shut off, and all regulators are properly bled down.

Only approved fittings designed for a specific application may be used. Handmade, converted, or adapted fittings must not be used.

Where a special wrench is required, it shall be left in position on the stem of the valve while the cylinder is in use so that the acetylene or oxygen flow can be quickly turned off in case of emergency.

Hose showing leaks, burns, worn places, or other defects shall be replaced.

## Exhibit 5-2. References and Standards

**National Fire Protection Association Codes and Standards**

NFPA-51B, Standard for Fire Prevention During Welding, Cutting, and Other Hot Work

**OSHA General Industry Standards**

29 CFR 1910.252, General Requirements for Welding, Cutting, and Brazing

**American National Standards Institute (ANSI) Standards**

ANSI-Z-49.1- Safety in Welding

**NOTE**

For questions concerning OSHA standards, contact your servicing safety office.

OSHA standards are available at www.OSHA.gov

NFPA publications are available from:

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269-7471

Or NFPA.org

ANSI publications are available from:

American National Standards Institute
1430 Broadway
New York, NY 10018-3308

Or ANSI.org

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# SECTION 6
# FIRE ALARM SIGNAL AND DETECTION SYSTEMS

## 6.1 GENERAL

Fire alarm, signaling, and detection systems are key elements in the protection of buildings, properties, and lives. Properly designed, installed, and maintained they greatly limit the losses caused by fire and smoke. This chapter provides guidelines in the selection, installation, inspection, and maintenance of alarms, signaling, or detection systems for postal owned or leased buildings.

## 6.2 PURPOSE

These systems provide early detection and warning to building occupants, thus protecting lives and property. A simple system provides a reliable evacuation alarm, activated manually or automatically. The complexity of the system is influenced by the size and structural features, occupancy, hazards, age, and worth of the property. All components in a detection system must be listed by a nationally recognized testing laboratory, such as underwriter's laboratories. The installation of such systems must also conform to the provisions of the NFPA, the National Electrical Code, and other standards such as OSHA guidelines and those found in the Employee and Labor Relations Manual, Section 856.

## 6.3 TYPES OF ALARM SYSTEMS

### 6.3.1 Use

There are five types of fire alarm signaling systems used in postal leased or owned buildings. They include local, proprietary, central station, remote, and auxiliary systems. These alarm systems may provide one or more of the following secondary services:

a. Notifying the fire department of any emergency.

b. Activating special fire suppressing systems to extinguish or control the fire.

c. Automatically sending elevators to ground level for fire department use.

d. Overriding elevator controls to prevent stops on a fire floor.

e. Pressurizing stairwells for evacuation.

f. Operating smoke and heat vents.

g. Closing smoke or fire-rated doors and dampers.

h. Shutting down heating, ventilation, and/or air conditioning systems for smoke control.

i. Shutting down mail processing equipment.

### 6.3.2 Local Alarm Systems

Local alarm systems are considered the basic setup upon which other alarm systems

are built. A local alarm system notifies occupants of a fire in the local premises. It is up to the occupants to notify the proper authorities.

### 6.3.3 Proprietary Alarm System

A proprietary alarm system is comprised of two or more separate local alarm systems tied into one central location owned or leased by the postal service. This system is often found in large postal facilities where several buildings are protected. The central alarm receiving point has monitoring equipment staffed by specially trained personnel. These persons are trained in emergency procedures and are knowledgeable of alarm system operation and maintenance. Proprietary systems must be connected to a municipal fire department either by direct lines or through a municipal fire alarm system.

### 6.3.4 Central Station Alarm System

Central station systems use commercial companies contracted to monitor and receive alarms from postal owned or leased buildings. Usually these alarms are received via telephone equipment. The staffing and service provided is essentially the same as the proprietary system but is not performed by postal personnel. The central station must respond to all trouble and fire signals and either clear the trouble or notify the fire department and the postal service.

### 6.3.5 Auxiliary and Remote Alarm Systems

There are three basic types of Auxiliary systems: the local energy system, the shunt system, and parallel telephone system. The local energy system is an alarm system within a facility that is attached directly to a hard wired or radio-type municipal master fire alarm box. When an alarm activates in the facility, it initiates the fire alarm box to which it's attached and transmits an alarm to a fire alarm center. An alarm can be initiated as a manual pull station, automatic fire detection device, or water flow device.

The shunt system is one in which the municipal alarm circuit extends directly into the postal facilities and upon activation, either automatically or manually, the alarm is immediately transmitted to an alarm center over the municipal system.

Parallel telephone systems do not interconnect with a municipal alarm circuit. The alarm is transmitted directly from postal facilities to an alarm center via a telephone circuit that serves no other purposes.

Remote alarm systems are similar to an auxiliary; however, they are connected directly with the fire departments telecommunications center or to an answering service by some means other than a municipal fire alarm box system.

## 6.4 TYPES OF SIGNALS

### 6.4.1 Alarm Signal

All postal employees should know how to respond when an alarm signal is given. This signal, sounded by a chime or air horn indicates that a fire has been detected and that immediate action must be taken. This alarm is generally given throughout the building and is initiated by a manual or automatic device.

### 6.4.2 Trouble Signal

A trouble signal is a signal initiated by the fire alarm system or device which tells the operator that there is something electrically wrong with the alarm system. When the trouble signal is given, maintenance personnel must be immediately notified. The trouble is given top priority until it is repaired.

### 6.4.3 Supervisory Signal

Supervisory signals are used to monitor the condition of particular fire equipment components. Included are such items as low water service pressure, loss of power to a fire pump, closing of a water supply valve, low water level in a supply tank, or near freezing temperatures in an outdoor water supply tank.

### 6.4.4 Voice Communication Systems

A voice communication system consists of a series of highly reliable speakers located throughout the postal facility connected to the fire console. When an alarm is sounded, a live or pre-taped message comes over the system giving specific evacuation instructions. This system may also be used during firefighting operations for communicating with firefighters.

### 6.4.5 Visual and Tactile Signals

Because postal buildings must be accessible to, and safe for, the handicapped, fire alarm systems must be equipped with visual alarm devices to protect individuals with impaired hearing. One of these devices is a combination horn/light that flashes and beeps when an alarm is sounded. There are also tactile devices on the market that indicate an alarm to the sense of touch.

## 6.5 ALARM INITIATORS

### 6.5.1 Pull Box

The most commonly used manual device in the postal service is the non-coded pull box. The pull box is a manual switch with a set of electrical contacts either open or closed, monitored by the alarm panel. When the box is manually activated, the contacts change the electrical current status, which activates an alarm signal (Figure 6-1).

**NOTE**

All pull boxes must be unobstructed, readily accessible, and located in the normal path of exit.

### 6.5.2 Detectors

Fire detectors may also initiate alarms. See paragraph 660 for a more detailed discussion of detectors.

### 6.5.3 Extinguishing System Alarms

Most fire extinguishing systems in the postal service are interconnected to act as an alarm initiating device for the building alarm system. The activation of the extinguishing system generates an alarm that gives employees an opportunity to evacuate the building.

