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# Portable Fire Extinguishers

## 1. Purpose / Background

Fires are a leading cause of accidental death resulting in thousands of injuries and fatalities every year in the U.S. Experience has shown that most fires, when discovered in their early stages, can be successfully controlled by trained personnel using portable fire extinguishers (PFEs). Control of small (incipient stage) fires can save lives and prevent property damage.

Insurance carrier requirements (FM Global), the National Fire Protection Association (NFPA), the Occupational Health and Safety Administration (OSHA), 780 CMR Massachusetts State Building Code, and 527 CMR 1.00, Massachusetts Comprehensive Fire Safety Code, have established requirements for portable fire extinguishers.

## 2. Scope

This document covers the minimum requirements for the selection, proper and effective operation, and maintenance of portable fire extinguishers at MIT.

## 3. General Information

**3.1** The type, location, and size (capacity) of PFEs are based on the specific fire hazard(s) present in the work area.

### Classes of Fire Hazards (per NFPA 10)

**3.1.1** Class A: Solid materials such as wood, paper, textiles, plastics, trash, etc.

**3.1.2** Class B: Flammable or combustible liquids such as oil, gasoline, alcohol, etc. (May also be used on grease fires).

**3.1.3** Class C: Energized electrical equipment; if possible, de-energize before using PFE.

**3.1.4** Class D: Combustible metals such as magnesium, aluminum, titanium, etc. (See Section 4.2.6 for further information & procedures for Class D fires).

**3.1.5** Class K: Cooling oils, grease, animal fat, etc.

**3.2** 527 CMR 1.00, Massachusetts Comprehensive Fire Safety Code, 2015, Paragraph 13.6, Portable Fire Extinguishers, NFPA 10 (Portable Fire Extinguishers),

OSHA 1910.157 and this SOP outline requirements for the selection and placement of portable fire extinguishers in the workplace. Key points include:

- 3.2.1** They must be readily accessible, along normal paths of travel, including exits from areas and not obstructed or secured from view.
- 3.2.2** PFEs intended for use on **Class A** fires (ordinary combustibles) shall be placed so as not to exceed a travel distance of 75 feet. Class A PFE Types: Pressurized water; foam; dry chemical (including multipurpose ABC-rated).
- 3.2.3** PFEs intended for use on **Class B** fires (flammable and combustible liquids) shall be placed so as not to exceed a travel distance of 50 feet. Class B PFE Types: Carbon dioxide (CO<sub>2</sub>); foam; dry chemical (including BC-rated (a.k.a. Purple K) & multipurpose ABC-rated), gas agent (Halotron). For additional information or guidance, contact the Facilities Fire Protection Supervisor, MIT Facilities Engineering (FE), or the Environment, Health and Safety (EHS) Office.
- 3.2.4** PFEs intended for use on **Class C** fires (electrical) shall be placed based on the appropriate hazard for Class A or Class B fires. Class C PFE Types: CO<sub>2</sub>; foam; dry chemical (including BC-rated (a.k.a. Purple K) & multipurpose ABC-rated), gas agent (Halotron). For additional information or guidance, contact the Facilities Fire Protection Supervisor, MIT FE, or EHS Office.
- 3.2.5** For **most, but not all** occupancies at MIT, a multipurpose ABC-rated dry chemical type PFE (travel distance spacing of 50 feet) will provide adequate protection. The suggested classification is 4A:80BC.
  - Exception 1: Certain high hazard laboratory operations may need special protection. These areas may require a carbon dioxide or foam-agent PFE. For additional information or guidance, contact the Facilities Fire Protection Supervisor, MIT SEG, or EHS Office.
  - Exception 2: Multi-purpose ABC-rated dry chemical type extinguishers, containing ammonia compounds, are prohibited for use on oxidizers containing chlorine and bromine. Water type extinguishers should be used for these areas. For additional information or guidance, contact the Facilities Fire Protection Supervisor, MIT FE, or EHS Office.
- 3.2.6** Small fires involving reactive metals and organo-metallic compounds (such as magnesium, sodium, potassium, metal hydrides, etc.) may be extinguished with Met-L-X Class D Extinguisher Powder or by covering with dry sand. **\*Dry is defined as 100% free of moisture. Dampness of any kind in the extinguishing media (sand, Met-L-X, or other) or application method (i.e. hands, shovel, scooper, etc.) is extremely dangerous and will cause an adverse reaction with the reactive metal, resulting in a**

**high potential for burn injuries.** The travel distance from the hazard shall be a maximum of 30 feet.

**3.2.6.1** No pressurized PFEs shall be used when extinguishing these types of fires, use only Class D listed/approved PFEs. Note that all Class D materials, once extinguished, must be left in place until fully cooled, so as to not cause a reignition.

