



# Best Practices Guide For Workplace Fire Safety And Fire Extinguishers

## FIRE IN THE WORKPLACE

The risk of fire in the municipal workplace is a serious concern, both from a property loss and an injury hazard standpoint. Even if a fire injures no employees or building occupants, the disruption to municipal services can be considerable and important information can be lost.

Each year in the U.S., 70-80,000 workplaces experience a serious fire. About 200 employees per year die in these fires and another 5000 are injured. Property losses from workplace fires exceed \$2 Billion annually.

The good news is that only about 15% of workplace fires result from a catastrophic failure of equipment. 85% are caused by factors related to human behavior. This means that by being proactive, with a simple fire prevention plan and program, you can greatly reduce the likelihood of a fire in your workplace. Also, with a simple emergency plan as well as proper detection and fire extinguishers, you can greatly reduce the chances of injury or serious loss, should a fire occur.

## THE FIRE PREVENTION PLAN

To develop an effective fire prevention plan, evaluate each building or workplace using the list of common and special fire hazards on the following pages. For each that exists in a particular workplace, assign control measures to reduce the risk and assign an individual to be responsible for maintaining these control measures.

For maximum effectiveness, fire prevention plan items should be included in a periodic hazard inspection program as part of your overall safety and health program.

The form attached as APPENDIX A can be used as a starting point for a fire prevention program in your workplace.

## COMMON FIRE HAZARDS AND THEIR CONTROL

- A. **Heating Equipment-** Improperly installed, operated, or maintained furnaces and other heating equipment can lead to a fire.
1. Heating equipment should be installed and serviced annually by a licensed technician.
  2. Every furnace or heater has required minimum clearance distances on all four sides and above. Material and building components must be kept out of this area.
  3. Combustible material must never be stored in furnace rooms. Some furnace malfunctions can cause sparks and embers. FURNACE ROOMS ARE NOT STORAGE ROOMS.
  4. Temporary heating units should generally not be used in public buildings. If they must be used, they should be UL listed, equipped with tip-over protection and the manufacturer's recommendations for use strictly followed- especially clearances around the unit! Electric heaters can easily overload electrical branch circuits, causing another fire hazard. An electrician should be consulted to ensure that current amperage limits are not being exceeded.

B. **Electrical-** Misused, overloaded, damaged, or improperly maintained electrical equipment is a very common cause of workplace fires.

1. Extension cords should only be used for temporary power to “in hand” equipment that is in use by someone “NOW”. They should never be used:
  - a) To power equipment on a semi-permanent basis, in lieu of plugging the equipment directly into a proper outlet.
  - b) Run through walls, above ceilings etc.
  - c) Attached to building surfaces.
  - d) Where subject to crushing or pinching.
2. Cords should never be left coiled up while plugged in. This can cause inductive heating that will damage the insulation and can cause fires.
3. Multiple outlet strips should be used only where equipped with a surge suppressor and used to power only computer equipment. They must never be used to power appliances or other electric equipment. Doing so can overload outlets and branch circuits.

**Extension cord and multiple outlet strip misuse is the most common cause of office fires!**

4. Circuits must not be overloaded. Warm or hot circuit breakers indicate an overloaded circuit and a serious fire hazard.
5. Romex type wiring must be properly secured and supported. It should never be used as flexible temporary wiring. damaged conduit, wires, junction boxes, outlets and switches must be de-energized and repaired by a qualified electrician immediately.
6. Air vents on electrical and electronic equipment must never be blocked and should be kept clear of dust and lint.
7. Circuit breakers should be “exercised” every six months, by turning them off and on, to ensure proper function.

C. **Conventional Cooking-** Microwave ovens, coffee makers and stoves used for food warming can cause fires if misused.

1. NEVER leave cooking unattended.
2. All break/kitchen rooms should be equipped with smoke detectors.
3. Combustible material must be kept away from stovetops.
4. Follow microwave container recommendations and popcorn instructions carefully.