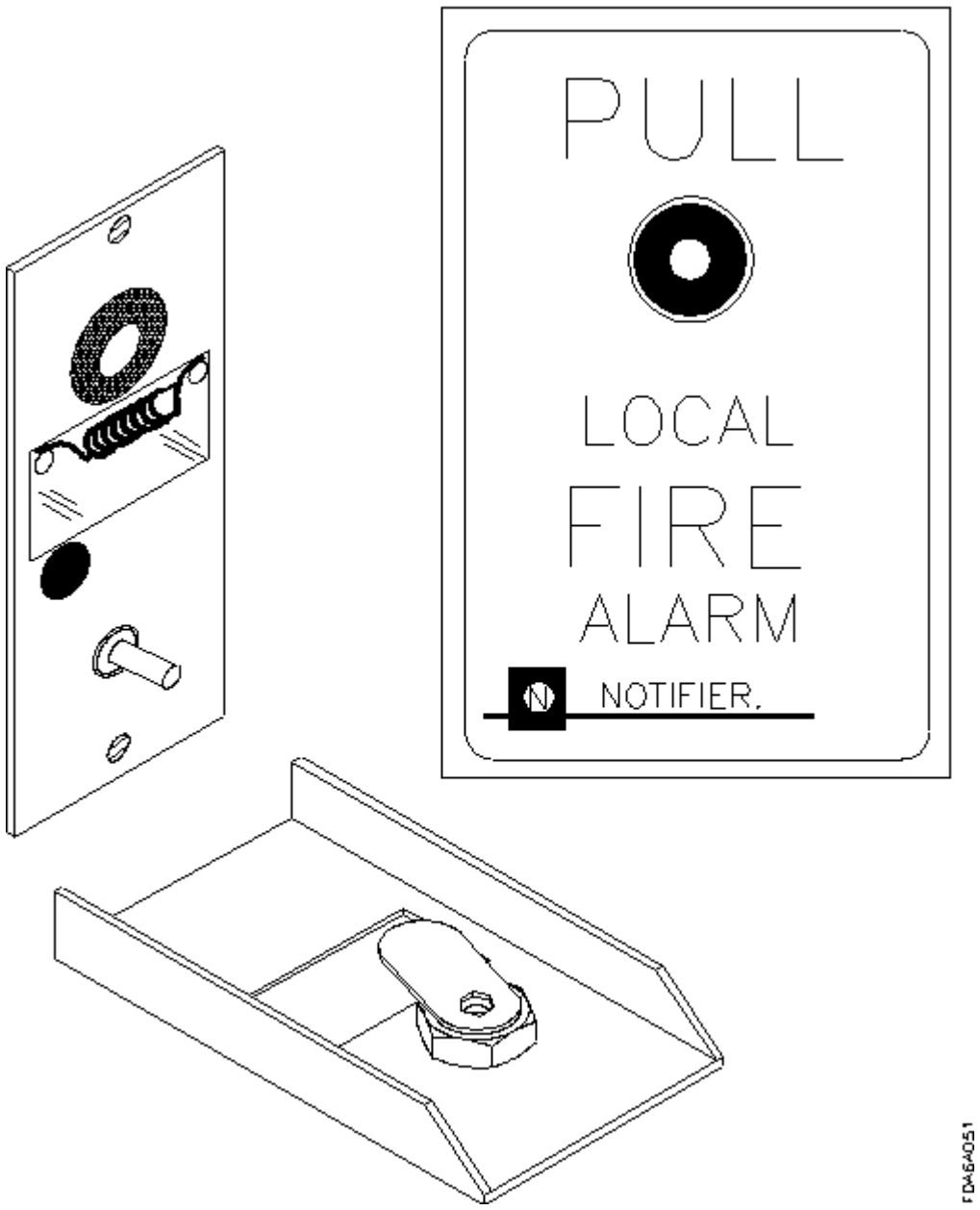


**Figure 6-1. Non-coded Pull Box**

## 6.6 DETECTION SYSTEMS

### 6.6.1 Products of Combustion Detectors

There are three types of products of combustion detectors: heat, smoke, and flame (Figure 6-2).

### 6.6.2 Heat Detectors

#### 6.6.2.1 General

Heat is a major product of combustion. By using the principles of heat physics, there are three ways to detect heat. The first principle states that heat causes the expansion of materials, the second that heat causes melting, and the third that changes in resistance of heated metal are detectable. The detectors that use these principles to detect fire are the fixed temperature, the rate-of-rise, and the combination fixed temperature and rate-of-rise detectors.

#### 6.6.2.2 Fixed Temperature Detectors

##### 6.6.2.2.1 Use

Fixed temperature devices are found in many postal buildings because of their low cost and extreme reliability. The only drawback with this type of device is it must be replaced after a fire.

##### 6.6.2.2.2 Bimetallic Thermostat

A fixed temperature detector responds when its operating element becomes heated to a pre-determined level. The most commonly used in postal facilities is the bimetallic thermostat (Figure 6-3).Its sensing element is made up of two metals having different coefficients of thermal expansion arranged so that the effect when heated is a deflection in one direction. This deflection opens or closes a set of contacts that initiate an alarm signal. These detectors must be checked after a fire to ensure that they have sustained no permanent damage. These detectors are self-resetting and reusable.

##### 6.6.2.2.3 Fusible Alloys

A second type of fixed temperature detector is the fusible alloy device that melts when exposed to heat. The most common fusible alloy detectors are fusible links. A soft metal such as solder holds a spring operated contact inside the detector in the open position. When a fire raises the ambient temperature to the fusing temperature of the device, the solder melts, allowing the spring to move the contact point. This action completes the alarm circuit, causing an alarm to be sent.

#### 6.6.2.2.4 Thermoplastic Polymers Bimetallic Detector

Thermoplastic polymers provide another sort of detector. These polymers are used to insulate two actuators. Each actuator is made of a different thermal expansion metal which are thin metal wires independently covered with heat sensitive material. A protective tape covers the heat sensitive material followed by an outer coating. The two actuators are bonded together and one or both ends of the strips are attached to the alarm circuit. When heated, one metal expands faster than the other causing the strip to arch or bend. The deflection either makes or breaks contact in the alarm circuit initiating an alarm signal (Figure 6-4).These wire type continuous line heat detector cables can be run throughout large areas, forming a continuous fixed temperature alarm device. After a fire, the melted section is cut out and replaced.

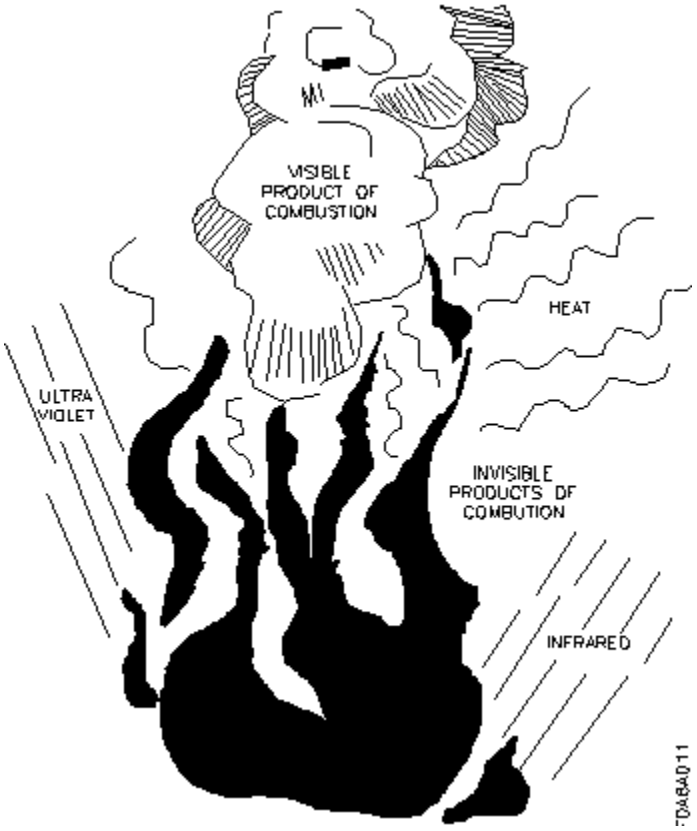


**Figure 6-2. Combustion Detectors**

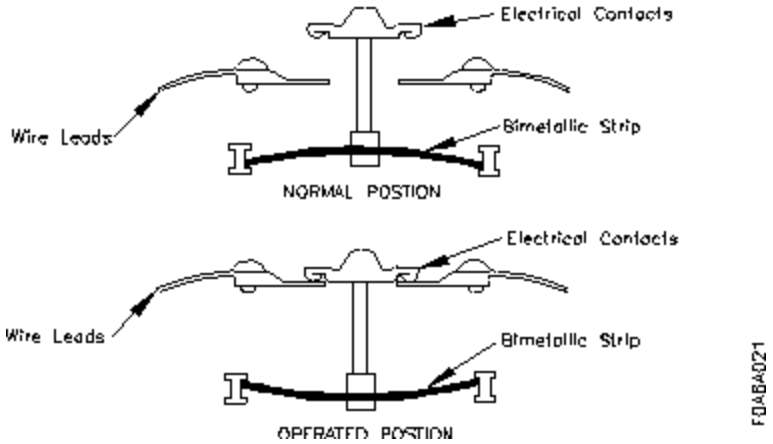


**Figure 6-3. Bimetallic Thermostat**

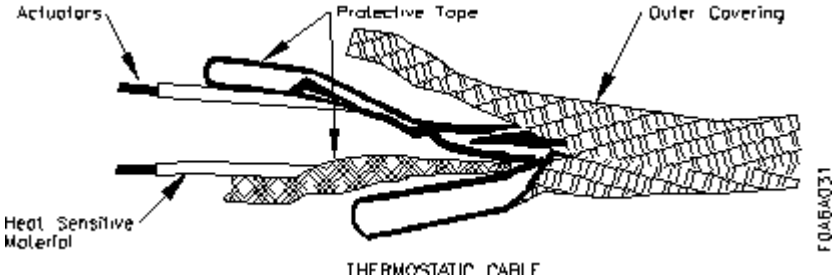


**Figure 6-4. Thermoplastic Polymers**

### 6.6.2.3 Rate-of-Rise Detectors

#### 6.6.2.3.1 Operation

All pneumatic rate-of-rise detectors work on the principles of heat and expansion. Spot rate-of-rise detectors are used in postal owned or leased facilities to monitor smaller areas within a facility. They are designed to have a small dome-shaped air chamber with a flexible metal diaphragm in the base. A small metering hole allows air to enter and exit the chamber during the normal rise and fall of atmospheric temperatures and barometric pressure. When a fire occurs, the expansion causes the pressure within the chamber to increase, thus forcing the metal diaphragm against contact points in the alarm circuit. An alarm signal is then generated (Figure 6-5).