**3.2.6.2** Class A, Class B, Class C, Class K, and combination fire extinguishers **are prohibited** to be used to extinguish Class D material fires.

**3.2.6.3 Extinguishing the Class D material fire listed above should be attempted by trained personnel only.**

**3.2.7** Portable fire extinguishers for kitchens (utilizing grease producing equipment such as deep fryers, etc.) shall use a Class K extinguishing agent. The travel distance from the hazard shall be a maximum of 30 feet. Class K PFE Types: Class K “wet chemical.”

**3.2.8** Portable fire extinguisher must be marked by an indicator sign and be installed on a hanger or bracket; in a cabinet; or in a recessed wall pocket.

**3.2.9** Top of extinguisher shall be  $\leq 5$  feet above floor for  $\leq 40$ -pound extinguisher and bottom of extinguisher  $\geq 4$  inches above floor.

## 4. Procedures

### 4.1 Use of Portable Fire Extinguishers at MIT

**4.1.1** Note that there is no mandatory requirement to fight a fire on the MIT campus. Personal safety is the first priority in a fire event.

**4.1.2** In the event of a fire, activate the nearest fire alarm pull station and leave the building.

**4.1.3** Use of portable fire extinguishers at MIT by untrained students and employees is prohibited.

**4.1.4** Only personnel who have completed a portable fire extinguisher training course should attempt to use a portable fire extinguisher, if comfortable doing so. If not, then refer to 4.1.2.

**4.1.5** Portable fire extinguisher training is provided by EHS through course #0408C on a regular basis.

**4.1.6** Portable fire extinguishers shall be deployed by trained personnel during all forms of hot work including open flame work, spark producing/grinding activities and welding/cutting (refer to SOP 0058 Hot Work Program for details).

## 4.2 Operating a Portable Fire Extinguisher (Trained personnel only)

- 4.2.1 Refer to MIT EHS SOP 0053: Control and Reporting Fires for detailed explanations in support of EHS training course #00408c and for the procedures outlined below.
- 4.2.2 Portable fire extinguishers are only effective on incipient stage fires (e.g. small, early stage).
- 4.2.3 Do not use a pressurized water fire extinguisher on a flammable liquid fire or an electrical fire.
- 4.2.4 Use extreme caution in confined areas.
- 4.2.5 Always activate the nearest fire alarm pull station before attempting to extinguish a fire.
- 4.2.6 Make sure that the exit door is behind you at all times and you have a clear means of egress.
- 4.2.7 After the fire has been extinguished, notify the MIT Operations Center (who shall contact Cambridge Fire Department (CFD)) and the EHS Office. Be available to assist in a follow-up investigation.
- 4.2.8 Fires can re-ignite; so do not resume operations until the CFD and the EHS Office have inspected and cleared the area for reuse.
- 4.2.9 Remember **PASS** for portable fire extinguisher operation: *Refer to training course for details.*
  - P**ull the pin.
  - A**im the extinguisher.
  - S**queeze the handle.
  - S**weep the extinguisher stream back and forth at the base of fire.

## 4.3 Portable Fire Extinguisher Annual Maintenance – outsourced service

- 4.3.1 PFEs, including Class D extinguishing agents, shall be inspected monthly.
- 4.3.2 PFEs shall be evaluated and serviced (as needed) at least annually.
- 4.3.3 Only qualified PFE technicians shall examine and service portable fire extinguishers.
- 4.3.4 PFEs shall be checked annually for physical damage that would prevent operation. This includes dents, broken parts, or signs of corrosion.
- 4.3.5 The pressure gauge level shall be verified that it is in the normal working green range (carbon dioxide fire extinguishers are weighed.)
- 4.3.6 PFEs shall require maintenance every six (6) years, unless otherwise noted, in accordance with the requirements in NFPA 10.

