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Evacuation Plans and Procedures

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This eTool will help small, low-hazard service or retail businesses implement an [emergency action plan](#), and comply with OSHA's [emergency standards](#).

- **Do I need an Emergency Action Plan (EAP)?**
- **What is an EAP?**
- **How do I write my own EAP?**
- **How do I evaluate my workplace to comply with OSHA's emergency standards?**
- **Where can I get additional assistance?**



The eTool is not an OSHA standard or regulation, and it creates no legal obligations. Likewise, the eTool does not eliminate or limit any obligations that may be created by the OSH Act or by OSHA standards or regulations.

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An emergency action plan (EAP) is a written document required by particular OSHA standards. The purpose of an EAP is to facilitate and organize employer and employee actions during workplace emergencies. The elements of the plan must include, but are not limited to:

- Evacuation procedures and emergency escape route assignments.
- Procedures to be followed by employees who remain to operate critical plant operations before they evacuate.
- Procedures to account for all employees after an emergency evacuation has been completed.
- Rescue and medical duties for those employees who are to perform them.
- Means of reporting fires and other emergencies.
- Names or job titles of persons who can be contacted for further information or explanation of duties under the plan.

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OSHA's emergency standards include:

- [1910.36 Design and Construction Requirements for Exit Routes,](#)
- [1910.37 Maintenance, Safeguards, and Operational Features for Exit Routes,](#)
- [1910.38 Emergency Action Plans,](#)
- [1910.39 Fire Prevention Plans,](#)
- [1910.157 Portable Fire Extinguishers,](#)
- [1910.160 Fixed Extinguishing Systems,](#)
- [1910.164 Fire Detection Systems,](#) and
- [1910.165 Employee Alarm Systems.](#)

This eTool applies only to small, low-hazard service or retail businesses. Businesses that deal with hazardous substances (such as [Ethylene Oxide](#), [Methylenedianiline](#), or [Butadiene](#)), or that are subject to the provisions of the [Process Safety Management of Highly Hazardous Chemicals](#), [Hazardous Waste Operations](#), or [Grain Handling](#) standards, also may need to develop an emergency action plan in compliance with [29 CFR 1910.38\(a\)](#). However, these businesses are beyond the scope of this eTool.

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What is an emergency action plan?

An emergency action plan describes the actions employees should take to ensure their safety if a fire or other emergency situation occurs. Well developed emergency plans and proper employee training (such that employees understand their roles and responsibilities within the plan) will result in fewer and less severe employee injuries and less structural damage to the facility during emergencies. A poorly prepared plan, likely will lead to a disorganized evacuation or emergency response, resulting in confusion, injury, and property damage.

[Print a Checklist](#)



[OSHA's Floorplan Diagram example](#)

Use the OSHA expert!



A simple
"fill in the blank"
expert system
helps you write
your own EAP!

Putting together a comprehensive emergency action plan that deals with those issues specific to your worksite is not difficult. It involves taking what was learned from your [workplace evaluation](#) and describing how employees will respond to different types of emergencies, taking into account your specific worksite layout, structural features, and emergency systems. Most organizations find it beneficial to include a diverse group of representatives (management and employees) in this planning process and to meet frequently to review progress and allocate development tasks. The commitment and support of all employees is critical to the plan's success in the event of an emergency; ask for their help in establishing and implementing your emergency action plan.

The following two bullet points will take you to cards within this page that give an overview of an emergency action plan:

- [What should an emergency action plan contain?](#)
- [How do I develop an emergency action plan?](#)

The next five bullet points will take you to external pages that cover the emergency action plan concepts in greater detail:

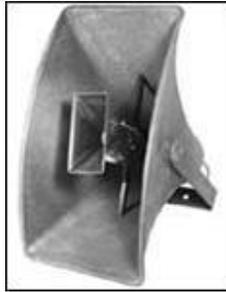
- What are the essential [evacuation elements](#)?
- In some instances, is it better to [shelter-in-place](#)?
- How are [portable fire extinguishers](#) integrated into the emergency action plan?
- What are the [use and limitations](#) of portable fire extinguishers?
- How are [fire, rescue and medical services](#) typically arranged?
- What are the options for [reporting an emergency and alerting employees](#)?

What should an emergency action plan contain?

Your planning process and site-specific emergency action plan should address each of the following elements:

- Preferred procedures for [reporting emergencies](#) such as dialing 911, or an internal emergency number, or pulling a manual fire alarm. [1910.38\(a\)\(2\)\(v\)](#)

- A description of the [alarm system](#) to be used to notify employees (including disabled employees) to evacuate and/or take other actions. The alarms used for different actions should be distinctive and might include horn blasts, sirens, or even public address systems. [[More on Alarms](#)]



- An [evacuation](#) policy, procedures, and escape route assignments so employees understand who is authorized to order an evacuation, under what conditions an evacuation would be necessary, how to evacuate, and what routes to take. Evacuation procedures often describe actions employees should take before and while evacuating such as shutting windows, turning off equipment, and closing doors behind them. [Exit diagrams](#) are typically used to identify the escape routes to be followed by employees from each specific facility location. [1910.38\(a\)\(2\)\(i\)](#)



- Procedures for [sheltering-in-place](#).
- Procedures for [employees who remain](#) on site after the evacuation alarm sounds, if required, before evacuating. Employees may be required to operate fire extinguishers or shut down gas and/or electrical systems and other special equipment that could be damaged if left operating or create additional hazards to emergency responders (such as releasing hazardous materials). [1910.38\(a\)\(2\)\(ii\)](#)
- Procedures to [account for employees](#) after the evacuation to ensure that everyone got out. This might include procedures for designated employees to sweep areas, checking offices and rest rooms, before being the last to leave a workplace or conducting a roll call in the assembly area. Many employers designate an "evacuation warden" to assist others in an evacuation and to account for personnel. [1910.38\(a\)\(2\)\(iii\)](#)
- The duties, responsibilities, and names of employees assigned with [rescue and medical tasks](#). Most small organizations rely on local public resources such as the local fire department or hospital to provide these services. [1910.38\(a\)\(2\)\(iv\)](#)



- A [description of how employees will be informed](#) of the contents of the plan and trained in their roles and responsibilities. [1910.38\(a\)\(5\)](#)
- The names, titles, departments, and phone numbers of employees who can be contacted for additional information or clarification of some aspect of the plan. [1910.38\(a\)\(2\)\(vi\)](#)

- A list of key personnel who should be contacted during off-hours emergencies. [1910.38\(a\)\(2\)\(vi\)](#)



Although they are not specifically required by OSHA, you may find it helpful to include the following in your plan:

- The site of an alternative communications center to be used in the event of a fire or explosion; and
- A secure on- or offsite location to store originals or duplicate copies of accounting records, legal documents, your employees' emergency contact lists, and other essential records.

Effective plans often call for retraining employees annually and include drills in which employees can practice evacuating their workplace and gathering in the assembly area.

How do I develop an emergency action plan?

A very simple plan will suffice in offices, small retail shops, and small manufacturing settings where there are few or no hazardous materials or processes, and employees evacuate when alarms sound or when notified by public address systems. More complex plans are required in workplaces containing hazardous materials or workplaces where employees fight fires, perform rescue and medical tasks, or delay evacuation after alarms sound to shut down critical equipment. These more complex situations are outside the scope of this eTool.

It is essential that the emergency action plan developed be site specific with respect to emergency conditions evaluated, evacuation policies and procedures, emergency reporting mechanisms, and alarm systems. To assist you in your planning, a series of checklists are provided that identify issues that must be considered when drafting a comprehensive emergency action plan. An explanation of each issue and/or examples of how each issue might be addressed in typical workplaces is provided.

[Print a Checklist!](#)

The best emergency action plans [include employees in the planning process](#), specify what employees should do during an emergency, and ensure that employees receive proper training for emergencies. When you include your employees in your planning, encourage them to offer suggestions about potential hazards, worst-case scenarios, and proper emergency responses. After you develop the plan, review it with your employees to make sure everyone knows what to do before, during, and after an emergency. Keep a copy of your emergency action plan in a convenient location where employees can get to it, or provide a copy to all employees. If you have 10 or fewer employees, you may communicate your plan orally.

Now that you have read through the basic overview of an emergency action plan, use the following links to explore the emergency action plan concepts in greater detail:

- [What are the essential evacuation elements?](#)
- [How are portable fire extinguishers integrated into the emergency action plan?](#)
- [What are the use and limitations of portable fire extinguishers?](#)
- [How are fire, rescue and medical services typically arranged?](#)
- [What are the options for reporting an emergency and alerting employees?](#)

Emergency Action Plan Checklist

General Issues		
<input type="checkbox"/>	Does the plan consider all potential natural or man-made emergencies that could disrupt your workplace?	Common sources of emergencies identified in emergency action plans include - fires, explosions, floods, hurricanes, tornadoes, toxic material releases, radiological and biological accidents, civil disturbances and workplace violence.
<input type="checkbox"/>	Does the plan consider all potential internal sources of emergencies that could disrupt your workplace?	Conduct a hazard assessment of the workplace to identify any physical or chemical hazards that may exist and could cause an emergency.
<input type="checkbox"/>	Does the plan consider the impact of these internal and external emergencies on the workplace's operations and is the response tailored to the workplace?	Brainstorm worst case scenarios asking yourself what you would do and what would be the likely impact on your operation and devise appropriate responses.
<input type="checkbox"/>	Does the plan contain a list of key personnel with contact information as well as contact information for local emergency responders, agencies and contractors?	Keep your list of key contacts current and make provisions for an emergency communications system such as a cellular phone, a portable radio unit, or other means so that contact with local law enforcement, the fire department, and others can be swift.
<input type="checkbox"/>	Does the plan contain the names, titles, departments, and telephone numbers of individuals to contact for additional information or an explanation of duties and responsibilities under the plan?	List names and contact information for individuals responsible for implementation of the plan.
<input type="checkbox"/>	Does the plan address how rescue operations will be performed?	Unless you are a large employer handling hazardous materials and processes or have employees regularly working in hazardous situations, you will probably choose to rely on local public resources, such as the fire department, who are trained, equipped, and certified to conduct rescues. Make sure any external department or agency identified in your plan is prepared to respond as outlined in your plan. Untrained individuals may endanger themselves and those they are trying to rescue.
<input type="checkbox"/>	Does the plan address how medical assistance will be provided?	Most small employers do not have a formal internal medical program and make arrangements with medical clinics or facilities close by to handle emergency cases and provide medical and first-aid services to their employees. If an infirmary, clinic, or hospital is not close to your workplace, ensure that onsite person(s) have adequate training in first aid. The American Red Cross, some insurance providers, local safety councils, fire departments, or other resources may be able to provide this training. Treatment of a serious injury should begin within 3 to 4 minutes of the accident. Consult with a physician to order appropriate first-aid supplies for emergencies. Establish a relationship with a local ambulance service so transportation is readily available for emergencies.
<input type="checkbox"/>	Does the plan identify how or where personal information on employees can be obtained in an emergency?	In the event of an emergency, it could be important to have ready access to important personal information about your employees. This includes their home telephone numbers, the names and telephone numbers of their next of kin, and medical information.