Line detectors work similar to the spot detectors and utilize tubing arranged over a wide area of coverage. When a fire occurs, pressure changes occur in the tubing which force the metal diaphragm against contact points in the alarm circuit. An alarm signal is then generated.

### 6.6.2.3.2 Thermoelectric Sensors

The only rate-of-rise detector that does not use the air chamber is the thermoelectric sensor. This sensor works on the principle that two wires of dissimilar metal twisted together, when heated at one end, will generate an electrical potential at the other end. The detector is electronically designed to bleed off or dissipate small currents. This allows it to disregard small or gradual temperature changes. When the change is great, the increase in current transmits an electrical signal to the alarm panel.

### 6.6.2.3.3 Use

Since rate-of-rise detectors are more complicated, they are slightly less dependable than the fixed temperature detectors. They also tend to be more expensive.

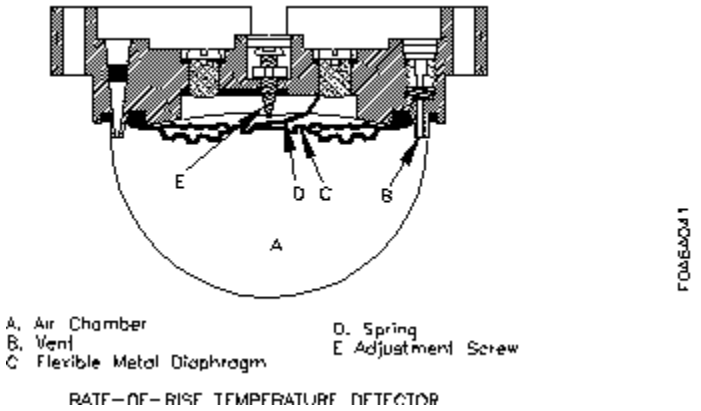


**Figure 6-5. Temperature Detector**

### 6.6.2.3.4 Combination Rate-of-Rise/Fixed Temperature Detectors

A fixed temperature detector becomes increasingly effective when combined with a rate-of-rise detector. This combination takes advantage of the capability of the rate-of-rise detector to respond to fast fires, and the dependability of the fixed temperature detector.

## 6.6.3 Smoke Detectors

### 6.6.3.1 General

Smoke is one of the easiest products of combustion to detect. There are two types of smoke detectors, ionization and photoelectric. A smoke detector operating on the photoelectric principle responds faster to the smoke generated by low energy fires, as these fires produce larger smoke particles. Smoke detectors using the ionization principle provide a somewhat faster response to high energy fires, since these fires produce large numbers of small smoke particles.

### 6.6.3.2 Ionization Smoke Detectors

Ionization detectors work in the following manner. A small amount of radioactive material is placed in a sensing chamber. The material ionizes the air in the chamber, thus making it conductive. A current flows through the air between two charged electrodes. When smoke particles enter the ionized area, they decrease the conductance of the air. When conductance is less than a pre-determined level, the detector will respond (Figure 6-6).

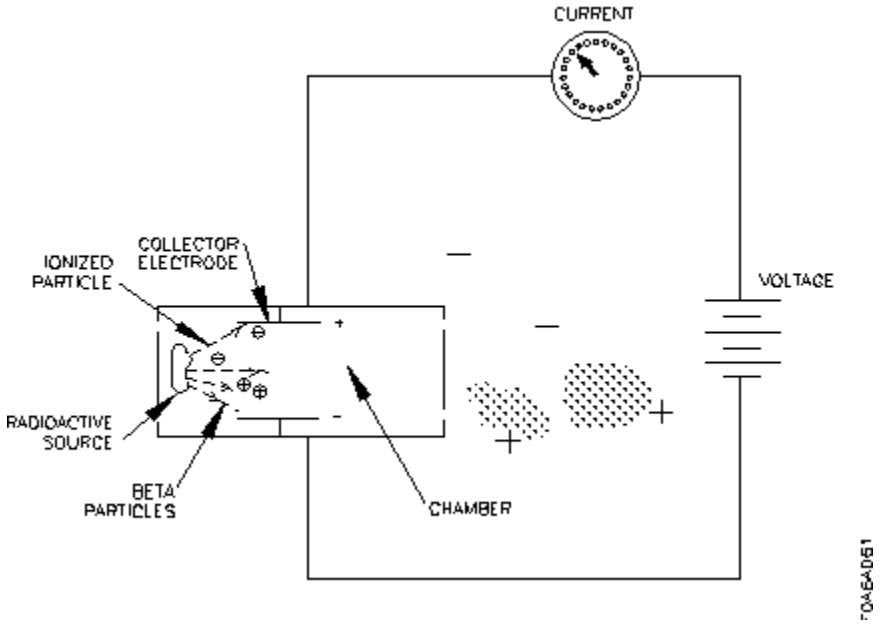


**Figure 6-6. Ionization Smoke Detectors**

### 6.6.3.3 Photoelectric Smoke Detectors

#### 6.6.3.3.1 General

Photoelectric detectors have been used for several years, particularly if the type of fire anticipated is expected to generate a substantial amount of smoke before temperature changes are sufficient to actuate a heat detector. This detector operates on a principle that smoke entering a light beam either obscures the beam's path or reflects light into a photocell.

#### 6.6.3.3.2 Light Obscuration Detectors

Most light obscuration detectors are beams used to protect large open areas. They are installed with the light source at one end of the area and the receiver at the other end. When smoke particles enter the light beam, the light reaching the photosensitive device is reduced initiating an alarm. When this beam application is used, a delay is generally programmed into the alarm switch. This delay allows an animal or the top of a piece of moving equipment to move through the beam without sending an alarm. The atmosphere in the area must be kept relatively clean to avoid false alarms.

#### 6.6.3.3.3 Light Scattering Detectors

The operating principles of light scattering detectors are opposite of the light obscuration detector. A light beam passes through a small chamber toward the end away from the light source. The light does not normally strike the photocell. When smoke is drawn through the chamber, it causes the light beam to be reflected in random directions. A portion of the scattered light strikes the photocell, initiating a current which in turn activates an alarm. This type of detector must be carefully placed to ensure correct availability of air. When installed correctly, it is a reasonably reliable, sensitive detector.

**NOTE**

Smoke detectors must not be installed in areas where normal ambient temperature is likely to exceed 100 °F or fall below 32 °F (0 °C), unless they have been specifically listed for installation at higher or lower temperatures.

### 6.6.4 Flame Detectors

#### 6.6.4.1 General

Flame detectors detect the appearance of radiant energy visible or invisible to the human eye. Though they offer an extremely fast response, they may have a high false alarm rate due to the accidental placement of an infrared or ultraviolet source in their line of sight. Care must be taken to ensure that they can see the entire protected area. Although expensive, they are well suited to protecting areas where explosive or flammable vapors or dusts are encountered.

#### 6.6.4.2 Infrared Flame Detectors

Infrared detectors have a sensing element responsive to radiant energy outside of human vision. This detector can respond to the total infrared component either of the flame alone, or in combination with flame flicker in the frequency range of 5 to 30 hertz. To minimize false alarms infrared detectors must be mounted away from any sunlight and heat producing appliances.

#### 6.6.4.3 Ultraviolet Flame Detector

Ultraviolet detectors have a somewhat wider application than the infrared, since they are essentially insensitive to both sunlight and artificial light. This detector uses either a solid-state device or a gas-filled tube for a sensing element.

### 6.6.5 Installation of Detectors

The location and spacing of detectors is based upon the principle of operation and an engineering survey of the conditions anticipated in service. Ceiling shape and surfaces, ceiling height, configuration of contents, burning characteristics of combustible material present, and ventilation are some of the conditions that must be considered. Refer to manufacturer's technical bulletins and applicable NFPA standards on detector uses and locations (Exhibit 6-2).

## 6.7 MAINTENANCE AND TESTING

### 6.7.1 General

Maintenance and testing of postal owned fire alarm and detection systems must be performed by trained persons. In addition, proper equipment and copies of the technical and parts manuals must be obtained from the manufacturer to assist in performing routine maintenance or repair. If trained personnel are not available to work on these systems, a service contract with an alarm company must be obtained. See Exhibit 6-1 for NFPA inspection and testing frequencies.

#### 6.7.1.1 Testing

Testing shall be accomplished in compliance with NFPA 72.