D. **Laundry-** Misused or improperly maintained washers and dryers can cause fires.

1. Do not overload washers or dryers.
2. Clean lint traps before use. Clean dryer ducts periodically.
3. Follow laundering instructions on garments. Some synthetics are a fire hazard if dried improperly.
4. Use only dryer duct approved for that purpose. Many hardware stores sell ventilation duct that is not rated for dryer exhaust temperatures.
5. Do not launder clothing contaminated with gasoline or other flammable liquids.

- E. **Mechanical Friction**- Improperly maintained or cleaned mechanical equipment can lead to fires.
  - 1. Bearings on ventilation equipment and conveyors should be kept properly lubricated and aligned.
  - 2. Conveyors and mobile equipment such as loaders and forklifts should be kept cleaned and free of accumulations of combustible material.
- F. **Housekeeping**- Poor housekeeping can lead to fires and increase the severity of fires from other causes.
  - 1. Excessive storage of boxes and other combustible material increases fuel loading that can increase fire severity and decrease the time occupants have to get out in the event of a fire.
  - 2. Stored material must not obstruct exits, walkways, electrical panels, or emergency equipment.
  - 3. Combustibles should not be stored close to heat sources.
  - 4. Stored material must not be within 18" of the level of sprinkler heads.
- G. **Proximity Hazards**- Hazards outside of buildings can expose them to the risk of fire.
  - 1. Other buildings within 100' pose a risk and should be evaluated for fire risk and considered in emergency plans.
  - 2. Fuel tanks near buildings should be installed to current codes and protected from vehicle collisions by barricades.
  - 3. Dumpsters should be at least 30' from buildings to prevent dumpster fires from exposing a structure.
  - 4. Weeds/grass/brush should be kept mowed back at least 30 feet from buildings to avoid fire exposure during the spring wildfire season.
- H. **Smoking**- Unauthorized smoking or poor setup of smoking areas can cause fires.
  - 1. Smoking is prohibited in all Maine public buildings. Unauthorized smoking in buildings must be addressed and stopped if it exists.
  - 2. Outside smoking areas must be kept away from fuel tanks, landscaping that has chips or mulch, dumpsters and building air intakes.
  - 3. Butt cans should be of the self-extinguishing type.

## SPECIAL FIRE HAZARDS

"Special" fire hazards are special because of the severe risk of fire loss that they present, the special or unusual safety controls required to effectively prevent severe fires from them, and the fact that they *usually* are not common in office or residential occupancies.

- A. **Cutting/Welding and other "Hot Work"**- Lack of proper safety equipment and safety procedures during work that produces flames, slag or sparks, such as welding, burning or grinding, can lead to serious fires with high injury risk.
  - 1. Hot work should be restricted to two types of areas approved by supervision:
    - a) Permanent hot work areas, such as shops, which are kept free of combustible material and posted as approved hot work areas.
    - b) Locations that have been inspected and have a written "hot work permit" issued.
  - 2. All combustible material within 35' of hot work must be removed or protected with fire resistant coverings. Special attention should be given to floor openings that slag and sparks can fall into.