Evacuation Policy and Procedure		
<input type="checkbox"/>	Does the plan identify the conditions under which an evacuation would be necessary?	The plan should identify the different types of situations that will require an evacuation of the workplace. This might include a fire, earthquake, or chemical spill. The extent of evacuation may be different for different types of hazards.
<input type="checkbox"/>	Does the plan identify a clear chain of command and designate a person authorized to order an evacuation or shutdown of operations?	It is common practice to select a responsible individual to lead and coordinate your emergency plan and evacuation. It is critical that employees know who the coordinator is and understand that this person has the authority to make decisions during emergencies. The coordinator should be responsible for assessing the situation to determine whether an emergency exists requiring activation of the emergency procedures, overseeing emergency procedures, notifying and coordinating with outside emergency services, and directing shutdown of utilities or plant operations if necessary.
<input type="checkbox"/>	Does the plan address the types of actions expected of different employees for the various types of potential emergencies?	The plan may specify different actions for employees depending on the emergency. For example, employers may want to have employees assemble in one area of the workplace if it is threatened by a tornado or earthquake but evacuate to an exterior location during a fire.
<input type="checkbox"/>	Does the plan designate who, if anyone, will stay to shut down critical operations during an evacuation?	You may want to include in your plan locations where utilities (such as electrical and gas utilities) can be shut down for all or part of the facility. All individuals remaining behind to shut down critical systems or utilities must be capable of recognizing when to abandon the operation or task and evacuate themselves.
<input type="checkbox"/>	Does the plan outline specific evacuation routes and exits and are these posted in the workplace where they are easily accessible to all employees?	Most employers create maps from floor diagrams with arrows that designate the exit route assignments. These maps should include locations of exits, assembly points and equipment (such as fire extinguishers, first aid kits, spill kits) that may be needed in an emergency. Exit routes should be clearly marked and well lit, wide enough to accommodate the number of evacuating personnel, unobstructed and clear of debris at all times, and unlikely to expose evacuating personnel to additional hazards.
<input type="checkbox"/>	Does the plan address procedures for assisting people during evacuations, particularly those with disabilities or who do not speak English?	Many employers designate individuals as evacuation wardens to help move employees from danger to safe areas during an emergency. Generally, one warden for every 20 employees should be adequate, and the appropriate number of wardens should be available at all times during working hours. Wardens may be responsible for checking offices and

		bathrooms before being the last person to exit an area as well as ensuring that fire doors are closed when exiting. Employees designated to assist in emergency evacuation procedures should be trained in the complete workplace layout and various alternative escape routes. Employees designated to assist in emergencies should be made aware of employees with special needs (who may require extra assistance during an evacuation), how to use the buddy system, and any hazardous areas to avoid during an emergency evacuation.
<input type="checkbox"/>	Does the plan identify one or more assembly areas (as necessary for different types of emergencies) where employees will gather and a method for accounting for all employees?	Accounting for all employees following an evacuation is critical. Confusion in the assembly areas can lead to delays in rescuing anyone trapped in the building, or unnecessary and dangerous search-and-rescue operations. To ensure the fastest, most accurate accounting of your employees, consider taking a head count after the evacuation. The names and last known locations of anyone not accounted for should be passed on to the official in charge.
<input type="checkbox"/>	Does the plan address how visitors will be assisted in evacuation and accounted for?	Some employers have all visitors and contractors sign in when entering the workplace. The hosts and/or area wardens, if established, are often tasked with assisting these individuals evacuate safely.

Reporting Emergencies and Alerting Employees in an Emergency		
<input type="checkbox"/>	Does the plan identify a preferred method for reporting fires and other emergencies?	Dialing 911 is a common method for reporting emergencies if external responders are utilized. Internal numbers may be used. Internal numbers are sometimes connected to intercom systems so that coded announcements may be made. In some cases employees are requested to activate manual pull stations or other alarm systems.
<input type="checkbox"/>	Does the plan describe the method to be used to alert employees, including disabled workers, to evacuate or take other action?	Make sure alarms are distinctive and recognized by all employees as a signal to evacuate the work area or perform other actions identified in your plan. Sequences of horn blows or different types of alarms (bells, horns, etc.) can be used to signal different responses or actions from employees. Consider making available an emergency communications system, such as a public address system, for broadcasting emergency information to employees. Ideally alarms will be able to be heard, seen, or otherwise perceived by everyone in the workplace including those that may be blind or deaf. Otherwise floor wardens or others must be tasked with ensuring all employees are notified. You might want to consider providing an auxiliary power supply in the event of an electrical failure.

Employee Training and Drills		
<input type="checkbox"/>	Does the plan identify how and when employees will be trained so that they understand the types of emergencies that may occur, their responsibilities and actions as outlined in the plan?	<p>Training should be offered employees when you develop your initial plan and when new employees are hired. Employees should be retrained when your plan changes due to a change in the layout or design of the facility, when new equipment, hazardous materials, or processes are introduced that affect evacuation routes, or when new types of hazards are introduced that require special actions. General training for your employees should address the following:</p> <ul style="list-style-type: none"> • Individual roles and responsibilities; • Threats, hazards, and protective actions; • Notification, warning, and communications procedures; • Emergency response procedures; • Evacuation, shelter, and accountability procedures; • Location and use of common emergency equipment; and • Emergency shutdown procedures. <p>You may also need to provide additional training to your employees (i.e. first-aid procedures, portable fire extinguisher use, etc.) depending on the responsibilities allocated employees in your plan.</p>
<input type="checkbox"/>	Does the plan address how and when retraining will be conducted?	If training is not reinforced it will be forgotten. Consider retaining employees annually.
<input type="checkbox"/>	Does the plan address if and how often drills will be conducted?	Once you have reviewed your emergency action plan with your employees and everyone has had the proper training, it is a good idea to hold practice drills as often as necessary to keep employees prepared. Include outside resources such as fire and police departments when possible. After each drill, gather management and employees to evaluate the effectiveness of the drill. Identify the strengths and weaknesses of your plan and work to improve it.



Learn about elements of a good emergency evacuation floorplan by moving your mouse over the items listed below.

[Designate Primary & Secondary Exits](#)

[No Emergency Exits in Restrooms](#)

[Exit Away From Rooms with Hazardous Materials](#)

[No Emergency Exits into Narrow Passages](#)

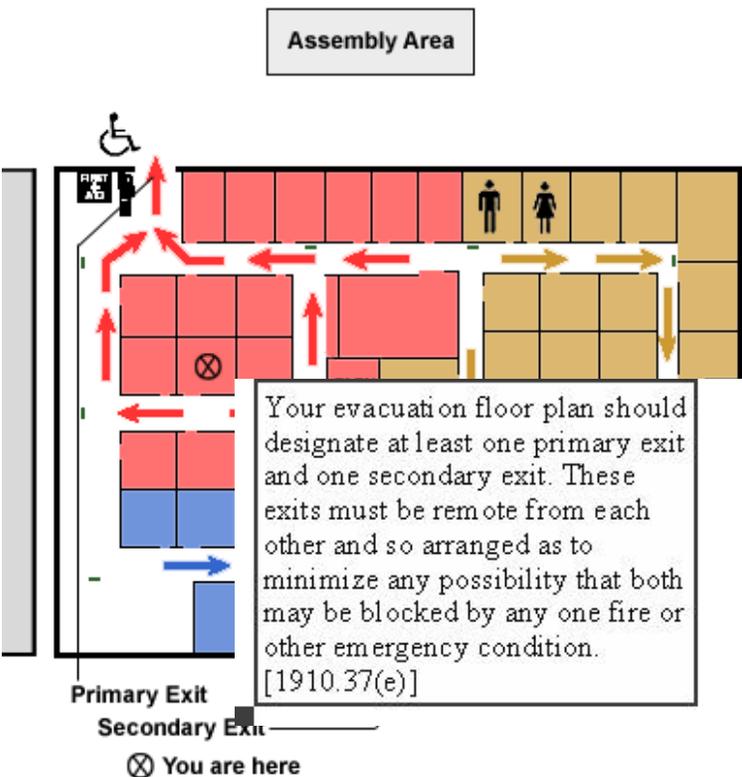
[Exit Signs Indicating the Nearest Emergency Exit](#)

[Designate an Assembly Area](#)

[No Use of Elevators to Reach an Emergency Exit](#)

[Indicate Exits with Wheelchair Access](#)

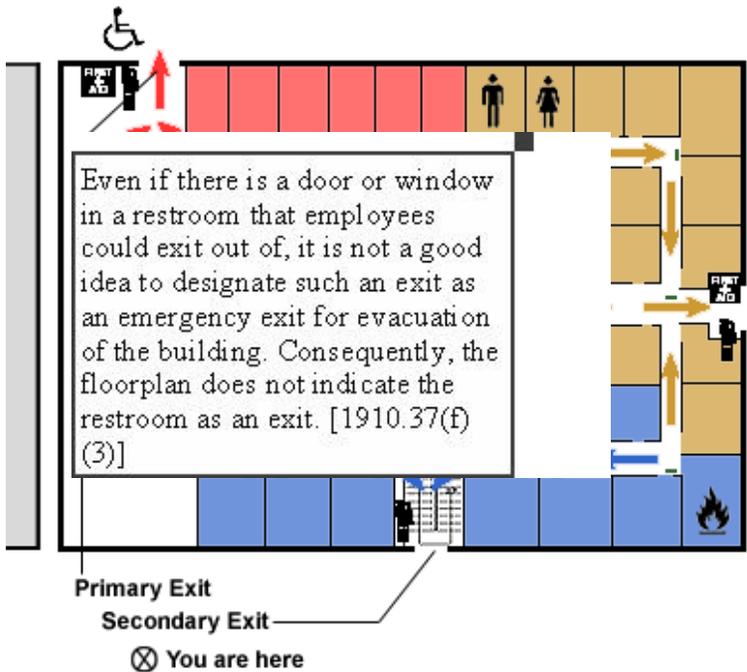
[Indicate the Employee's Current Location](#)



[Designate Primary & Secondary Exits](#)