#### 6.7.1.2 Testing Personnel

Testing personnel shall meet the qualifications in NFPA 72 10.5.3.4.

**NOTE**

USPS has organized the following information regarding testing frequencies for fire detection and alarm systems. All of the following information can be found in the 2007 edition of the National Fire Alarm and Signaling Code (NPFA-72). For definitions, details, and procedures, please refer to the 2007 edition of NFPA-72. Please note that the following table summarizes the requirements of NFPA-72, some of which may not be applicable to all USPS buildings.

**Exhibit 6-1. NFPA Fire Alarm Detection and Signaling Systems Inspection and Testing Frequencies**

| | Component | Initial/ Reacceptance | Monthly | Quarterly | Semi-annually | Annually | Other |
|---|---|---|---|---|---|---|---|
| 1. | Control Equipment — Building Systems Connected to Supervising Station | | | | | | |
| | (a) Functions | X | — | — | — | X | |
| | (b) Fuses | X | — | — | — | X | |
| | (c) Interfaced equipment | X | — | — | — | X | |
| | (d) Lamps and LEDs | X | — | — | — | X | |
| | (e) Primary (main) power supply | X | — | — | — | X | |
| | (f) Transponders | X | — | — | — | X | |
| 2. | Control Equipment — Building Systems Not Connected to a Supervising Station | — | — | — | — | — | |
| | (a) Functions | X | — | X | — | — | |
| | (b) Fuses | X | — | X | — | — | |
| | (c) Interfaced equipment | X | — | X | — | — | |
| | (d) Lamps and LEDs | X | — | X | — | — | |
| | (e) Primary (main) power supply | X | — | X | — | — | |
| | (f) Transponders | X | — | X | — | — | |
| 3. | Engine-Driven Generator — Central Station Facilities and Fire Alarm Systems | X | X | — | — | — | |
| 4. | Engine-Driven Generator — Public Fire Alarm Reporting Systems | X | X | — | — | — | |
| 5. | Batteries — Fire Alarm Systems | | | | | | |
| | VRLA Batteries | — | — | — | — | — | |
| | 1. Charger test (replace battery as needed.) | X | — | — | X | — | — |
| | 2. Temperature Test | X | — | — | X | — | — |

| | Component | Initial/ Reacceptance | Monthly | Quarterly | Semi-annually | Annually | Other |
|---|---|---|---|---|---|---|---|
| | 3. Cell/Unit voltage test | X | — | — | X | — | — |
| | 4. Ohmic Test | X | — | — | X | — | — |
| | 5. Replacement/Load Test | — | — | — | — | — | #3 Yrs |
| 6. | Batteries — Public Fire Alarm Reporting Systems Voltage tests in accordance with Table 10.4.2.2, items 7(1)–(6) | X (daily) | — | — | — | — | — |
| 7. | Fiber-Optic Cable Power | X | — | — | — | X | |
| 8. | Control Unit Trouble Signals | X | — | — | — | X | |
| 9. | Conductors — Metallic | X | — | — | — | — | |
| 10. | Conductors — Nonmetallic | X | — | — | — | — | |
| 11. | Emergency Voice/Alarm Communications Equipment | X | — | — | — | X | |
| 12. | Retransmission Equipment | X | — | — | — | — | — |
| 13. | Remote Annunciators | X | — | — | — | X | |
| 14. | Initiating Devices | — | — | — | — | — | |
| | (a) Duct detectors | X | — | — | — | X | — |
| | (b) Electromechanical releasing device | X | — | — | — | X | — |
| | (c) Fire extinguishing system(s) or suppression system(s) switches | X | — | — | — | X | — |
| | (d) Fire–gas and other detectors | X | — | — | — | X | — |
| | (e) Heat detectors | X | — | — | — | X | — |
| | (f) Fire alarm boxes | X | — | — | — | X | — |
| | (g) Radiant energy fire detectors | X | — | — | X | — | — |
| | (h) System smoke detectors — functional | X | — | — | — | X | — |
| | (i) Smoke detectors — sensitivity in accordance with 14.4.4.3 | — | — | — | — | — | — |
| | (j) Single- and multiple-station smoke alarms (the requirements for monthly testing in accordance with 10.4.4 shall also apply) | X | — | — | — | X | — |
| | (k) Single- and multiple-station heat alarms | X | — | — | — | X | — |
| | (l) Supervisory signal devices (except valve tamper switches) | X | — | X | — | — | — |
| | (m) Water flow devices | X | — | — | X | — | — |
| | (n) Valve tamper switches | X | — | — | X | — | — |
| 15. | Guard’s Tour Equipment | X | — | — | — | X | — |

| | Component | Initial/ Reacceptance | Monthly | Quarterly | Semi-annually | Annually | Other |
|---|---|---|---|---|---|---|---|
| 16. | Interface Equipment | X | — | — | — | X | — |
| 17. | Special Hazard Equipment | X | — | — | — | X | — |
| 18. | Alarm Notification Appliances | — | — | — | — | — | — |
| | (a) Audible devices | X | — | — | — | X | — |
| | (b) Audible textual notification appliances | X | — | — | — | X | — |
| | (c) Visible devices | X | — | — | — | X | — |
| 19. | Off-Premises Transmission Equipment | X | — | X | — | — | — |
| 20. | Supervising Station Fire Alarm Systems — Transmitters | — | — | — | — | — | — |
| | (a) DACT | X | — | — | — | X | — |
| | (b) DART | X | — | — | — | X | — |
| | (c) McCulloh | X | — | — | — | X | — |
| | (d) RAT | X | — | — | — | X | — |
| 21. | Special Procedures | X | — | — | — | X | — |
| 22. | Supervising Station Fire Alarm Systems — Receivers | — | — | — | — | — | — |
| | (a) DACR | X | X | — | — | — | — |
| | (b) DARR | X | X | — | — | — | — |
| | (c) McCulloh systems | X | X | — | — | — | — |
| | (d) Two-way RF multiplex | X | X | — | — | — | — |
| | (e) RASSR | X | X | — | — | — | — |
| | (f) RARSR | X | X | — | — | — | — |
| | (g) Private microwave | X | X | — | — | — | — |

Note: Above chart was extracted from the NFPA 72.

Exception: Devices or equipment that are inaccessible for safety considerations (e.g., continuous process operations, energized electrical equipment, radiation, and excessive height) shall be tested during scheduled shutdowns if approved by the authority having jurisdiction but shall not be tested more than every 18 months.

### 6.7.2 Equipment Inspection

#### 6.7.2.1 Alarms and Detectors

A visual inspection of equipment must be performed upon installation acceptance then as noted in Exhibit 6-1. Bells, gongs, buzzers, pull boxes, detectors, etc., must be free of paint, dirt, or any damage which may interfere with their operation. Exposed circuit wiring must be checked for wear, punctures, cracks, and other defects which could render the insulation ineffective. Conduit must be inspected for proper support and solid connections.

#### 6.7.2.2 Control Boxes

All control boxes must be clean, properly identified, and have no obstructions or foreign objects in or around them.

#### 6.7.2.3 Battery Systems

Battery systems used as emergency power sources must be kept clean and fully operational. Depending on the type of battery, Exhibit 6-1 suggests the frequency for testing.

### 6.7.3 Detector Testing

### 6.7.4 General

An alarm is only as reliable as the detectors it uses, so detectors require periodic testing. Three conditions require testing: The initial installation, after a fire, and after an elapsed period of time. All fire detector testing must be in accordance with applicable NFPA standards (Exhibit 6-1).

#### 6.7.4.1 Fixed Temperature Detectors

After 15 years from initial installation, all non-restorable detectors shall be replaced or two detectors per 100 shall be laboratory tested. The two detectors shall be replaced with new devices. If a failure occurs on any of the detectors removed, additional detectors shall be removed and tested to determine either a general problem involving faulty detectors or a localized problem involving one or two defective detectors. If detectors are tested instead of replaced, tests shall be repeated at intervals of 5 years. Cable type line detectors must have the loop resistance tested semiannually.

#### 6.7.4.2 Spot Type Heat Detector

Restorable spot type heat detectors are tested on a regular basis. At least one detector on each signal initiating circuit must be tested semiannually, and a different detector must be selected for each test. They may be tested with a portable heat source such as a hair dryer or heat lamp with a temperature shield and activate within one (1) minute.

### 6.7.4.3 Pneumatic Detector

Pneumatic line type detectors must be tested for leaks and proper operation in accordance with Exhibit 6-1. These detectors may be tested with a heating device or with an approved pressure pump. If a pressure pump is used, the manufacturer's instructions must be followed.

### 6.7.4.4 Smoke Detectors

Smoke detectors must be tested in accordance with manufactures instructions and Exhibit. Instruments to perform tests and set sensitivities are generally available from the manufacturer.