3. An individual should stand "fire watch" for 30 minutes after "hot work" is done.
  4. Welding leads must be frequently inspected and free from damage. Do not repair leads with electrical tape.
  5. All torches should be equipped with flashback arresters and the hoses inspected frequently. Cylinders should be shut off and the system bled down when not in use.
  6. Oxygen and fuel gas cylinders in storage (not on a torch cart) should be properly secured, capped and separated by 20' or a ½ hour fire barrier, such as a cement block wall, at least 5 feet high. Torch cylinders should be capped at all times when regulators are not attached.
- B. Flammable Liquid Storage and Handling** - Improper handling and storage of flammable liquids, such as gasoline and solvents, can lead to dangerous "flash" fires.
1. Flammable liquids should not be used or stored inside buildings unless it is absolutely necessary to operations. If it is necessary to store flammable liquids inside buildings, the quantity should be limited to the minimum necessary.
  2. DO NOT store flammable liquids in furnace/boiler rooms.
  3. If 25 or more gallons of flammable liquids must be stored in one building, a UL listed flammable liquid cabinet should be used. An alternative is a separate storage shed at least 30 feet from the main building.
  4. Gasoline should only be stored in UL Type I or Type II safety cans.
  5. If flammable liquids are dispensed from drums or portable tanks, proper bonding and grounding techniques must be used. Always set portable containers on the ground before filling.
  6. Parts washer covers must rest on their fusible link when open.
- C. Spontaneous Combustion**- Improper storage of oily rags, chemicals, hay, straw, leaves, or coal can result in a fire.
1. Oily rags should be disposed of in an airtight metal container, which is regularly emptied to an outside container at least 30 feet from buildings. Plant based oils such as linseed oil and wood stains are the most hazardous.
  2. Oxidizers, such as pool treatments, tile cleaners, and disinfection/fluoridation chemicals should not be stored near combustible or flammable liquids. If they mix, a fire can result.
  3. Damp hay, straw, or leaves can spontaneously ignite. Store only in outside structures at least 30 feet from main buildings. Never allow hay/straw bales as decorations inside buildings.
- D. Commercial Cooking Equipment**- Commercial cooking, especially that which generates grease laden vapors, is a serious fire loss hazard.
1. Fryers, griddles and other equipment generating grease laden vapors must have a hood and ventilation system meeting the requirements of NFPA Standard 96.
  2. Grease baffles must be properly installed when the equipment is in use.
  3. Grease baffles must be washed frequently. Ductwork must be cleaned periodically.
  4. Grease vents must not discharge horizontally through a combustible wall.
  5. Open flame equipment, such as char broilers and gas stove burners, must be separated from the grease surface by 8", horizontally, vertically, or by use of an 8" high metal divider.
  6. Fryers, griddles and other equipment generating grease laden vapors must have a Class K wet agent automatic fire extinguishing system that meets the performance requirements of UL 300. DRY CHEMICAL extinguishing systems are not effective against modern vegetable based oils!

7. A Class K wet agent portable extinguisher should be installed in all kitchens where any frying takes place.
- E. **LPG (“Propane”) and Natural Gas**- Improper use of portable gas fueled equipment and inadequate maintenance of piped in gas equipment and systems can lead to serious fires and facility threatening explosions.
1. Only gas fired portable equipment that is approved for indoor use should be used indoors. The use of portable gas fired equipment indoors should be limited to essential operations only.
  2. All gas fired equipment and fuel systems should be serviced annually by a qualified technician.
  3. Regulators must be kept clear of ice, spider webs etc.
  4. Inside storage of gas cylinders should be kept to a minimum needed. An approved cabinet or storage room should be used. Gas cylinders must never be stored within 50’ of exits.
  5. our emergency plan should clearly require immediate evacuation in the event of a suspected leak. All evacuated personnel should be moved at least 100’ from the building ASAP.

## BEING PREPARED FOR WORKPLACE FIRES

Despite all prevention efforts, fires can still occur in the workplace. It may occur because of an equipment failure, an unanticipated hazard, an act of violence, or due to a violation of a fire safety rule. If a fire does occur in your workplace, how well you have prepared will determine the chances of everyone getting out safely and the loss kept to a minimum. Readiness for a fire emergency is referred to as the **“Fire Defense Triad”**:

1. **DETECTION/NOTIFICATION**- Finding out that there is a fire, as early as possible, letting all building occupants know about it, and notifying emergency services to respond.
2. **EMERGENCY EGRESS**- Having a way to exit the building safely and to make sure everyone is out.
3. **INCIPIENT SUPPRESSION**- Automatic sprinkler systems, fire hoses, and portable fire extinguishers that can put the fire out in its early stages.

### DETECTION/NOTIFICATION

In a small town office building, this may be as simple as someone yelling “fire!” and having an agreed upon meeting place outside. Larger buildings may have complete fire alarm systems with detectors; pull stations, and audible/visual alarm signals. It is important that everyone know exactly what type of fire alarm detectors are present in the building and whether the alarm notifies the fire department (proprietary or central station) or not (local alarm). Even if notification of emergency responders is automatic, someone should still be designated to call 911 from a safe location, in case the system fails. A 911 call also gives the responders more information.

No matter how small your workplace is, certain areas should have working smoke detectors to provide early warning. These include kitchen/break rooms and laundry areas.