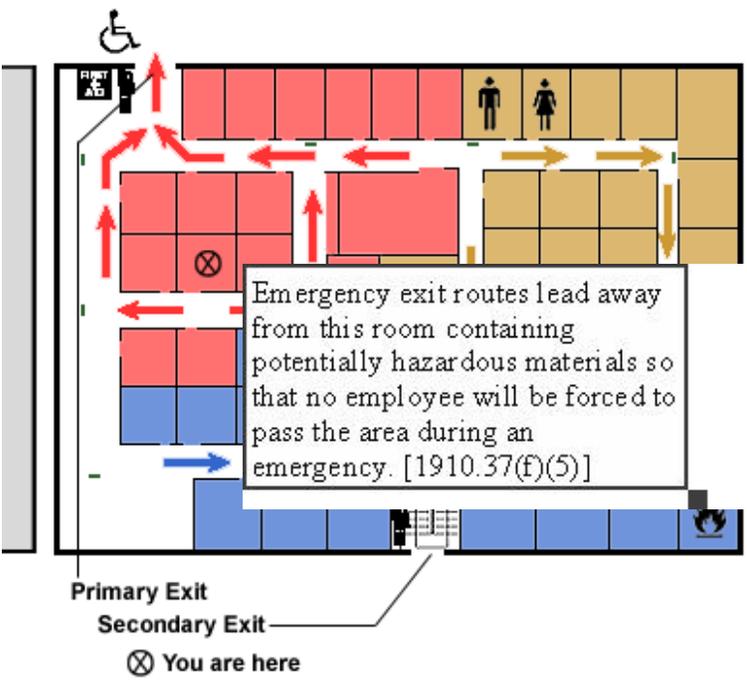
Your evacuation floor plan should designate at least one primary exit and one secondary exit. These exits must be remote from each other and so arranged as to minimize any possibility that both may be blocked by any one fire or other emergency condition.
[1910.37(e)]

Assembly Area



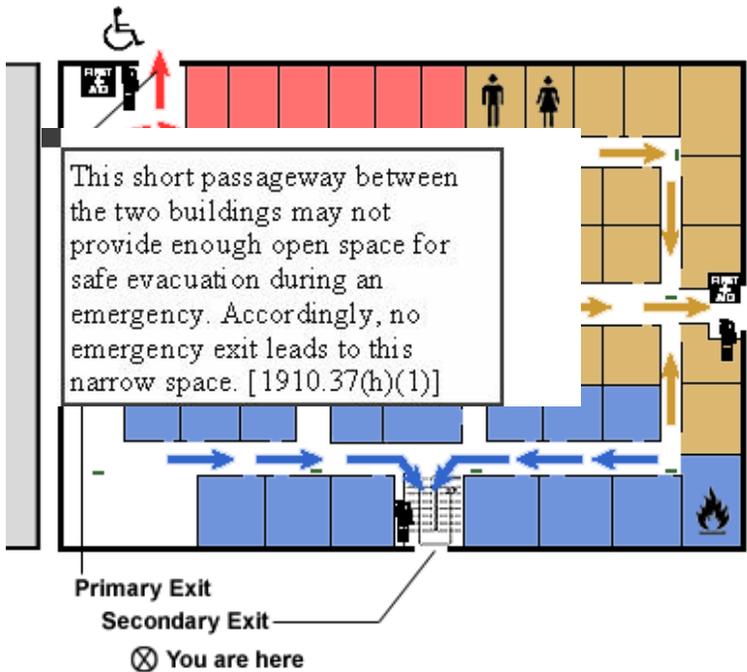
No Emergency Exits in Restrooms

Assembly Area



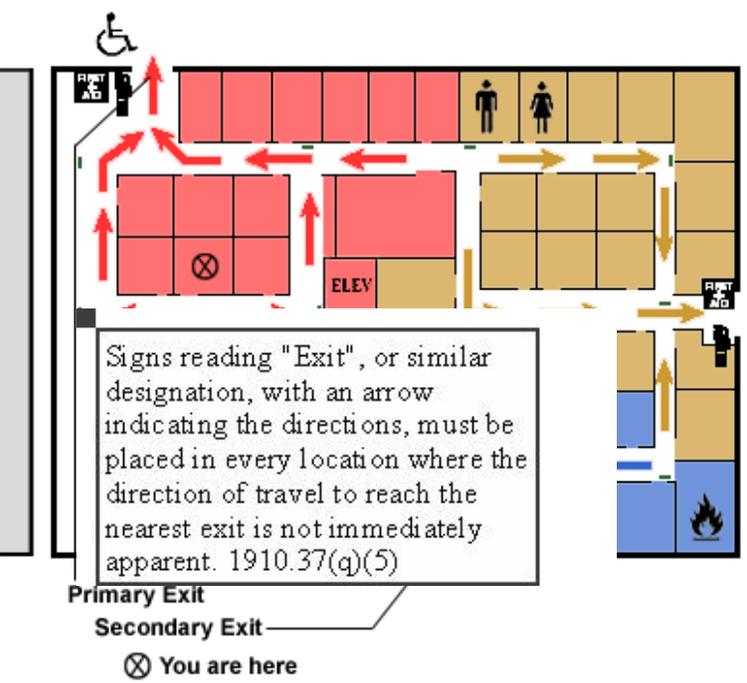
Exit Away From Rooms with Hazardous Materials

Assembly Area

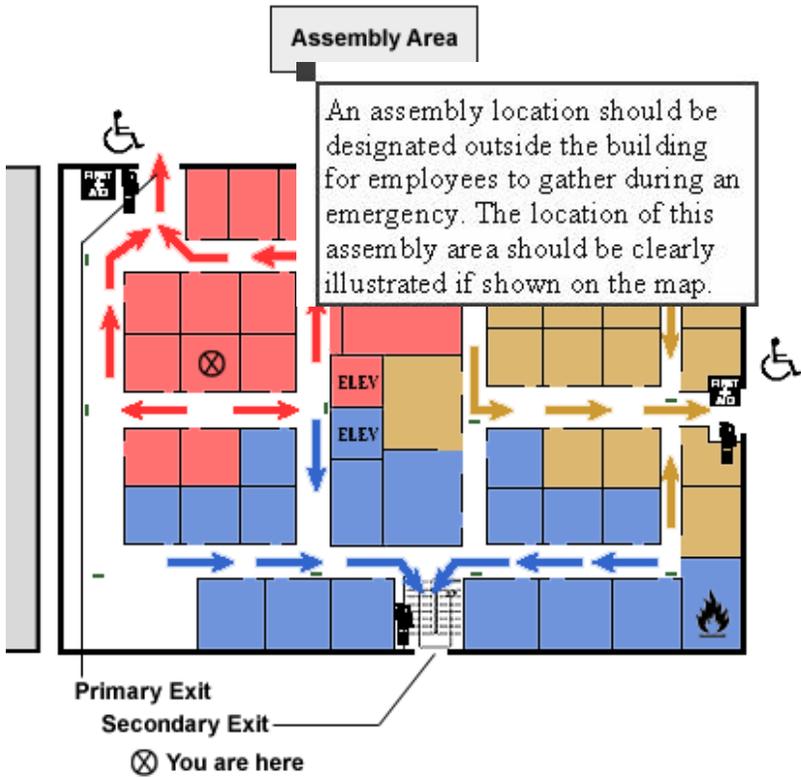


[No Emergency Exits into Narrow Passages](#)

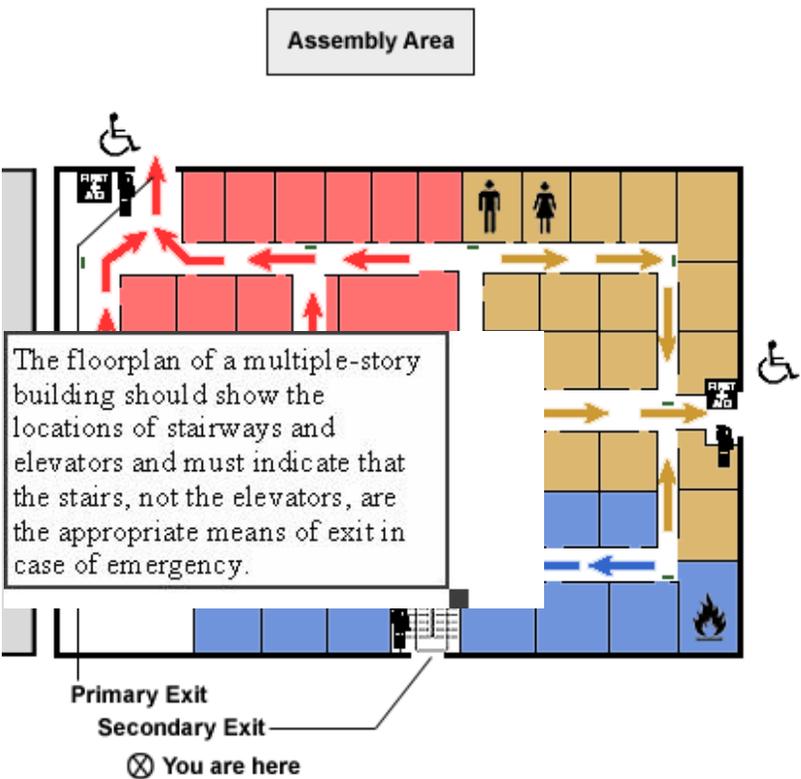
Assembly Area



[Exit Signs Indicating the Nearest Emergency Exit](#)



[Designate an Assembly Area](#)



[No Use of Elevators to Reach an Emergency Exit](#)



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Implementation of the EAP

Drafting an [emergency action plan](#) (EAP) is not enough to ensure the safety of your employees. When an evacuation is necessary, you will need responsible, trained individuals who can supervise and coordinate activities to ensure a safe and successful evacuation. An EAP will be useful only if its content is up to date and employees are sufficiently educated and trained before an actual evacuation. The following sections will help you successfully implement your plan:

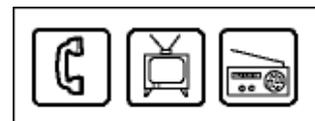
- [Authority](#)
- [Training](#)
- [Plan Review, Coordination, and Update](#)



Authority

It is common practice to select a responsible individual to lead and coordinate your emergency plan and evacuation. It is critical that employees know who the coordinator is and understand that this person has the authority to make decisions during emergencies. The coordinator should be responsible for assessing the situation to determine whether an emergency exists requiring activation of the emergency procedures, overseeing emergency procedures, notifying and coordinating with outside emergency services, and directing shutdown of utilities or plant operations if necessary.

In other instances, local emergency officials, such as the local fire department, may order you to evacuate your premises. If you have access to radio or television, listen to newscasts to keep informed and follow whatever official orders you receive.



When emergency officials, such as the local fire department, respond to an emergency at your workplace, they will assume responsibility for the safety of building occupants and have the authority to make decisions regarding evacuation and whatever other actions are necessary to protect life and property. The highest-ranking responder will assume the incident command role and will work with the onsite emergency coordinator, but will be responsible for directing all response activities.