**NOTE**

Blowing smoke near a detector is not considered a proper test.

### 6.7.4.5 Flame Detectors

Flame detectors must be tested as prescribed by the manufacturer and noted in Exhibit 6-1.Due to the intricacy and expense of this equipment, it is recommended that training, or a service contract, be obtained from the manufacturer.

### 6.7.4.6 Records

A permanent record of all detector tests must be kept on the premises for at least 5 years. The minimum information required on these records are the date, detector type and location, type of test, name of inspector, and the results.

## Exhibit 6-2. References and Standards

**National Fire Protection Association Codes and Standards**

NFPA-72, National Fire Alarm Code

**OSHA General Industry Standards**

29 CFR 1910.165, Fire Detection Systems

29 CFR 1910.164, Employee Alarm Systems

**US Postal Service Documents**

Employee and Labor Relations Manual 17 Edition Section 856

**NOTE**

For questions concerning OSHA standards, contact your servicing safety office.

NFPA publications are available from:

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

Or at NFPA.org

### 6.7.5 Control Equipment Inspection

#### 6.7.5.1 General

Control equipment consists of local annunciator panels and signal switching or transmitting devices. When testing, verify that the proper zones are indicated on all annunciator panels and that the time stamp is clearly recording the time and location of the signals.

#### 6.7.5.2 Alarms and Power Sources

All alarms associated with these panels must be inspected to see that they are clean and operable. The supervisory power source must be checked for proper operation by viewing the pilot light or gauge. If an emergency power supply is installed, it is tested by interrupting the 120-volt AC power supply to ensure the unit will convert to battery.

**NOTE**

During all testing, the municipal signal must be disabled and the fire department notified. After all tests are completed, the devices must be returned to their normal standby condition.

## 6.8 RESPONSIBILITY

In all buildings owned by the postal service, the USPS is responsible for periodic inspections and routine preventive maintenance of fire alarm detection and signaling systems. In buildings operated by the General Services Administration, GSA is responsible for repair and or replacement of alarm systems and components. In leased buildings, the lessor is responsible for repairs to the alarm system and replacement of components unless otherwise indicated in the terms of the lease. In total maintenance leased buildings, the postal service is responsible for repairs and replacement as well as preventive maintenance. There must be no delays in the repair of alarm systems. All repairs must be termed emergency and receive priority attention. If a fire alarm system has to be taken out of service, all key personnel must be informed. Form 4707, Out of Order Tag, must be displayed whenever any station is inoperative.

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# SECTION 7
# STANDPIPE AND HOSE SYSTEMS

## 7.1 GENERAL

### 7.1.1 Scope

This chapter covers the minimum requirements for the maintenance and inspection of standpipe and hose systems when installed in postal owned or postal leased buildings. Please note that in some facilities where firefighting training has not been provided, firefighting equipment such as hoses and nozzles have been removed. Chapter 7 does not mandate that new equipment must be purchased and installed, merely how to properly service and inspect existing equipment.

### 7.1.2 Hardware

Standpipe systems may be supplied by either an internal direct connection to a water supply or an external connection for a fire department pumper, or both. These connections and outlets may be in either a vertical or horizontal position and are usually located on each floor, on roofs, in basements, or outside in open yard areas of larger facilities. (Please note that any standpipe system susceptible to freezing temperatures will remain dry until such time that firefighting activities require the water. Also with some systems, the standpipe can also supply water to the sprinkler system.)

### 7.1.3 Water Supply

A standpipe system must be supplied with adequate water and pressure in order to be effective. Properly installed systems provide a quick and convenient means for deploying and operating hose streams. A standpipe system is an arrangement of piping, valves, hose connections, hose outlets, and allied equipment.

### 7.1.4 Effectiveness

Standpipe systems, which are properly designed, equipped, and maintained, are an effective means for extinguishing fires. Even in buildings equipped with automatic sprinkler systems, standpipes may be a necessary complement. The standpipe system furnishes a reliable means of obtaining effective hose streams in the shortest possible time, especially in those difficult to reach areas.

### 7.1.5 Classification

Standpipe systems are classified according to their intended use. There are three classes of standpipe systems:

a. Class I systems are designed for use by fire departments only. Class I service must furnish the effective hose streams necessary during the more advanced stages of a fire. This type of system requires 2 1/2 inch hose connections to supply water for use by the fire department. Postal employees are not authorized to use this system.

b. Class II systems use 1-1/2 inch hose stations, and are used primarily by trained EET personnel or by the fire department during the initial response. If the building is equipped with a Class II system, postal employees assigned to the EET are to be trained in the use of this system.

c. Class III systems shall provide 1 1/2 inch hose stations for EET members who have been properly trained and 2 1/2 inch hose connections to supply a larger volume of water for the use of the fire department. A Class III system is capable of furnishing adequate water volume and pressure to meet the requirements of Class I and Class II service.

## 7.2 TYPES OF SYSTEMS

There are four types of standpipe systems currently in use at many postal installations:

Automatic wet standpipe systems have the water supply open and maintain water pressure at all times.

a. Automatic dry standpipe systems are filled with pressurized air, and when the air pressure drops, a device activates and allows water to charge the system upon opening a hose valve.

b. Manual dry standpipe systems are connected to a small water supply for the purpose of maintaining water within the system or sharing a water supply with an automatic sprinkler system but not having a water supply capable of delivering the system demand attached to the system.

c. Wet standpipe systems are connected to a small water supply for the purpose of maintaining water within the system or sharing a water supply with an automatic sprinkler system but not having a water supply capable of delivering the system demand attached to the systems.

## 7.3 WATER SUPPLY FOR STANDPIPE SYSTEMS

To fight a fire, the amount of water required for standpipe systems depends upon the size of the hose, the size and type of nozzle, the number of hose streams in use and the probable length of time they will be used. All of these factors are largely influenced by the construction, type of occupancy, and fire load contained within the building.

## 7.4 SYSTEM REQUIREMENTS

### 7.4.1 General

Closets and cabinets used to contain fire hoses must be of sufficient size to permit the installation of the necessary equipment at hose stations, and designed so as not to interfere with the prompt use of the hose valves, the hose, and other equipment in the event of an emergency. Within the cabinet, the hose valves must be located so that there is at least 1 inch between any part of the cabinet and the handle of the valve when the valve is in any position from fully open to fully closed. The cabinet must be used for fire equipment only and each cabinet must be conspicuously identified.

### 7.4.2 Number and Location of Standpipes

#### 7.4.2.1 Local Requirements

The number and arrangement of standpipe equipment necessary for proper protection is governed by local conditions such as occupancy, character, and construction of the building, exterior exposures, and accessibility.

#### 7.4.2.2 Hose Station Distribution

When Class I, Class II, and Class III service is installed, the number of hose stations in each facility and in each section of a building, divided by firewalls, must be such that all portions of each story of the building are within 30 feet of a nozzle attached to not more than 100 feet of approved hose. In buildings divided by numerous partitions, standpipes must be located so that hose streams can be utilized in any room.

### 7.4.3 Location of Standpipe

Standpipe risers and horizontal standpipe runs must not pass through hazardous areas and must be located so they are protected from mechanical and fire damage. Dry standpipes shall not be concealed unless the piping integrity is monitored with supervisory air pressure.

Where a standpipe or lateral pipe that is normally filled with water passes through an area subject to freezing temperatures, it shall be protected to maintain the temperature of the water in the piping between 4.4°C and 48.9°C (40°F and 120°F).Antifreeze solutions shall not be used to protect standpipe system piping from freezing.

Where corrosive conditions exist, or piping is exposed to the weather, corrosion-resistant types of pipe, tube, fittings, and hangers, or protective corrosion-resistive coatings, shall be used.

## 7.5 HOSE CONNECTION REQUIREMENTS

### 7.5.1 Location

Hose connections and hose stations shall be unobstructed and shall be located not less than 0.9 m (3 ft.) or more than 1.5 m (5 ft.) above the floor.

### 7.5.2 Threads

Hose connection threads should conform to the American National Fire Hose Connection Screw Threads, as specified in applicable NFPA 1963 standards. Check to ensure local threads are compatible with fire department equipment.

### 7.5.3 Hose, Hose Racks, and Nozzles

#### 7.5.3.1 Requirements

Each hose connection provided for use by building occupants (Class II and Class III services) must be equipped with not more than 100 feet of approved, listed 1-1/2 inch lined hose, with nozzle attached, and ready for use. Each station provided with 1-1/2

inch hose must be equipped with an approved, listed rack assembly or other approved storage facility. Each rack or storage facility for 1-1/2 inch hose must be provided with a label affixed to the cabinet door stating "Fire Hose For Use By Trained Personnel," and operating instructions. Nozzles for Class II service hose must be listed and approved with a variable hose stream and shutoff capability.