## EMERGENCY EGRESS

An “EXIT” is actually made up of three equally important components:

1. An **EXIT ACCESS**- A clear path through the building to an EXIT DOOR.
2. An **EXIT PROPER** or **EXIT DOOR** leading outside.
3. An **EXIT DISCHARGE**- A safe, clear path from the exit door to a “public way” such as a street or parking lot.

NFPA Standard 101, the “Life Safety Code” sets the actual egress system requirements for any building. While the code requirements vary from occupancy to occupancy, and are beyond the scope of this guide, a few requirements that are applicable to most public buildings are:

1. All exit access, exit, and exit discharge must be made up of approved components. Hallways, aisles, walkways, hinged doors, proper stairs and ramps are approved components. Ladders, spiral stairways and windows are generally not.
2. The exit access and exit width are based on the occupant capacity. As a general rule, exit access should never be narrowed down below the total width of all exit doors at its end. The exit access and exit doors in any building must be a minimum of 36” wide.
3. Doors cannot lock against the direction of exit travel. In occupancies over 50 persons, or high hazard occupancies such as flammable liquid storage rooms and electrical load centers, the door must swing in the direction of exit travel. In occupancies over 100 persons, panic hardware is required.
4. Stair treads must be at least 9” deep and risers must not be over 8”.
5. Two exits are generally required from each area or room, however, minimum dead ends” are allowed to have only one exit. For typical town office type buildings, the maximum dead end is 50’. For schools, it is 20’ unless sprinklered, then it is 50’. For assembly occupancies it is 20’.
6. EXIT signs are required along exit access and at exits unless they are “obvious”. Exit signs must have letters at least 6” tall with ¾” strokes. Some exit signs commonly available do not meet this requirement! Doors that could be confused with exits, must be labeled “Not an Exit” or with their purpose such as “Restroom”, “Closet”, etc.
7. Exit signs must be self illuminated or illuminated by emergency light units. Emergency lighting is required unless there is no occupancy during dark hours.
8. Self-closing fire doors must never be blocked open.
9. Exit discharges need proper stairs and must be kept clear of snow to a public way at all times.
10. Combustible finish in exit access corridors must not exceed 10%. This includes posters and decorations!

## INCIPIENT SUPPRESSION

Incipient suppression in most municipal government buildings is limited to portable fire extinguishers. Some buildings have automatic sprinkler protection and/or automatic suppression systems on special hazards. A few buildings have wheeled or fixed fire extinguishers or fire hoses for employee use.

A qualified contractor must maintain sprinkler and automatic suppression systems annually. Employees who operate equipment with automatic suppression systems should be trained in their purpose, automatic activation methods, and how to manually activate them.

If wheeled/fixed extinguishers or fire hoses are present, and employees are not specifically prohibited by the emergency plan from using them, special training should be provided in their proper operation.

## PORTABLE FIRE EXTINGUISHERS

The proper selection, location, maintenance and use of portable fire extinguishers can greatly reduce the risk of a serious injury or a serious property loss in the event of a fire. As an employer, you have three choices when it comes to employee use of portable extinguishers:

1. Prohibit their use in the emergency plan. Require evacuation of all employees immediately. In this case, no employee training is required.
2. Allow all employees to use extinguishers and train them annually.
3. Train a selected group of employees annually (an “incipient fire brigade”). Prohibit their use by other employees.

If employees will be allowed to use extinguishers, an annual training program must be implemented. As a minimum, this training should include selection, operation of extinguishers and the hazards associated with incipient firefighting. Good training will include the entire Fire Defense Triad and spend a major part of the training on proper “fight or flee” decision making. While not specifically required by safety regulations, “hands on” live fire training greatly increases employee effectiveness if they must ever use an extinguisher. It should be considered occasionally, even if not practical every year.

The selection and placement of extinguishers is based on the types of fire hazards present in any work area:

- **Class A** hazards are ordinary combustibles such as wood, paper, and plastics.
- **Class B** hazards are flammable/combustible liquids such as gasoline, fuel oil, solvents, as well as flammable gases such as LPG and acetylene.
- **Class C** hazards are any type of fire in the presence of energized electrical equipment.
- **Class D** hazards are combustible metals such as magnesium, titanium and aluminum.
- **Class K** hazards are commercial cooking equipment, especially fryers and griddles.