Employee training

Before implementing the [emergency action plan](#), the employer must designate and train enough people to assist in the safe and orderly emergency evacuation of employees. [1910.38\(a\)\(5\)\(i\)](#) Training should be offered to employees when you develop your initial plan [1910.38\(a\)\(5\)\(ii\)\(A\)](#) and to all

newly hired employees. Employees should be retrained when their actions or responsibilities under the plan change [1910.38\(a\)\(5\)\(ii\)\(B\)](#), or when the plan changes due to a change in the layout or design of the facility, new equipment, hazardous materials, or processes are introduced that affect evacuation routes, or new types of hazards are introduced that require special actions. [1910.38\(a\)\(5\)\(ii\)\(C\)](#)

Educate your employees about the types of emergencies that may occur and train them in the proper course of action. The size of your workplace and workforce, processes used, materials handled, and the availability of onsite or outside resources will determine your training requirements. Be sure all employees understand the function and elements of your [emergency action plan](#), including types of potential emergencies, reporting procedures, alarm systems, evacuation plans, and shutdown procedures. Discuss any special hazards you may have onsite such as flammable materials, toxic chemicals, radioactive sources, or water-reactive substances. An employer must inform employees of the fire hazards present in the workplace. [1910.38\(b\)\(4\)\(i\)](#) Clearly communicate to your employees who will be in charge during an emergency to minimize confusion.

General training for your employees should also address the following:

- Individual roles and responsibilities;
- Threats, hazards, and protective actions;
- Notification, warning, and communications procedures;
- Means for locating family members in an emergency;
- Emergency response procedures;
- Evacuation, shelter, and accountability procedures;
- Location and use of common emergency equipment; and
- Emergency shutdown procedures.

And remember, if training is not reinforced it will be forgotten. Consider retraining employees annually.

You also may want to train your employees in first-aid procedures, including protection against [bloodborne pathogens](#); [respiratory protection](#), including use of an [escape-only respirator](#); and methods for preventing unauthorized access to the site.

Once you have reviewed your [emergency action plan](#) with your employees and everyone has had the proper training, it is a good idea to hold practice drills as often as necessary to keep employees prepared. Include outside resources such as fire and police departments when possible. After each drill, gather management and employees to evaluate the effectiveness of the drill. Identify the strengths and weaknesses of your plan and work to improve it.



Plan review, coordination, and update

Once you have completed your emergency action plan, review it carefully with your employees and post it in an area where all employees will have access to it.

The employer must review with each employee upon initial assignment those parts of the EAP and fire prevention plan (FPP) that the employee must know to protect him or herself in the event of an emergency. The written plans must be available to the employees and

kept at the workplace. For employers with 10 or fewer employees, the plans may be communicated orally, and the employer does not need to maintain written plans.

[1910.38\(b\)\(4\)\(ii\)](#), [1910.38\(a\)\(5\)\(iii\)](#)



The plans also should be reviewed with other companies or employee groups in your building to ensure that your efforts will be coordinated with theirs, enhancing the effectiveness of your plan. In addition, if you rely on assistance from local emergency responders such as the fire department, local HAZMAT teams, or other outside responders, you may find it useful to review and coordinate your emergency plans with these organizations. This ensures that you are aware of the capabilities of these outside responders and that they know what you expect of them.

It is a good idea to hold practice evacuation drills. Evacuation drills permit employees to become familiar with the emergency procedures, their egress routes, and assembly locations, so that if an actual emergency should occur, they will respond properly. Drills should be conducted as often as necessary to keep employees prepared. Include outside resources, such as fire and police departments, when possible. After each drill, gather management and employees to evaluate the effectiveness of the drill. Identify the strengths and weaknesses of your plan and work to improve it.

Operations and personnel change frequently, and an outdated plan will be of little use in an emergency. You should review the contents of your plan regularly and update it whenever an employee's emergency actions or responsibilities change, or when there is a change in the layout or design of the facility, new equipment, hazardous materials, or processes are introduced that affect evacuation routes, or new types of hazards are introduced that require special actions. The most common outdated item in plans is the facility and agency contact information. Consider placing this important information on a separate page in the front of the plan so that it can be readily updated.

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Evacuation Elements

A disorganized evacuation can result in confusion, injury, and property damage. When developing your [emergency action plan](#), it is important to determine the following:

- [Conditions](#) under which an evacuation would be necessary;
- Conditions under which it may be better to [shelter-in-place](#);
- A clear [chain of command](#) and designation of the person in your business authorized to order an evacuation or shutdown;
- Specific evacuation procedures, including [routes and exits](#);
- Specific evacuation procedures for high-rise buildings;
 - [For Employers](#)
 - [For Employees](#)
- Procedures for [assisting visitors and employees to evacuate](#), particularly those with disabilities or who do not speak English;
- Designation of [what, if any, employees will remain](#) after the evacuation alarm to shut down critical operations or perform other duties before evacuating;
- A means of [accounting for employees](#) after an evacuation;
- [Special equipment](#) for employees; and
- [Appropriate respirators](#).



Conditions under which an evacuation would be necessary

A wide variety of emergencies both man-made and natural, may require a workplace to be evacuated. These emergencies include - fires, explosions, floods, earthquakes, hurricanes, tornadoes, toxic material releases, radiological and biological accidents, civil disturbances and workplace violence.

Employers will want their employees to respond differently to these different threats. For example, employers may want to have employees assemble in one area inside the workplace if threatened by a tornado or perhaps a chemical spill on an adjacent highway, but evacuate to an exterior location during a fire. Your plan must identify when and how employees are to respond to different types of emergencies. Ask yourself questions and brainstorm worst-case scenarios. What would happen if the storeroom caught fire, the river flooded, or a chemical release occurred in the shop?

- The type of building you work in may be a factor in your decision. Most buildings are vulnerable to the effects of disasters such as tornadoes,

earthquakes, floods, or explosions. The extent of the damage depends on the type of emergency and the building's construction. Modern factories and office buildings, for example, are framed in steel and are structurally more sound than neighborhood business premises may be. In a disaster such as a major earthquake or explosion, however, nearly every type of structure will be affected. Some buildings will collapse and others will be left with weakened floors and walls.



Steel building

Routes and exits

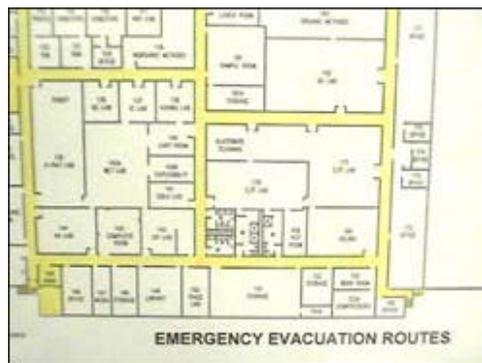
Most employers create maps from [floor diagrams](#) with arrows that designate the exit route assignments. These maps should include locations of exits, assembly points, and equipment (such as fire extinguishers, first aid kits, spill kits) that may be needed in an emergency. Exit routes should be:

- Clearly marked and well lit,
- Wide enough to accommodate the number of evacuating personnel,
- Unobstructed and clear of debris at all times, and
- Unlikely to expose evacuating personnel to additional hazards.



Obstacles in hallways may prevent passageways from providing the [required width](#) to accommodate a safe evacuation.

When preparing drawings that show evacuation routes and exits, post them prominently for all employees to see. [See OSHA's Floorplan Demonstration](#).



Also, see [OSHA's Means of Egress requirements](#).

Procedures for assisting visitors and employees to evacuate, particularly those with disabilities or who do not speak English

Many employers designate individuals as evacuation wardens to help move employees from danger to

safe areas during an emergency. Generally, one warden for every 20 employees should be adequate, and the appropriate number of wardens should be available at all times during working hours.

Wardens may be responsible for checking offices, bathrooms, and other spaces before being the last person to exit an area. They might also be tasked with ensuring that fire doors are closed when exiting. All employees designated to assist in emergency evacuation procedures should be trained in the complete workplace layout and various alternative escape routes if the primary evacuation route becomes blocked. Employees designated to assist in emergencies should be made aware of



employees with special needs (who may require extra assistance during an evacuation), how to use the buddy system, and any hazardous areas to avoid during an emergency evacuation.

Visitors also should be accounted for following an evacuation and may need additional assistance when exiting. Some employers have all visitors and contractors sign in when entering the workplace and use this list when accounting for all persons in the assembly area. The hosts and/or area wardens, if established, are often tasked with helping these individuals safely evacuate.

You also may find it beneficial to coordinate the action plan with other employers when several employers share the worksite, although OSHA standards do not specifically require this.

Employees who may remain to shut down critical operations before evacuating

Certain equipment and processes must be shut down in stages or over time. In other instances it is not possible or practical for equipment or certain process to be shut down under certain emergency situations. This condition, which is not unusual for certain large manufacturers operating complex processes, is not typical of small enterprises that normally can turn off equipment or utilities if necessary and evacuate. However some small enterprises may require designated employees remain behind briefly to operate [fire extinguishers](#) or shut down gas and/or electrical systems and other special equipment that could be damaged if left operating or create additional hazards to emergency responders (such as releasing hazardous materials).

Each employer must review their operation and determine whether total and immediate evacuation is possible for various types of emergencies. The preferred approach, and the one most often taken by small enterprises, is immediate evacuation of all their employees when the evacuation alarm is sounded.

If any employees will stay behind, the plan must describe in detail the procedures to be followed by these employees. All employees remaining behind must be capable of recognizing [when to abandon the operation or task and evacuate](#) themselves before their [egress](#) path is blocked. In small establishments it is common to include in your plan locations where utilities (such as electrical and gas) can be shut down for all or part of the facility either by your own employees or by emergency response personnel.

Accounting for employees after an evacuation

To ensure the fastest, most accurate accountability of your employees, you may want to consider including these steps in your [emergency action plan](#):

- Designate [assembly areas](#) where employees should gather after evacuating;
- Take a head count after the evacuation. Identify the names and last known locations of anyone not accounted for and pass them to the official in charge;
- Establish a method for accounting for non-employees such as suppliers and customers; and
- Establish procedures for further evacuation in case the incident expands. This may consist of

sending employees home by normal means or providing them with transportation to an offsite location.

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What are assembly areas?

Depending on the type of emergency, your plan may designate assembly areas, or areas where employees will gather following an evacuation, both inside and outside your workplace. Assembly locations within the building are often referred to as "areas of refuge." Make sure your assembly area has sufficient space to accommodate all of your employees. Exterior assembly areas, used when the building must be partially or completely evacuated, are typically located in parking lots or other open areas away from busy streets. Try and designate assembly areas so that you will be up-wind of your building from the most common or prevailing wind direction. Accounting for all employees following an evacuation is critical. Confusion in the assembly areas can lead to delays in rescuing anyone trapped in the building, or unnecessary and dangerous search-and-rescue operations. When designating an assembly area, consider (and try to minimize) the possibility of employees interfering with rescue operations.

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Employer Responsibilities

When there is an emergency, getting workers out of high-rise buildings poses special challenges. Preparing in advance to safely evacuate the building is critical to the safety of employees who work there.