#### 7.5.3.2 Hose Connections for Dry Standpipes

Each hose connection for manual standpipes must be provided with a conspicuous, durable, and permanently legible sign reading "MANUAL STANDPIPE FOR FIRE DEPARTMENT USE ONLY."

## 7.6 TESTS, INSPECTIONS, AND MAINTENANCE

### 7.6.1 Tests

#### 7.6.1.1 Regular Tests

Piping between the fire department connection and the check valve in the inlet pipe must be tested hydrostatically in the same manner as the balance of the system, at intervals of not less than 5 years. Such tests must be performed by sources qualified to accomplish this service.

#### 7.6.1.2 Dry Pipe Testing

Hydrostatic tests at not less than 13.8-bar (200-psi) pressure for 2 hours, or at 3.4 bar (50 psi) in excess of the maximum pressure, where maximum pressure is in excess of 10.3 bar (150 psi), shall be conducted every 5 years on dry standpipe systems and dry portions of wet standpipe systems. Such tests must be performed by sources qualified to accomplish this service.

### 7.6.2 Inspection

#### 7.6.2.1 General

Systematic periodic inspections of all portions of the standpipe system are essential. Inspection procedures for standpipe systems, frequency, and reports are found in NFPA 25.

#### 7.6.2.2 Inspection Procedures

Regular inspection and testing of standpipe systems is necessary to ensure proper operation. All inspections must be accomplished by trained personnel who have the proper equipment and the manufacturer’s service manuals. Specialized inspections must be performed by sources qualified to perform standpipe system inspections.

Table 7-1 shall be used to determine the minimum required frequencies for inspection, testing, and maintenance.

**Table 7-1**
**Summary of Standpipe and Hose Systems Inspection, Testing, and Maintenance**

| Item | Activity | Frequency |
|---|---|---|
| Control valves (sealed) | Inspection | Weekly |
| Control valves (locked) | Inspection | Monthly |
| Pressure regulating devices | Inspection | Quarterly |
| Piping | Inspection | Annually |
| Hose connections | Inspection | Annually |
| Cabinet | Inspection | Annually |
| Alarm device | Test | Quarterly |
| Main drain test | Test | Annually |
| Hose connections | Maintenance | Annually |
| Valves (all types) | Maintenance | Annually/as needed |

Note: References are extracted from NFPA 25.

### 7.6.3 Maintenance

When maintenance is required, it must be performed by trained persons who have the proper equipment and the manufacturer's service manuals. With proper tools and parts, trained postal employees could perform most of the checks and corrective actions required. However, some corrective actions involve specialized activities and those activities must be performed by sources qualified to perform standpipe servicing. Any replacement parts needed should be obtained from the manufacturer or their representative.

Ensure that water supply tanks are kept at the proper level. When pressure tanks are used, ensure that specified pressure for the system is maintained at all times:

a. Valves in the main piping connections to the automatic sources of water supply must be kept fully open at all times.

b. When the system or any portion thereof is found to be unserviceable, it must be removed from service immediately and replaced with equivalent protection, such as extinguishers or fire watches.

**Exhibit 7-1. References and Standards**

**National Fire Protection Association Codes and Standards**

NFPA-14, Standard for the Installation of Standpipe and Hose Systems

NFPA-20, Standard for the Installation of Stationary Pumps for Fire Protection

NFPA 25, Standards for Inspecting, Testing, and Maintenance of Water Based Fire Protection Systems

NFPA-1961, Standard on Fire Hose

NFPA-1962, Standard for the Inspection, Care, and Use of Fire Hose, Coupling,

and Nozzles and the Service Testing of Fire Hose

NFPA-1963, Standard for Fire Hose Connections

**OSHA General Industry Standards**

29 CFR 1910.158, Standpipe and Hose Systems

**NOTE**

For questions concerning OSHA standards, contact your servicing safety office.

NFPA publications are available from:

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

Or at NFPA.org

# SECTION 8
# SPRINKLER SYSTEMS

## 8.1 GENERAL

### 8.1.1 Scope

This chapter cites applicable portions of the OSHA standards, and NFPA and USPS regulations regarding the operation and maintenance of various types of sprinkler systems when installed in postal owned or leased buildings.

### 8.1.2 Purpose

This chapter provides the installation head and maintenance and safety personnel with the necessary information to maintain, repair, inspect, and test both wet and dry type sprinkler systems. Additional information is included to inform maintenance personnel of extra sources and guides to be used in maintenance procedures.

## 8.2 DEFINITION

A sprinkler system is a series of pipes, valves, and various mechanical equipment distributed in a given location that conveys water to outlets for fire extinguishment. Sprinkler systems, which are normally automatic, afford protection to property, equipment, and personnel by extinguishing fire promptly, and continuously discharging water directly on the burning materials.

## 8.3 BASIC REQUIREMENTS

### 8.3.1 Fire Department Connections

Each sprinkler system must have a minimum of one (1) connection which allows the fire department to pump water directly into the system. These connections must be identified by a sign having raised letters at least one (1") inch cast on a plate or fitting showing the type of sprinkler (i.e. AUTO SPKR or OPEN SPKR).

### 8.3.2 Vertical Clearance

Sprinklers must have a minimum vertical clearance of eighteen (18") inches above material below them to properly protect/sprinkle the designated area.

### 8.3.3 Water Supply

Every automatic system must be provided with an automatic water supply capable of providing design flow for at least 30 minutes.

### 8.3.4 Flow Alarms

Water flow alarms must be provided on all systems consisting of more than 20 sprinklers.

## 8.4 TYPES OF SPRINKLERS

### 8.4.1 Wet Pipe Systems

#### 8.4.1.1 Location

Wet pipe systems are only installed where they cannot freeze and where water will not create additional hazards.

#### 8.4.1.2 Use

Systems are charged with pressurized water at all times. Systems operate automatically when the fusible element is released due to a heat build-up. Hose connections may be attached to wet pipe sprinkler systems, if the water supply satisfies both designed demands.

### 8.4.2 Dry Pipe Systems

#### 8.4.2.1 Location

Dry pipe systems are normally installed in areas where the system or portions of the system may freeze.

#### 8.4.2.2 Use

These systems are normally charged with compressed air that is released when one or more of the fusible heads are subjected to heat buildup in a given location. The system must be installed so that it may be totally drained without the formation of water pockets that could freeze and cause damage to the system or prevent portions from operating as designed.

### 8.4.3 Deluge and Pre-action Systems

#### 8.4.3.1 Location

Deluge and pre-action systems are used for fast total application, and are usually found in hazardous areas, such as conveyor openings in the floor. Pre-action systems are designed to protect properties where there is danger of serious water damage as a result of damaged automatic sprinklers or broken pipes.

#### 8.4.3.2 Use

In deluge systems, the entire fire area is sprinklered by admitting water to sprinklers that are open at all times. Deluge systems are actuated by using sensitive thermostatic controls operating on the rate-of-rise or fixed temperature principle or controls designed for individual hazards.

Pre-action systems differ from standard dry pipe systems in that the pre-action system water supply valve is actuated independently of the opening of sprinklers and is opened by the operation of the automatic fire detection system, not by the fusing of a sprinkler head.

## 8.5 ASSOCIATED EQUIPMENT

### 8.5.1 Valves

A typical sprinkler system may include test valves, control valves (i.e. OS & Y, backflow), check valves, dry pipe valves, and deluge or pre-action valves. They are used for flow control, and flow monitoring and usually are supervised to cause the activation of an alarm and/or a supervisory signal in case of water flow or tampering.

### 8.5.2 Alarm Systems

Water motor alarms are required on all systems and are actuated by the flow of water.

### 8.5.3 Sprinkler Heads

Sprinkler heads are used in a given location based on the temperature requirements, the type of system, and on the spray pattern required. When sprinkler heads are replaced, caution must be used so that they are replaced with a head of the same color code or temperature rating (Figure 8-1).