- 4.3.7 Carbon dioxide, wet chemical, foam, and pressurized water PFEs shall undergo hydrostatic testing every five (5) years.
  - 4.3.7.1 Maintenance shall be performed every five (5) years.
- 4.3.8 Dry-chemical, dry-powder, and halogenated PFEs shall undergo hydrostatic testing every twelve (12) years.
  - 4.3.8.1 Note that maintenance is required on a six (6) year basis.
- 4.3.9 Hydrostatic testing and maintenance shall be performed by a qualified PFE service company, at the direction of the Department of Facilities (DOF).
- 4.3.10 A qualified technician shall re-tag, initial, mark and date the fire extinguisher prior to it being placed back into service.

## 4.4 Monthly Inspections

- 4.4.1 Monthly inspections are required and can be manually inspected or have electronic monitoring. Departments, Laboratories, and Centers are responsible for inspecting PFEs, on a monthly basis.
- 4.4.2 Verification shall be made that the PFEs are mounted at the code-required location.
- 4.4.3 Verify that the PFEs are visible, accessible, and are equipped with wall-mounted signage that reads "Fire Extinguisher."
- 4.4.4 Inspect for obvious damage and that the plastic tamper seals are intact.
- 4.4.5 Verify that pressure gauge is within the green range.
- 4.4.6 Verify that a maintenance tag is present and current (e.g. maintenance was performed within the last year.)
- 4.4.7 Initial and date the inspection log on the maintenance tag.
- 4.4.8 Notify DOF Repair and Maintenance if a problem is found.

## 5. Roles & Responsibilities

### 5.1 Department of Facilities

- 5.1.1 Ensure that PFEs have been provided based on the hazard exposure and regulatory requirements for all new construction, renovation/space change projects.
  - 5.1.1.1 Requests for PFEs shall be made through DOF Repair & Maintenance (R&M) Office.
- 5.1.2 Ensure that a qualified vendor performs annual maintenance on PFEs.
- 5.1.3 Responsible for inspecting PFEs in buildings and building areas under the jurisdiction of the DOF, on a monthly basis.

## 5.2 Departments, Laboratories, and Centers (DLCs)

- 5.2.1 Report any new fire hazards in an area to the EHS Office.
- 5.2.2 If a PFE is missing or required for an area, contact DOF R&M to supply and install as needed.
- 5.2.3 Ensure that only trained personnel use PFEs.
- 5.2.4 Communicate explicitly that use by untrained personnel is prohibited, unless the situation dictates immediate action.
- 5.2.5 Responsible for inspecting PFEs in building areas under the jurisdiction of the DLC, confirm that the common areas are either the responsibility of DOF or the DLC, on a monthly basis.
- 5.2.6 During Level 2 inspections, verify that PFEs are being inspected annually for those located in laboratory and shop areas.
- 5.2.7 Any situation that resulted in the discharge of a PFE must be reported to CFD, regardless of the size of the fire, per SOP-0053.

## 5.3 EHS Office

- 5.3.1 Ensure that PFE use training is available on a regular basis (see Section 6).
- 5.3.2 Assist DLCs with interpretation of regulatory requirements related to PFEs.
- 5.3.3 Review and revise this SOP, as needed, on a periodic basis.

## 6. Training

Only trained personnel are authorized to use PFEs. PFE training is provided by EHS through course #0408C on a regular basis.

## 7. Monitoring Requirements

The presence of PFEs in the workplace shall be verified during Level II Inspections. Should there be no PFE present during inspection, submit request that EHS evaluate the situation.

## 8. Record Management

Records including the inspection, testing, and maintenance of PFEs shall be maintained by the DOF.

## 9. References

### 9.1 Standards

- NFPA 10 Portable Fire Extinguishers
- OSHA 1910.157 Portable Fire Extinguishers
- 527 CMR 1.00 Massachusetts Comprehensive Fire Safety Code, 2021

- 780 CMR Massachusetts State Building Code

## 9.2 Other SOP/ SOGs

To view the SOPs/SOGs go to <https://ehs.mit.edu/sops/> and search for the SOP/SOG listed. MIT Certificates are required to view SOPs/SOGs.

- EHS SOP-0053: Control and Reporting Fires
- EHS SOP-0058: Hot Work Program

## 10. Definitions

- **Portable Fire Extinguisher Inspection:** A periodic check to ensure that portable fire extinguishers are available, at their designated location, have not been actuated or tampered with and that there is no obvious damage or condition to prevent use.
- **Portable Fire Extinguisher Maintenance:** A periodic examination to ensure that an extinguisher will operate effectively, has the proper amount of extinguishing material and has undergone required hydrostatic testing.