- [What actions should employers take...?](#)
- [What should employers do...?](#)



What actions should employers take to help ensure safe evacuations of high-rise buildings?

- Don't lock fire exits or block doorways, halls, or stairways.
- Test regularly all back-up systems and safety systems, such as emergency lighting and communication systems, and repair them as needed.
- Develop a workplace evacuation plan, post it prominently on each floor, and review it periodically to ensure its effectiveness.
- Identify and train floor wardens, including back-up personnel, who will be responsible for sounding alarms and helping to evacuate employees.
- Conduct emergency evacuation drills periodically.
- Establish designated meeting locations outside the building for workers to gather following an evacuation. The locations should be safe distance from the building and in an area where people can assemble safely without interfering with emergency response teams.
- Identify personnel with special needs or disabilities who may need help evacuating and assign one or more people, including back-up personnel, to help them.
- Ensure that during off-hour periods, systems are in place to notify, evacuate, and account for off-hour building occupants.
- Post emergency numbers near telephones.

What should employers do when an emergency occurs?

- Sound appropriate alarms and instruct employees to leave the building.
- Notify, police, firefighters, or other appropriate emergency personnel.
- Take a head count of employees at designated meeting locations, and notify emergency personnel of any missing workers

Disclaimer:

Because every high-rise building has unique characteristics involving location, design, construction, and occupancy, this document covers only some of the basic considerations for safe evacuation. This publication does not substitute for a site-specific evacuation program nor does it detail specific OSHA or OSHA-approved state plan standards that may be applicable to individual work sites. Likewise, it does not create independent legal obligations. In addition, OSHA citations can only be issued for violations of the OSH Act, OSHA standards, or OSHA regulations.



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Employee Responsibilities

When there is an emergency, getting workers out of high-rise buildings poses special challenges. Preparing in advance to safely evacuate the building is critical to the safety of employees who work there.

- [What should employees know...?](#)
- [What should employees do...?](#)
- [What should employees do if trapped?](#)



What actions should employees know before an emergency occurs?

- Be familiar with the work site's emergency evacuation plan;
- Know the pathway to at least two alternative exits from every room/area at the workplace;
- Recognize the sound/signaling method of the fire/evacuation alarms;
- Know who to contact in an emergency and how to contact them;
- Know how many desks or cubicles are between your workstation and two of the nearest exits so you can escape in the dark if necessary;
- Know where the fire/evacuation alarms are located and how to use them; and
- Report damaged or malfunction safety systems and back-up systems.

What should employees do in an emergency?

- Leave the area quickly but in an orderly manner, following the work site's emergency evacuation plan. Go directly to the nearest fire-free and smoke-free stairwell recognizing that in some circumstances the only available exit route may contain limited amounts of smoke or fire.
- Listen carefully for instructions over the building's public address system.
- Crawl low, under the smoke to breathe cleaner air if there is a fire. Test doors for heat before opening them by placing the back of your hand against the door so you do not burn your palm and fingers. Do not open a hot door, but find another exit route. Keep "fire doors" closed to slow the spread of smoke and fire.
- Avoid using elevators when evacuating a burning building.
- Report to the designated meeting place.
- Don't re-enter the building until directed by authorities.

What should employees do if trapped?

- Stay clam and take steps to protect yourself.
- Go to a room with an outside window, and telephone for help if possible.
- Stay where rescuers can see you and wave a light-colored cloth to attract attention.

- Open windows if possible, but be ready to shut them if smoke rushes in.
- Stuff clothing, towels, or newspapers around the cracks in doors to prevent smoke from entering your room.

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Shelter-in-place

Chemical, biological, or radiological contaminants may be released into the environment in such quantity and/or proximity to a place of business that it is safer to remain indoors rather than to evacuate employees. Such releases may be either accidental or intentional. Examples of situations that might result in a decision by an employer to institute "shelter-in-place" include an explosion in an ammonia refrigeration facility across the street, or a derailed and leaking tank car of chlorine on the rail line behind your place of business.

"Shelter-in-place" means selecting an interior room or rooms within your facility, or ones with no or few windows, and taking refuge there. In many cases, local authorities will issue advice to shelter-in-place via TV or radio.

- [Preparing to stay or go](#)
- [Shelter-in-place procedures](#)
- [Links to additional information](#)

Related information:

- [Evacuating - Evacuation elements](#)
- [Fire - Do I fight or flee?](#)



Preparing to stay or go

Depending on your circumstances and the type of emergency, the first important decision is whether you stay put or get away. You should understand and plan for both possibilities. Use common sense and available information, including what you are learning here, to determine if there is immediate danger. In any emergency, local authorities may or may not immediately be able to provide information on what is happening and what you should do. Use available information to assess the situation. If you see large amounts of debris in the air, or if local authorities say the air is badly contaminated, you may want to "shelter-in-place." However, you should watch TV, listen to the radio, or check the Internet often for information or official instructions as it becomes available. If you're specifically told to evacuate or seek medical treatment, do so immediately.



Use telephones, televisions, and radios for receiving instructions or emergency information.



The Internet may be a valuable source of information during an emergency.

If you intend to include a shelter-in-place option in your emergency plan, be sure to keep the following in mind:



Alarm methods may vary depending on the type of emergency.

- Implement a means of [alerting your employees](#) to shelter-in-place that is easily distinguishable from that used to signal an evacuation.
- Train employees in the [shelter-in-place procedures](#) and their roles in implementing them.



Train employees for shelter-in-place procedures just the same as you would for evacuation procedures.

Shelter-in-place procedures

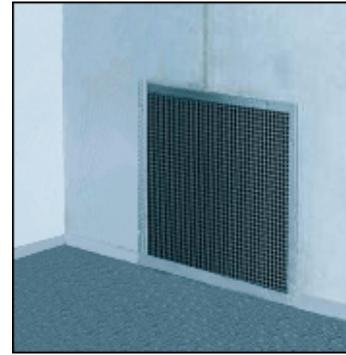
Specific procedures for shelter-in-place at a worksite may include the following:

- Close the business. 
- If there are customers, clients, or visitors in the building, provide for their safety by asking them to stay – not leave. When authorities provide directions to shelter-in-place, they want everyone to take those steps immediately. Do not drive or walk outdoors.
- Unless there is an imminent threat, ask employees, customers, clients, and visitors to call their emergency contact to let them know where they are and that they are safe.
- Turn on call-forwarding or alternative telephone answering systems or services. If the business has voice mail or an automated attendant, change the recording to indicate that the business is closed, and that staff and visitors are remaining in the building until authorities advise it is safe to leave.
- Quickly lock exterior doors and close windows, air vents, and fireplace dampers. Have employees familiar with your building's mechanical systems turn off all fans, heating and air conditioning systems, and clothes dryers. Some systems automatically provide for exchange of inside air with outside air. These systems, in particular, need to be turned off, sealed, or disabled.



Have employees and anyone else in the building call their emergency contacts, then turn on answering systems.

- If you are told there is danger of explosion, close the window shades, blinds, or curtains.



Close or tape-off all vents in the room.



Gather essential supplies such as a first-aid kit.

- Gather essential disaster supplies, such as nonperishable food, bottled water, battery-powered radios, first-aid supplies, flashlights, batteries, duct tape, plastic sheeting, and plastic garbage bags.
- Select interior room(s) above the ground floor, with the fewest windows or vents. The room(s) should have adequate space for everyone to be able to sit. Avoid overcrowding by selecting several rooms if necessary. Large storage closets, utility rooms, pantries, copy and conference rooms without exterior windows will work well. Avoid selecting a room with mechanical equipment like ventilation blowers or pipes, because this equipment may not be able to be sealed from the outdoors.
- It is ideal to have a hard-wired telephone in the room(s) you select. Call emergency contacts and have the phone available if you need to report a life-threatening condition. Cellular telephone equipment may be overwhelmed or damaged during an emergency.
- Take your emergency supplies and go into the room you have designated. Seal all windows, doors, and vents with plastic sheeting and duct tape or anything else you have on hand.
- Consider precutting plastic sheeting (heavier than food wrap) to seal windows, doors, and air vents. Each piece should be several inches larger than the space you want to cover so that it lies flat against the wall. Label each piece with the location of where it fits. [See Fig. 1]
- Write down the names of everyone in the room, and call your business' designated emergency contact to report who is in the room with you, and their affiliation with your business (employee, visitor, client, customer).
- Listen to the radio, watch television, or use the Internet for further instructions until you are told all is safe or to evacuate. Local officials may call for evacuation in specific areas at greatest risk in your community.



Fig. 1. Tape plastic sheeting over vents, windows, and doors to prevent contaminated air from entering the room.

Links to additional information

The following websites provide additional information on Shelter-In-Place:

- [Chemical Stockpile Emergency Preparedness Program \(CSEPP\): Protective Actions](#). Federal Emergency Management Agency (FEMA) (2003, February 11), 2 pages.
- [Make a Plan - Deciding to Stay or Go](#). Ready.gov (U.S. Department of Homeland Security) (2003), 3 pages.
- [Shelter-in-Place in an Emergency](#). American Red Cross (2003), 3 pages.

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Evacuation in or through High Hazard Environments

Though this eTool focuses on evacuations for low-hazard businesses, some small businesses may deal with chemicals or substances that could be hazardous during an emergency. In this situation, a prudent employer may provide additional equipment for employees to safely evacuate.

- [Special equipment for employees](#)
- [Appropriate respirators](#)



Special equipment for employees

Your employees may need personal protective equipment to evacuate during an emergency. Personal protective equipment must be based on the potential hazards in the workplace. Assess your workplace to determine potential hazards and the appropriate controls and protective equipment for those hazards. Personal protective equipment may include items such as the following:

- Safety glasses, goggles, or face shields for eye protection;
- Hard hats and safety shoes for head and foot protection;



Eye and face protection equipment

- [Proper respirators](#);
- Chemical suits, gloves, hoods, and boots for body protection from chemicals;
- Special body protection for abnormal environmental conditions, such as extreme temperatures; and
- Any other special equipment or warning

devices necessary for hazards associated with your worksite.



Chemical Suits

Appropriate respirators

Consult with health and safety professionals before making any purchases. Respirators selected should be appropriate to the hazards in your workplace, meet OSHA standards' criteria, and be certified by the National Institute for Occupational Safety and Health (NIOSH).

Respiratory protection may be necessary if your employees must pass through toxic atmospheres (such as dust, mists, gases, or vapors) or through oxygen-deficient areas while evacuating. There are four basic categories of respirators for use in different conditions. All respirators must be NIOSH-certified under the current [29 CFR 1910.134](#). See also OSHA's [Small Entity Compliance Guide for Respiratory Protection](#).