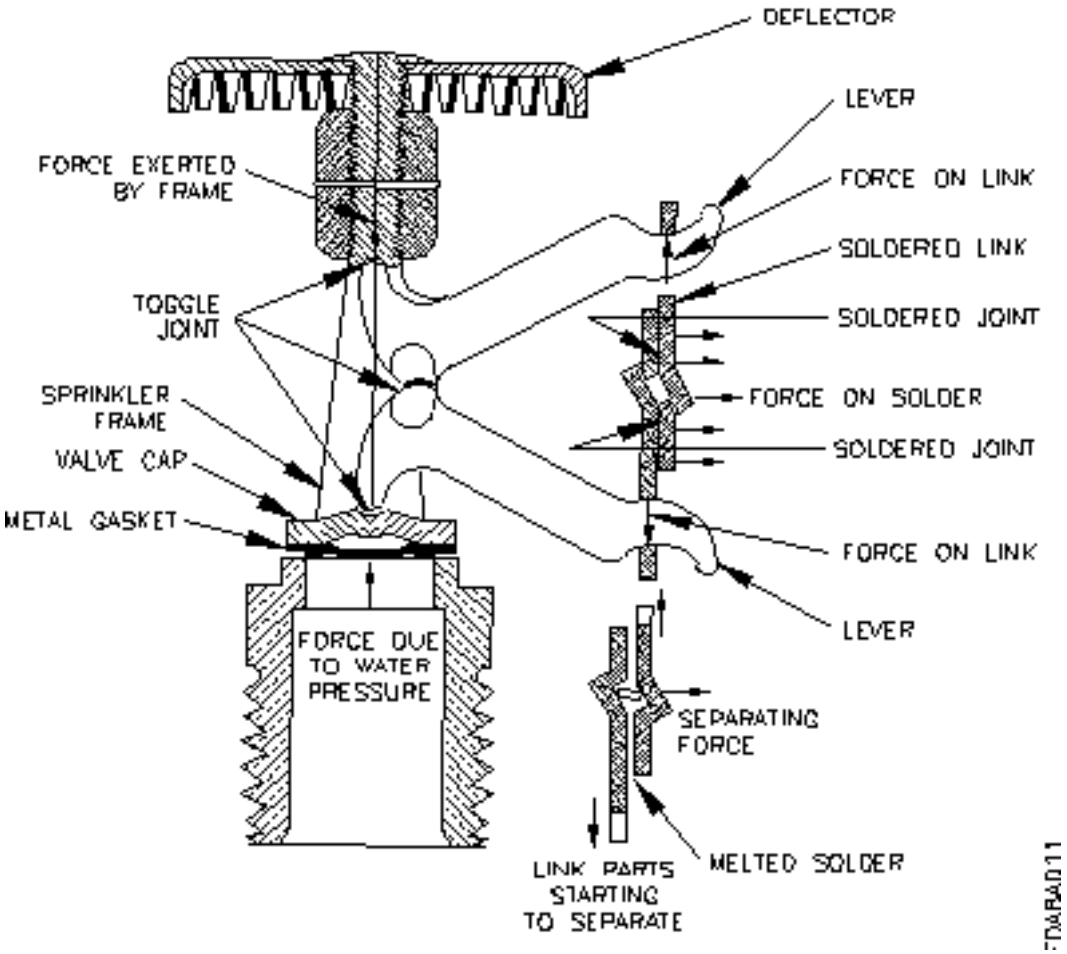


**Figure 8-1. Sprinkler Heads**

### 8.5.4 Pumper Connections

On connections installed for fire department pumper connections, caution must be exercised to ensure threads used on connections are compatible with the local fire department. If threads are not compatible, an adapter may be required. Required mounting height is between 81 and 36 inches from floor.

### 8.5.5 Fire Pumps

Fire pumps supplement the water supply available from public mains, gravity tanks, reservoirs, or other sources. Generally, the centrifugal fire pump is considered standard mainly because of its compactness, reliability, ease of maintenance, hydraulic characteristics, and variety of available drives. Drives for fire pumps may be an electric motor, internal combustion engine, or steam turbine type. Fire pumps must be housed to prevent freezing, dirt accumulation, corrosion, and tampering.

### 8.5.6 Retarding Chamber

Wet pipe systems that are subject to fluctuating water supply pressures need an alarm retarding device in order to prevent false alarms. Retarding chambers are inserted in the water line from the alarm check valve to the water motor gong and the electric circuit.

### 8.5.7 Exhauster or Accelerator

Dry pipe systems with a capacity of more than 500 gallons must have quick opening devices such as exhausters or accelerators. These devices operate as a result of a quick, but not large, drop in system air pressure. Both devices employ two chambers, one open to the dry pipe system and the other closed except for a small orifice, which allows its internal pressure to equalize with the normal dry pipe air pressure. The two chambers are separated by a diaphragm which, under given pressure, moves and actuates valves and mechanisms that open the dry pipe valve.

## 8.6 TESTING

### 8.6.1 Inspector Test Valves

Inspector test valves, which provide for flow equivalent to that from one sprinkler, must be opened at least annually to ensure proper operation of the sprinkler system. This servicing must be performed by trained persons with the proper equipment and manufacturer’s service manuals.

### 8.6.2 Flow Test

A water supply test pipe and pressure gauge must be provided to determine whether water supplies and connections are in order. A 2-inch drain at the sprinkler riser may suffice as a water test valve. This servicing must be performed by trained persons with the proper equipment and manufacturer’s service manuals.

### 8.6.3 Acceptance Test

Acceptance tests for new system installations must include all of the following:

a. Flushing of system and underground connections.
b. Hydrostatic tests of piping.
c. Air tests of dry pipe systems.
d. Dry pipe valve operation.
e. Drainage tests.
f. Certification of tests and materials by qualified contractor.

### 8.6.4 Repairs

Faulty items identified during testing or inspections must be repaired immediately. All sprinkler system repairs must be termed EMERGENCY and receive priority attention. When required to secure a system, or a portion of a system, for maintenance or repair, notification must be given to the proper authorities, including installation head, maintenance manager, fire department, maintenance control office or such other offices as may be required by the installation head. Standby or alternate protection such as fire watch, additional fire extinguishers, etc. must be provided.

## 8.7 MAINTENANCE

### 8.7.1 Responsibility

#### 8.7.1.1 Postal Owned Buildings

The U.S. Postal Service is responsible for periodic inspections, routine preventive maintenance, and repairs on the sprinkler systems in all buildings it owns.

#### 8.7.1.2 GSA Owned Buildings

In all buildings owned by the General Services Administration, GSA is responsible for all preventive maintenance, testing, replacement, and repair to sprinkler systems and components.

#### 8.7.1.3 Lessor Maintained Leased Buildings

In leased buildings, the lessor is responsible for repairs to sprinkler systems and components unless otherwise indicated in the terms of the lease.

#### 8.7.1.4 USPS Maintained Leased Buildings

In total maintenance leased buildings, the Postal Service is responsible for repairs and replacement of system components as well as testing and preventive maintenance.

### 8.7.2 Inspection

#### 8.7.2.1 Valves

All valves must be checked annually to verify that they are in good operating condition, turn easily, and do not leak. Valves must be unobstructed at all times and identified as to location, use, and portions of system controlled. This servicing must be performed by sources qualified with the proper equipment and manufacturer's service manuals.

#### 8.7.2.2 Alarms

System alarms must be tested every quarter (Chapter 6).This servicing must be performed by sources qualified with the proper equipment and manufacturer's service manuals.

#### 8.7.2.3 Sprinklers

Basic sprinkler maintenance must include an annual check of heads to verify that sprinklers have not accumulated an excessive amount of foreign material (such as dust, paint, or even plastic bags that have been placed on them for protection while painting).Materials must not be stacked closer than 18 inches to a sprinkler head. This servicing must be performed by sources qualified with the proper equipment and manufacturer's service manuals.

#### 8.7.2.4 Maintenance Checklists and Guidelines

Checklists and guidelines to perform routine maintenance are available from the following sources:

a. National Fire Protection Association (NFPA 13).
b. OSHA Safety and Health Standards, (29 CFR 1910).
c. Manufacturer's maintenance and repair manuals.

**NOTE**

See Exhibit 8-1 for a further list of applicable references.

### 8.7.3 Training

#### 8.7.3.1 Inspector Training

Systems must be inspected annually by a person knowledgeable in the design, and trained in the function of the system to ensure the system is properly maintained.

#### 8.7.3.2 Employee Training

The employees designated to inspect, maintain, operate, or repair sprinkler systems must be properly trained in all system functions.

### 8.7.3.3 Training Records

Employee training records must be reviewed periodically and training updated as necessary in all functions employees are required to perform.

**Exhibit 8-1. References and Standards**

**National Fire Protection Association Codes and Standards**

NFPA-13, Standard for the Installation of Sprinkler Systems

NFPA-14, Standard for the Installation of Standpipe and Hose Systems

NFPA-15, Standard for Water Spray Fixed Systems for Fire Protection

NFPA-101, Life Safety Code

NFPA, Fire Protection Handbook

**OSHA General Industry Standards**

29 CFR 1910.159, Automatic Sprinkler Systems

29 CFR 1910.160, Fixed Extinguishing Systems, General

29 CFR 1910.165, Employee Alarm Systems

**US Postal Service Documents**

Employee and Labor Relations Manual (ELM), Chapter 8

**NOTE**

For questions concerning OSHA standards, contact your safety office.