Placement of extinguishers should be as follows:

- **Class A** fire hazards (most areas of most buildings) should be protected by a Class A rated extinguisher within 75’.
- **Class B** fire hazards should be protected by a properly sized Class B rated extinguisher within 50’.
- **Class C** rated extinguishers should be installed in areas where fires involving electrical equipment are likely or in any area where an untrained member of the public might grab an extinguisher in an emergency.
- **Class D** rated extinguishers, approved for the specific metals present, should be installed where combustible metals are worked in a manner creating a hazard. In most cases, this involves handling powdered metals, grinding or machining.
- **Class K** rated extinguishers should be installed in or near areas where frying or other cooking with oils/grease takes place.

The coverage areas for Class A and Class B extinguishers are circles with the extinguisher in the middle. When placing extinguishers of any type, look at the area that it will protect and mount it toward the exit access from that area.

All extinguishers must be mounted using an approved bracket or hanger. Safety standards require that extinguishers not be mounted higher than 60”.

All extinguishers must be properly maintained and inspected to ensure proper operation in the event of an emergency. The requirements are:

- **Maintenance-** A qualified fire equipment vendor must conduct annual maintenance of each extinguisher. This must be documented, usually by attaching a tag.
- **Inspection-** The employer must conduct monthly visual inspections (“quick checks”) of all extinguishers in the workplace. This should be documented on attached tags or in a logbook. A monthly inspection includes ensuring that: the unit is mounted in its place and not blocked, the gauge (if so equipped) is in the “green”, the pin seal is intact, and the unit appears overall ready for use.

Types of extinguishers that are available are:

- **Pressurized Water-** Class A only. These units come in a standard 2 ½ gallon size and generate a 25 foot reach with a water stream that is highly effective at quenching trash and other ordinary combustible fires. The key disadvantage is that they are unsafe, potentially lethal, around energized electrical equipment or flammable/combustible liquids. For this reason pressurized water extinguishers are useful at transfer stations and similar occupancies where the staff are trained in proper extinguisher selection, but ***should never be provided where the public or untrained staff have ready access to them.***
- **Loaded Stream** extinguishers are pressurized water units with a special anti-freeze for use at locations where freezing temperatures are possible.
- **Foam-** Class A and B. Several different types of foam are available, with AFFF and FFFP being the most common. They are effective, in trained hands, at suppressing flammable/combustible liquid fires, but will not extinguish such fires if dripping or squirting fuel is present. One big advantage to this type of extinguisher, however, is that foam can be used to “secure” gasoline spills and prevent ignition until the fire department arrives. Foam conducts electricity so they should not be used around energized electrical equipment and ***should never be provided where the public or untrained staff have ready access to them.***
- **Carbon Dioxide-** Class B C. Carbon dioxide extinguishers have the shortest range, lowest extinguishing capacity pound for pound, and require well trained users to successfully extinguish a fire with them. They are popular for use around electrical equipment, though, since they leave no residue and the gas easily penetrates electrical cabinets and motors.
- **Dry Chemical-** Class B C or Class A B C (“Multiple Purpose Dry Chemical”). Pound for pound, these are the most effective extinguishers for suppressing fires. Since they are safe for use around energized electrical equipment, Multiple purpose dry chemical extinguishers are recommended in any general hazard location where the public, tenants, or untrained staff may misguidedly grab them in an emergency.
- **Halon Replacements-** Class B C or Class A B C. Halogenated hydrocarbon, or “halon” fire extinguishers are still in use in some buildings, with Halon 1211 being the most common. These extinguishers are being phased out, though, due to concerns about damage to the ozone layer. Several halon replacements are available, at higher than dry chemical cost, for situations where the powdered agent from a dry chemical extinguisher might damage sensitive equipment. “Haleotron” is the most common of these agents.
- **Class D extinguishers-** Also called “dry powder” extinguishers come in several types for specific types of metals. Selection of an agent must be based on the metals present in the work area.

# Appendix "A"

## Fire Prevention Plan

Facility: \_\_\_\_\_

Date: \_\_\_\_\_

Completed by: \_\_\_\_\_

Location	Hazard	Controls	Responsible