Tight-fitting facepiece



Full-facepiece SCBA



Particulate APR, N95

- [Additional respirator images](#)

Additional Respirators



Atmosphere supplying respirator



Half-facepiece SAR



Full-facepiece PAPR



Loose-fitting hood



Emergency escape breathing apparatus (above and top right corner)



Half-facepiece APR



Full-facepiece SCBA



Air-purifying respirator

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Evaluating the Workplace - Portable Fire Extinguishers

Workplace fires and explosions kill hundreds and injure thousands of workers each year. One way to limit the amount of damage due to such fires is to make portable fire extinguishers an important part of your fire prevention program. When used properly, fire extinguishers can save lives and property by putting out a small fire or controlling a fire until additional help arrives.



- [Portable fire extinguishers relation to the EAP - fight or flee?](#)
- [Portable fire extinguisher basics](#)
- [Portable fire extinguisher use](#)
- [Portable fire extinguisher placement and spacing](#)
- [Hydrostatic testing](#)
- [OSHA's fire extinguisher requirements](#)
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Fire Extinguishers relation to the EAP - Fight or Flee?

[Fight or Flee?](#) | [Extinguisher Basics](#) | [Extinguisher Use](#) | [Extinguisher Placement and Spacing](#) | [Hydrostatic Testing](#) | [OSHA Requirements](#) | [Test Your Knowledge](#)

A fire is the most common type of emergency for which small businesses must plan. A critical decision when planning is whether or not employees should fight a small fire with a portable fire extinguisher or simply evacuate. Small fires can often be put out quickly by a well-trained employee with a portable fire extinguisher. However, to do this safely, the employee must understand the use and limitation of a portable fire extinguisher and the hazards associated with fighting fires. Evacuation plans that designate or require some or all of the employees to fight fires with portable fire extinguishers increase the level of complexity of the plan and the level of training that must be provided employees.



- [Should employees evacuate or be prepared to fight a small fire?](#)
- [Risk assessment](#)

Should employees evacuate or be prepared to fight a small fire?

Choosing to evacuate the workplace rather than providing fire extinguishers for employee use in fighting fires will most effectively minimize the potential for fire-related injuries to employees. In addition, training employees to use [fire extinguishers](#) and maintaining them requires considerable resources. However, other factors, such as the availability of a public fire department or the vulnerability of [egress routes](#), will enter into this decision.

Option 1	Option 2	Option 3
Total evacuation of employees from the workplace immediately when alarm sounds. No one is authorized to use available portable fire extinguishers.	Designated employees are authorized to use portable fire extinguishers to fight fires. All other employees must evacuate workplace immediately when alarm sounds.	All employees are authorized to use portable fire extinguishers to fight fires.
Requirement	Requirement	Requirement

Establish an emergency action and fire prevention plan and train employees accordingly. If fire extinguishers are left in the workplace, they must be inspected, tested, and maintained.

Establish an emergency action and fire prevention plan and train employees accordingly. Meet all general fire extinguisher requirements plus annually train designated employees to use fire extinguishers. Fire extinguishers in the workplace must be inspected, tested, and maintained.

If **any** employees will be evacuating, establish an emergency action and fire prevention plan and train employees accordingly. Meet all general fire extinguisher requirements plus annually train all employees to use fire extinguishers. Fire extinguishers in the workplace must be inspected, tested, and maintained.

Risk assessment

Portable fire extinguishers have two functions: to control or extinguish small or incipient stage fires and to protect evacuation routes that a fire may block directly or indirectly with smoke or burning/smoldering materials.

To extinguish a fire with a portable extinguisher, a person must have immediate access to the extinguisher, know how to actuate the unit, and know how to apply the agent effectively. Attempting to extinguish even a small fire carries some risk. Fires can increase in size and intensity in seconds, blocking the exit path of the fire fighter and creating a hazardous atmosphere. In addition, portable fire extinguishers contain a limited amount of extinguishing agent and can be discharged in a matter of seconds. Therefore, individuals should attempt to fight only very small or incipient stage fires.

Prior to fighting any fire with a portable fire extinguisher you must perform a risk assessment that evaluates the fire size, the fire fighters evacuation path, and the atmosphere in the vicinity of the fire.

Risk Assessment Question	Characteristics of incipient stage fires or fires that can be extinguished with portable fire extinguishers	Characteristics of fires that SHOULD NOT be fought with a portable fire extinguisher (beyond incipient stage) - evacuate immediately
Is the fire too big?	The fire is limited to the original material ignited, it is contained (such as in a waste basket) and has not spread to other materials. The flames are no higher than the firefighter's head.	The fire involves flammable solvents, has spread over more than 60 square feet, is partially hidden behind a wall or ceiling, or can not be reached from a standing position.
Is the air safe to breathe?	The fire has not depleted the oxygen in the room and is producing only small quantities of toxic gases. No respiratory protection equipment is required.	Due to smoke and products of combustion, the fire can not be fought without respiratory protection.
Is the environment too hot or smoky?	Heat is being generated, but the room temperature is only slightly increased. Smoke may be accumulating on the ceiling, but visibility is good. No special personal protective equipment is required.	The radiated heat is easily felt on exposed skin making it difficult to approach within 10-15 feet of the fire (or the effective range of the extinguisher). One must crawl on the floor due to heat or smoke. Smoke is quickly filling the room, decreasing visibility.
Is there a safe evacuation path?	There is a clear evacuation path that is behind you as you fight the fire.	The fire is not contained, and fire, heat, or smoke may block the evacuation path.



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Fire Extinguisher Basics

[Fight or Flee?](#) | [Extinguisher Basics](#) | [Extinguisher Use](#) | [Extinguisher Placement and Spacing](#)
[Hydrostatic Testing](#) | [OSHA Requirements](#) | [Test Your Knowledge](#)

This section contains basic information on fire and fire extinguishers. It is broken into the following modules:

- [Fire and extinguisher operation](#)
- [Types of fire extinguishers:](#)
 - [Air-pressurized water extinguishers](#)
 - [Carbon dioxide extinguishers](#)
 - [Dry chemical extinguishers](#)



Fire and extinguisher operation

Fire triangle

To understand how fire extinguishers work, you need to understand a little about fire. Fire is a very rapid chemical reaction between oxygen and a combustible material, which results in the release of heat, light, flames, and smoke.



For fire to exist, the following four elements must be present at the same time:

- Enough **oxygen** to sustain combustion,
- Enough **heat** to raise the material to its ignition temperature,
- Some sort of **fuel** or combustible material, and
- The chemical reaction that is fire.

How a fire extinguisher works

Portable fire extinguishers apply an extinguishing agent that will either cool burning fuel, displace or remove oxygen, or stop the chemical reaction so a fire cannot continue to burn. When the handle of an extinguisher is compressed, it opens an inner canister of high-pressure gas that forces the extinguishing agent from the main cylinder



through a siphon tube and out the nozzle. A fire extinguisher works much like a can of hair spray.

Types of fire extinguishers

Different types of fire extinguishers are designed to fight different types of fire. The three most common types of fire extinguishers are:

- [Air pressurized water extinguishers](#)
- [CO2 \(carbon dioxide\) extinguishers](#)
- [Dry chemical extinguishers](#)

All portable fire extinguishers must be approved by a nationally recognized testing laboratory such as Underwriters Laboratories, Inc. (UL) or Factory Mutual Research (FM) to verify compliance with applicable standards [1910.157\(c\)\(2\)](#). Equipment that passes the laboratory's tests are labeled and given an alpha-numeric classification based on the type and size of fire it will extinguish.

Let's take a look at the label pictured. The classification is:



1-A:10-BC

The letters (A, B, and C) represent the [type\(s\) of fire](#) for which the extinguisher has been approved.

The number in front of the A rating indicates how much water the extinguisher is equal to and represents 1.25 gallons of water for every unit of one. For example, a 4-A rated extinguisher would be equal to five (4 x 1.25) gallons of water.

The number in front of the B rating represents the area in square feet of a class B fire that a non-expert user should be able to extinguish. Using the above example, a non-expert user should be able to put out a flammable liquid fire that is as large as 10 square feet.

Extinguisher Type	Type of Fire
 Water	Ordinary Combustibles Fires in paper, cloth, wood, rubber, and many plastics require a water type extinguisher labeled A. 
	Flammable Liquids Fires in oils, gasoline, some paints, lacquers, grease, solvents, and other flammable liquids require an



CO₂

extinguisher labeled B.



OR



Dry Chemical

Electrical Equipment

Fires in wiring, fuse boxes, energized electrical equipment, computers, and other electrical sources require an extinguisher labeled C.



Ordinary Combustibles, Flammable Liquids, or Electrical Equipment



Multi-Purpose

Multi-purpose dry chemical is suitable for use on class A, B, and C.



Metals

D

Combustible metals such as magnesium and sodium require special extinguishers labeled D.

Air-pressurized water extinguishers (APW)



Water is one of the most commonly used extinguishing agents for type A fires. You can recognize an APW by its large silver container. They are filled about two-thirds of the way with ordinary water, then pressurized with air. In some cases, detergents are added to the water to produce a foam. They stand about two to three feet tall and weigh approximately 25 pounds when full.

APWs extinguish fire by cooling the surface of the fuel to remove the "heat" element of the fire triangle.

APWs are designed for Class A (wood, paper, cloth, rubber, and certain plastics) fires only.



Important:

Never use water to extinguish flammable liquid fires. Water is extremely ineffective at extinguishing this type of fire and may make matters worse by the spreading the fire.

Never use water to extinguish an electrical fire. Water is a good conductor and may lead to electrocution if used to extinguish an electrical fire. Electrical equipment must be unplugged and/or de-energized before using a water extinguisher on an electrical fire.

Carbon dioxide extinguishers



This type of extinguisher is filled with Carbon Dioxide (CO_2), a non-flammable gas under extreme pressure. These extinguishers put out fires by displacing oxygen, or taking away the oxygen element of the fire triangle. Because of its high pressure, when you use this extinguisher pieces of dry ice shoot from the horn, which also has a cooling effect on the fire.

You can recognize this type of extinguisher by its hard horn and absent pressure gauge.

CO_2 cylinders are red and range in size from five to 100 pounds or larger.

CO_2 extinguishers are designed for Class B and C (flammable liquid and electrical) fires only.



Important:

CO_2 is not recommended for Class A fires because they may continue to smolder and re-ignite after the CO_2 dissipates.

Never use CO_2 extinguishers in a confined space while people are present without proper respiratory protection.

Locations:

Carbon dioxide extinguishers will frequently be found in industrial vehicles, mechanical rooms, offices, computer labs, and flammable liquid storage areas.

Dry chemical extinguishers



Dry chemical extinguishers put out fires by coating the fuel with a thin layer of fire retardant powder, separating the fuel from the oxygen. The powder also works to interrupt the chemical reaction, which makes these extinguishers extremely effective.

Dry chemical extinguishers are usually rated for class B and C fires and may be marked multiple purpose for use in A, B, and C fires. They contain an extinguishing agent and use a compressed, non-flammable gas as a propellant.