NFPA publications are available from:

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269-7471

Or at NFPA.org

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# SECTION 9
# SPECIAL PURPOSE FIXED EXTINGUISHING SYSTEMS

## 9.1 GENERAL

### 9.1.1 Scope

This chapter covers applicable OSHA, NFPA, and USPS requirements for the inspection, testing, maintenance, and repair of special purpose fixed extinguishing systems installed in postal owned or leased buildings (Exhibit 9-1 lists these references).

### 9.1.2 Purpose

This chapter provides the basic maintenance standards, special requirements, and uses of special purpose fixed extinguishing systems.

### 9.1.3 Definition

Special purpose fixed extinguishing systems are systems designed to provide fire protection to specific operations, such as computer rooms and electrical and electronic equipment.

## 9.2 SYSTEM REQUIREMENTS

### 9.2.1 Alarms

Distinctive alarms or annunciating systems that can be perceived above ambient light and/or noise levels must be installed on all fixed extinguishing systems. If the extinguishing system's discharge is not immediately recognizable, alarms or signals must alert employees. Tactile devices may be required to alert those employees who would not recognize a visual or audible alarm. Total flooding fire suppression systems must be provided with alarms that notify employees prior to discharge.

### 9.2.2 Signs

Hazard or caution signs must be posted inside of, and at the entrance to, areas where special purpose fixed extinguishing systems are installed.

### 9.2.3 Abort Switches

Manual pull stations and abort switches must be provided on each special purpose fixed system.

### 9.2.4 Records

Fire suppression agent container inspection and maintenance dates must be recorded on the container, on an attached tag, or in a central location. The original weight and pressure of agent containers must be checked semiannually. Manufacturer's specifications must be available in maintenance files.

### 9.2.5 Rescue

Where a total flooding fire suppression system may trap personnel, a prompt means of rescue must be provided. Special training and warning signs must be considered.

**Exhibit 9-1. References and Standards**

**National Fire Protection Association Codes and Standards**

NFPA 12, Standard on Carbon Dioxide Extinguishing Systems

NFPA 12A, Standard for Halon 1301 Fire Extinguishing Systems

NFPA 75, Standard on the Protection of Information Technology Equipment

NFPA 101, Life Safety Code

NFPA, Fire Protection Handbook Section 18

**OSHA General Industry Standards**

29 CFR 1910.160, Fixed Extinguishing Systems, General

29 CFR 1910.161, Fixed Extinguishing Systems, Dry Chemical

29 CFR 1910.162, Fire Extinguishing Systems, Gaseous

29 CFR 1910.164, Fire Detection Systems

29 CFR 1910.165, Employee Alarm Systems

**American Society for Mechanical Engineers**

American Society of Mechanical Engineers (ASME), Safety Standard for Pressure Vessels for Human Occupancy

**NOTE**

For questions concerning OSHA standards, contact your safety office.

NFPA publications are available from:

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269-7471

Or at NFPA.org

## 9.3 TYPES OF SYSTEMS

### 9.3.1 Carbon Dioxide ($CO_2$) Systems

#### 9.3.1.1 Description

$CO_2$ is a colorless, odorless, electrically nonconductive inert gas that extinguishes fire by reducing the concentrations of oxygen. An adequate amount of carbon dioxide will stop combustion.

#### 9.3.1.2 Ineffective Use

$CO_2$ does not extinguish fires in chemicals with their own oxygen supply, or reactive metals such as sodium or magnesium.

#### 9.3.1.3 Uses

$CO_2$ systems are used to extinguish fires in specific hazards or equipment, and in areas where an inert electrically nonconductive medium is essential.$CO_2$ is effective on:

a. Most gaseous materials or flammable liquids.
b. Electrical hazards such as transformers, oil switches, circuit breakers, etc.
c. Engines using gasoline or other flammable fuels.
d. Ordinary combustibles, such as paper, wood, and textiles.

#### 9.3.1.4 $CO_2$ System Safety

a. $CO_2$ dilutes oxygen in the air. This can create a hazardous atmosphere and threaten the life of humans and other animals. Also large volume discharge of $CO_2$ seriously interferes with visibility during and immediately after discharge because of the production of water vapor or fog.
b. When using a $CO_2$ system, if personnel may be trapped in or enter hazardous atmospheres, suitable safeguards must be provided for prompt evacuation of, and to prevent entry into, such areas. Safeguards may be such things as pre-discharge alarms or flashing lights.
c. $CO_2$ systems with a design concentration of 4 percent or greater must have a pre-discharge alarm for alerting employees.

### 9.3.2 Halon 1301 Systems

#### 9.3.2.1 Description

Halon 1301 is a colorless, odorless, electrically nonconductive fire extinguishing gas.

### 9.3.2.2 Uses

Halon systems are useful for extinguishing fires in specific hazards or equipment, where electrical non-conductivity is essential, where cleanup presents a problem, or where weight vs. extinguishing potential is a factor. In the Postal Service, Halon systems are found in some computer equipment areas. Halon is effective on the following:

a. Some gaseous or flammable liquid materials.
b. Electrical hazards such as transformers, circuit breakers, and electronic equipment.
c. Engines using gasoline or flammable fuels.
d. Ordinary combustibles such as paper and wood.
e. Some hazardous solids.

### 9.3.2.3 Halon System Safety

Halon systems must not be used in concentrations less than 5 percent nor greater than 7 percent in occupied areas. Exposure to Halon 1301 vapors in low concentrations for brief periods may be accomplished without serious risk.

**NOTE**

Halon is not to be used on certain chemical mixtures such as gunpowder or on reactive metals such as sodium, potassium, or magnesium.

### 9.3.2.4 Halon System Removal

When a Halon system needs to be replaced, consult the current MMO on Halon handling.

### 9.3.2.5 Environmental Concerns

Halon 1301 is covered under the Clean Air Act of 1990. It has been identified as a targeted chemical because it is a significant threat to the Earth's ozone layer. As such, it has not been produced since Jan. 1, 1994.

## 9.4 SYSTEM OPERATION

### 9.4.1 Automatic Operation

### 9.4.1.1 Pneumatic Operation

Pneumatic operation occurs when the rate of temperature rise in the hazard area becomes excessive to the point where the pneumatic control head vent cannot bleed off the pressure fast enough and the control head operates.

#### 9.4.1.2 Electric Operation

Electric operation occurs when the temperature or ionization conditions in the hazard area rise to the point where the electrical fire detector operates, activating the control head or solenoid valve located on the suppression system assembly discharge control valve.

### 9.4.2 Manual Operation

#### 9.4.2.1 Local Operation

Local operation is performed by activating the system at the suppression system supply assembly. Operating instructions must be posted at this location.

#### 9.4.2.2 Remote Control

Remote operation is performed by pulling the handle of the remote control box marked for a given hazard area.

## 9.5 TRAINING

All persons expected to inspect, test, maintain, and operate fire extinguishing systems must be thoroughly trained and competent in the functions they are expected to perform.

## 9.6 TESTING

### 9.6.1 Requirements

Systems and their components must be thoroughly inspected and tested in a manner as set forth in NFPA.

### 9.6.2 High Pressure Cylinders

Carbon dioxide cylinders continuously in service without having discharged may be retained in service for a maximum of twelve (12) years before hydrostatic testing and recharging. Halon 1301 systems may be in continuous service for a maximum of twenty (20) years before hydrostatic testing and recharging. The pressure container must be made, tested, approved, equipped, and marked in accordance with the current requirements of the ASME Code for Unfired Pressure Vessels, Safety Standard for Pressure Vessels for Human Occupancy. For compressed gas cylinders passing a hydrostatic test, the month and year is stamped into the cylinder only on the shoulder, top head, neck, or footing.

## 9.7 MAINTENANCE

### 9.7.1 Operating Condition

Systems must be maintained in full operating condition at all times. Any repair of a system must be a priority item classified EMERGENCY.

### 9.7.2 Service Requirements

Damaged or inoperative components must be replaced at once by competent service personnel. It is recommended that system maintenance be performed by a contractor qualified and approved by the system manufacturer.

### 9.7.3 Monthly Inspection

A monthly general inspection of the system must be made to ensure damage to equipment and piping has not occurred, and that access to the extinguisher assembly and control boxes is maintained.

### 9.7.4 Pressure Checks

All agent supply cylinder pressure gauges must be checked monthly for proper operating pressure.

### 9.7.5 Cylinder Weight

Extinguisher assemblies must be checked for proper weight semiannually. If there is a loss of weight, in excess of 5 percent, or a loss of pressure of more than 10 percent of the original weight or pressure, the cylinder must be repaired and/or recharged.

### 9.7.6 Labeling

All components must be checked to verify that they are properly labeled, and are provided with proper operating instructions.

### 9.7.7 Inspection and Testing

At least semiannually, all systems shall be thoroughly inspected, tested and documented for proper operation by trained personnel.