ABC fire extinguishers are red in color, and range in size from five pounds to 20 pounds.

Dry Chemical extinguishers will have a label indicating they may be used on class A, B, and/or C fires.



Locations:

These extinguishers will be found in a variety of locations including: public hallways, laboratories, mechanical rooms, break rooms, chemical storage areas, offices, commercial vehicles, and other areas with flammable liquids.

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Fire Extinguisher Use

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If fire extinguishers are available for employee use, it is the employer's responsibility to educate employees on the principles and practices of using a fire extinguisher and the hazards associated with fighting small or developing fires. [1910.157\(g\)\(1\)](#) This education must be provided annually and when a new employee is first hired. [1910.157\(g\)\(2\)](#)

Employees who have been designated to use fire extinguishers as part of the emergency response plan, must be trained on how to use the fire extinguishers appropriately in the workplace. [1910.157\(g\)\(3\)](#) This training is a specialized form of education that focuses on developing or improving skills and it must be provided annually and when employees are first assigned these duties. [1910.157\(g\)\(4\)](#)



■ [Using a Fire Extinguisher](#)

Using a fire extinguisher

The following steps should be followed when responding to incipient stage fire:

- Sound the fire alarm and call the fire department, if appropriate.
- Identify a safe evacuation path before approaching the fire. Do not allow the fire, heat, or smoke to come between you and your evacuation path.
- Select the appropriate [type of fire extinguisher](#).
- Discharge the extinguisher within its effective range using the [P.A.S.S.](#) technique (pull, aim, squeeze, sweep).
- Back away from an extinguished fire in case it flames up again.
- Evacuate immediately if the extinguisher is empty and the fire is not out.
- Evacuate immediately if the fire progresses beyond the [incipient stage](#).

Most fire extinguishers operate using the following P.A.S.S. technique:

1. **PULL...** Pull the pin. This will also break the tamper seal.
 2. **AIM...** Aim low, pointing the extinguisher nozzle (or its horn or hose) at the base of the fire.
- Note:** Do not touch the plastic discharge horn on CO2 extinguishers, it gets very cold and may damage skin.
3. **SQUEEZE...** Squeeze the handle to release the extinguishing agent.
 4. **SWEEP...** Sweep from side to side at the base of the fire until it appears to be out. Watch the area. If the fire re-ignites, repeat steps 2 - 4.

If you have the slightest doubt about your ability to fight a fire....EVACUATE IMMEDIATELY!



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Fire Extinguisher Placement and Spacing

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Portable fire extinguishers can be an effective early response to a developing fire, if they are installed and used properly. In this section, we are going to review general information about the placement and spacing of portable fire extinguishers.

If employees use portable fire extinguishers to fight small fires, they must be installed in all areas of the workplace. To ensure each area is protected properly, ask yourself the following questions:

- [Is the extinguisher readily accessible in the event of a fire?](#)
- [Is the extinguisher fully charged and working properly?](#)



Where to place fire extinguishers

To avoid putting workers in danger, fire extinguishers should be located throughout the workplace and readily accessible in the event of a fire. [1910.157\(c\)](#) You can usually find them in hallways, laundry rooms, meeting rooms, kitchens, mechanical/electrical rooms, and near exit doors.

Selection and placement

If employees use portable fire extinguishers, they must be selected and positioned based on the potential type and size of fire that can occur. [1910.157\(d\)\(1\)](#) The following guidelines will help you identify the number and types of portable fire extinguishers you should have.

Type of Fire

Size and Spacing

Class A

Locations such as offices, classrooms, and assembly halls that contain mainly Class A combustible materials should have one 2-A extinguisher for every 3,000 square feet, with no more than 75 feet between extinguishers. [1910.157\(d\)\(2\)](#)

Note: Uniformly spaced standpipe systems or hose stations connected to a sprinkler system for emergency use can be used instead of Class A portable fire extinguishers, if they meet the respective requirements of [1910.158](#) or [1910.159](#), provide total coverage of the area to be protected,

and employees are trained at least annually in their use. [1910.157\(d\)\(3\)](#)

Class B Locations that contain Class B flammables, such as workshops, storage areas, research operations, garages, warehouses, or service and manufacturing areas, must size and space their extinguishers based on the degree of hazard associated with the flammable liquids and gases in the area: [1910.157\(d\)\(4\)](#)

Hazard	Extinguisher	Spacing
Low - Small amounts of flammable liquids used for copy machines, art departments, etc., that are stored safely and kept in closed containers.	5-B	30'
	10-B	50'
Moderate - The total amount of flammable liquids are present in greater amounts than expected under low-hazard locations. This can include garages, workshops, or support service areas.	10-B	30'
	20-B	50'
High - Locations where flammable liquids are present and used in large quantities. This includes areas used for storage, production, woodworking (finishing), vehicle repair, aircraft and boat servicing, or where painting, dipping, and coating, operations are performed with flammable liquids.	40-B	30'
	80-B	50'

Class C Class C extinguishers are required where energized electrical equipment is used. The extinguisher size and spacing is based on its Class A or B hazard. [1910.157\(d\)\(5\)](#)

Class D Locations where combustible metal powders, flakes, shavings, or similarly sized materials are generated at least once every two weeks must install Class D portable fire extinguishers not more than 75 feet from the hazard. [1910.157\(d\)\(6\)](#)

Installation

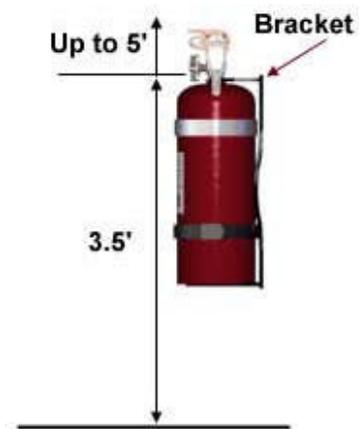
To prevent fire extinguishers from being moved or damaged, they should be mounted on brackets or in wall cabinets with the carrying handle placed 3-1/2 to 5 feet above the floor. Larger fire extinguishers need to be mounted at lower heights with the carrying handle about 3 feet from the floor.

Before installing any portable fire extinguisher, check the label to be sure it is approved by a nationally recognized testing laboratory such as Underwriters Laboratory (UL) or Factory Mutual (FM). [1910.157\(c\)\(2\)](#)

Prohibited fire extinguishers

The following types of portable fire extinguishers are considered dangerous and should not be used:

1. Any extinguisher having a shell construction of copper or brass joined by soft solder and/or rivets;





2. Any extinguisher that must be turned upside down to rupture a cartridge or to start an uncontrollable pressure generating chemical reaction to expel the agent. [1910.157\(c\)\(5\)](#) This includes:
 - Soda acid
 - Foam
 - Water-cartridge
 - Loaded stream cartridge
3. Extinguishers that use chlorobromomethane (Halon 1011) or carbon tetrachloride as an extinguishing agent. These agents are toxic and carbon tetrachloride may cause cancer and can produce phosgene gas (used as a chemical weapon during World War I) when used on electrical fires. [1910.157\(c\)\(3\)](#)

Care and maintenance

Regular maintenance and inspections of your portable fire extinguishers will provide assurance that they will operate effectively and safely if they are needed. [1910.157\(c\)\(4\)](#)

Inspect all extinguishers at least once a month. Use the following checklist as a guide.

1. Is each extinguisher in its designated place, clearly visible, and not blocked by equipment, coats or other objects that could interfere with access during an emergency?
2. Is the nameplate with operating instructions legible and facing outward?
3. Is the pressure gauge showing that the extinguisher is fully charged (the needle should be in the green zone)?
4. Is the pin and tamper seal intact?
5. Is the extinguisher in good condition and showing no signs of physical damage, corrosion, or leakage?
6. Have all dry powder extinguishers been gently rocked top to bottom to make sure the powder is not packing?

NOTE:

If you did not answer yes to all of these questions, have the extinguisher fixed or replaced immediately!





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Fire Extinguisher Hydrostatic Testing

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A visual inspection alone cannot insure that a portable fire extinguisher is safe or will operate properly when needed. Over time, normal handling or workplace conditions can impact the structural integrity of the extinguisher and cause it to malfunction or burst. To prevent this from happening, all portable fire extinguishers are required to be inspected and pressure tested by a qualified individual using the proper equipment and facilities. [1910.157\(f\)\(1\)](#)

Hydrostatic testing is the method used to pressure test an extinguisher's critical components (cylinder, shell, hose assembly, etc.) for leaks and structural flaws by pressurizing them with a liquid. This section is intended to help you understand what you need to do to comply with OSHA's requirements for "Hydrostatic Testing." [1910.157\(f\)](#)



- [How does hydrostatic testing work?](#)
- [When must I have my portable extinguishers hydrostatically tested?](#)
- [What records am I required to maintain?](#)

How does hydrostatic testing work?

To understand how hydrostatic testing is used to check a cylinder and/or hose assembly for leaks or flaws, let's take a look at the procedure.

First, the extinguisher valve is removed and the threads and interior of the cylinder are checked for corrosion, pitting, and any other abnormalities. [1910.157\(f\)\(3\)](#) If the cylinder passes the visual inspection, it is placed into a steel chamber, which is then filled with water at normal pressure. A glass burette attached to the side of the steel chamber will read zero, indicating normal or zero pressure of the chamber water. Water is then applied at high pressure to the interior of the extinguisher's cylinder. As the pressure increases, the cylinder will expand and



push water from the steel chamber through a small hole and into the glass burette. After the pressure is released, the cylinder will contract and the water will move from the burette back to the steel chamber. Depending on the results, the tester will either pass or fail the cylinder. The cylinder is normally considered unsafe and will fail if:

- The water level in the burette continues to rise while the specified pressure is applied. This could be due to a leak from the inside cylinder to the water in the steel chamber, or to a continual expansion of the walls of the cylinder, both of which would be a reasonable cause to fail the cylinder.
- The cylinder stretched and with the pressure released does not return to its original size (or close to it), it would mean the metal of the cylinder is not resilient enough to be considered safe for use. The burette can not have more than 10 percent of the displaced water remaining after the pressure is released. For example, if the expansion displaced 100 milliliters (mL) of water, after it contracts it must have a reading of 10 mL or less to pass the test.

Types of hydrostatic tests

The hydrostatic test described above is called the water jacket type because the cylinder is enclosed and surrounded by water during the testing process. All compressed gas type cylinders (CO₂, dry chemical, etc.) must be hydrostatically tested using this method. They must also have an expansion indicator that operates with an accuracy within one percent of the total expansion or .1cc (.1mL) of liquid. [1910.157\(f\)\(15\)\(i\)](#)



For all non-compressed gas type cylinders, you can use a manual or powered hydrostatic test pump as long as it meets the following requirements: [1910.157\(f\)\(15\)\(ii\)](#)

- It must be capable of producing at least 150 percent of the test pressure, and include the appropriate check valves and fittings; [1910.157\(f\)\(15\)\(ii\)\(A\)](#)
- It must have a flexible connection for attachment to the test pump and necessary fittings to test through the extinguisher nozzle, test bonnet, or hose outlet, as applicable; and [1910.157\(f\)\(15\)\(ii\)\(B\)](#)
- Personnel must be physically protected during use by a cage or barrier designed to allow visual observation of the extinguisher during the test. [1910.157\(f\)\(15\)\(ii\)\(C\)](#)

Note: Do not use air or gas pressure for hydrostatic testing because it compresses and expands many more times than water, which makes it very dangerous. [1910.157\(f\)\(13\)](#)

When do portable extinguishers need to be hydrostatically tested?

To ensure that your extinguisher will operate effectively and safely, you are required to have them hydrostatically tested:

1. Every five or 12 years, depending on the type of extinguisher. [1910.157\(f\)\(2\)](#)
2. Whenever they show new evidence of corrosion or mechanical injury. [1910.157\(f\)\(4\)](#)



It is **illegal** and **dangerous** to perform a hydrostatic test on any cylinder or shell without first doing a visual external and internal examination. If any component exhibits at least one of the following conditions, it must be removed from service immediately; [1910.157\(c\)\(5\)](#)

- The shell is of copper or brass construction joined by soft solder or rivets; or,
- You must invert the extinguisher to activate it.

Hydrostatically test portable extinguishers at the intervals listed in [Table L-1](#), except under any of the following conditions:

- When there have been repairs made by soldering, welding, brazing, or with patching compounds; [1910.157\(f\)\(2\)\(i\)](#)
- When the cylinder or shell threads are damaged; [1910.157\(f\)\(2\)\(ii\)](#)
- When there are signs of corrosion that has caused pitting, including corrosion under removable nameplate band assemblies; [1910.157\(f\)\(2\)\(iii\)](#)
- When the extinguisher shows signs of exposure to high heat or fire; [1910.157\(f\)\(2\)\(iv\)](#)
 - Charring, blistering, or discoloration of the cylinder paint or labels;
 - Distortion of the cylinder body;
 - Melting of any components (such as the valve knob, the carrying handle, etc.); or,
 - Activation of the valve pressure relief device.
- When a calcium chloride extinguishing agent has been used in a stainless steel shell; [1910.157\(f\)\(2\)\(v\)](#)

Hydrostatic Test Intervals

Depending on the type(s) of extinguishers you have, they must be emptied and hydrostatically tested at the intervals specified in table L-1. Extinguisher shells, cylinders, or cartridges that fail a hydrostatic pressure test must be removed from service. [1910.157\(f\)\(14\)](#)

Testing Intervals (Table L-1)		
Type of Extinguishers	Special Requirements	Test Interval (years)
Foam (soldered brass shells)		Must be removed from service
Soda acid (soldered brass shells)		
Soda acid (stainless steel shell)	Note: Test self-generating type soda acid and foam extinguishers at 350 psi (2,410 kPa). 1910.157(f)(12)	5 Years
Foam (stainless steel shell)		
Cartridge operated water and/or antifreeze		5 Years
Stored pressure water and/or antifreeze		
Wetting agent		
Aqueous Film Forming Foam (AFFF)		
Loaded stream		

Dry chemical with stainless steel

Carbon Dioxide

Note: (CO2 extinguishers that have a hose assembly equipped with a shut-off nozzle must be tested at 1,250 psi (8,620 kPa). [1910.157\(f\)\(6\)](#) Hose assemblies must also be tested within a protective cage device. [1910.157\(f\)\(9\)](#)

5 Years

Dry chemical, stored pressure, with mild steel, brazed brass or aluminum shells

Dry chemical, cartridge or cylinder operated, with mild steel shells

Note: Dry chemical and dry powder hose assemblies equipped with a shutoff nozzle must be hydrostatically tested at 300 psi (2,070 kPa). [1910.157\(f\)\(7\)](#)

12 Years

Dry powder, cartridge or cylinder operated with mild steel shells

Halon 1211

Halon 1301

Note: Halon 1211 and all stored pressure extinguishers must be hydrostatically tested at the factory test pressure, not to exceed two times the normal operating pressure. [1910.157\(f\)\(11\)](#)

12 Years

Note: All hose assemblies must be hydrostatically tested at the same interval as the extinguisher if it is equipped with a shutoff nozzle at the discharge end. [1910.157\(f\)\(5\)](#) Hose assemblies passing a hydrostatic test do not require any type of recording or stamping. [1910.157\(f\)\(8\)](#)

What records am I required to maintain?

Recordkeeping

For each extinguisher in the workplace you must keep a record that includes:

- The name of the person or agency who performed the last hydrostatic test, and the test date;
- The signature of the person who performed the test;
- The serial number or other identifier of the fire extinguisher that was tested.

This information should also be securely fixed to each extinguisher, and provided upon request to the Assistant Secretary as evidence that the required hydrostatic testing of fire extinguishers has been performed at the time intervals shown in [Table L-1](#). These records must be kept until the extinguisher is hydrostatically re-tested at the time interval specified in [Table L-1](#) or until the extinguisher is taken out of service, whichever comes first. [1910.157\(f\)\(16\)](#)

DO NOT REMOVE
BY ORDER OF
THE STATE FIRE MARSHAL

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
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Name of Licensee _____

Signature _____

License Number _____

TYPE of WORK

Inspection

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- Test carbon dioxide extinguishers and nitrogen or carbon dioxide cylinders used with wheeled extinguishers every five years at 5/3 of the service pressure as stamped into the cylinder. Nitrogen cylinders that comply with 49 CFR 173.34(e)(15) may be hydrostatically tested every 10 years. [1910.157\(f\)\(10\)](#)

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The requirements of this section apply to the placement, use, maintenance, and testing of portable fire extinguishers provided for the use of employees. The [Selection and distribution](#) section does not apply to extinguishers provided for employee use on the outside of workplace buildings or structures.

Where extinguishers are provided but are not intended for employee use and the employer has an [emergency action plan](#) and a fire prevention plan that meet the requirements of [1910.38](#), then only the requirements of the [Inspection, maintenance and testing](#) and [Hydrostatic testing](#) sections apply. [1910.157\(a\)](#)



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- [General requirements](#)
- [Selection and distribution](#)
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General requirements

An employer must:

- Provide portable fire extinguishers and mount, locate, and identify them so that they are readily accessible to employees without subjecting the employees to possible injury. [1910.157\(c\)\(1\)](#)
- Use only approved portable fire extinguishers. [1910.157\(c\)\(2\)](#)
- Not use portable fire extinguishers that use carbon tetrachloride or chlorobromomethane extinguishing agents. [1910.157\(c\)\(3\)](#)
- Assure that portable fire extinguishers are maintained, fully charged, operating properly, and kept in designated places at all times except during use. [1910.157\(c\)\(4\)](#)
- Remove from service all soldered or riveted shell self-generating soda acid or self-generating foam or gas cartridge water type portable fire extinguishers that are operated by inverting the

extinguisher to rupture the cartridge or to initiate an uncontrollable pressure generating chemical reaction to expel the agent. [1910.157\(c\)\(5\)](#)

Selection and distribution

An employer must:

- Provide portable fire extinguishers for employee use and select and distribute the extinguishers based on the types of anticipated workplace fires and on the size and degree of hazard that would affect their use. [1910.157\(d\)\(1\)](#)
- Ensure that the travel distance for employees to any Class A extinguisher is 75 feet (22.9 meters) or less. [1910.157\(d\)\(2\)](#)
- The employer may use uniformly spaced standpipe systems or hose stations connected to a sprinkler system installed for emergency use by employees instead of Class A portable fire extinguishers, provided that such systems meet the respective requirements of [1910.158](#) or [1910.159](#), that they provide total coverage of the area to be protected, and that employees are trained at least annually in their use. [1910.157\(d\)\(3\)](#)
- Ensure that the travel distance for employees to any Class B extinguisher is 50 feet (15.2 meters) or less. [1910.157\(d\)\(4\)](#)
- Base the travel distance for employees to any Class C extinguisher on the pattern for the existing Class A or Class B extinguishers. [1910.157\(d\)\(5\)](#)
- Ensure that the travel distance for employees from the combustible metal working area to any Class D extinguisher is 75 feet (22.9 meters) or less. Portable fire extinguishers for Class D hazards are required in areas where combustible metal powders, flakes, shavings, or similarly sized products are generated at least once every two weeks. [1910.157\(d\)\(6\)](#)

Inspection, maintenance, and testing

An employer must:

- Inspect, maintain, and test all portable fire extinguishers in the workplace. [1910.157\(e\)\(1\)](#)
- Visually inspect portable extinguishers or hoses monthly. [1910.157\(e\)\(2\)](#)
- Perform an annual maintenance check on portable fire extinguishers. Stored pressure extinguishers do not require an internal examination. The employer must record the annual maintenance date and retain this record for one year after the last entry or the life of the shell, whichever is less. The record must be made available to the Assistant Secretary upon request. [1910.157\(e\)\(3\)](#)
- Empty and maintain dry chemical extinguishers (that require a 12-year hydrostatic test) every six years. Dry chemical extinguishers that have non-refillable disposable containers are exempt from this requirement. When recharging or hydrostatic testing is performed, the six-year requirement begins from that date. [1910.157\(e\)\(4\)](#)
- Provide alternate equivalent protection when portable fire extinguishers are removed from service for maintenance and recharging. [1910.157\(e\)\(5\)](#)

Hydrostatic testing

An employer must:

- Assure that hydrostatic testing is performed by trained persons with suitable testing equipment and facilities. [1910.157\(f\)\(1\)](#)
- Assure that portable extinguishers are hydrostatically tested at the intervals listed in [Table L-1](#) of this section, except under any of the following conditions: [1910.157\(f\)\(2\)](#)
 - When the unit has been repaired by soldering, welding, brazing, or use of patching compounds; [1910.157\(f\)\(2\)\(i\)](#)
 - When the cylinder or shell threads are damaged; [1910.157\(f\)\(2\)\(ii\)](#)
 - When there is corrosion that has caused pitting, including corrosion under removable name plate assemblies; [1910.157\(f\)\(2\)\(iii\)](#)
 - When the extinguisher has been burned in a fire; or [1910.157\(f\)\(2\)\(iv\)](#)
 - When a calcium chloride extinguishing agent has been used in a stainless steel shell. [1910.157\(f\)\(2\)\(v\)](#)
- Assure that an internal examination of cylinders and shells to be tested is made before the hydrostatic tests. [1910.157\(f\)\(3\)](#)

Table L-1	
Type of extinguishers	Test interval (years)
Soda acid (soldered brass shells) (until 1/1/82)	5*
Soda acid (stainless steel shell)	5
Cartridge operated water and/or antifreeze	5
Stored pressure water and/or antifreeze	5
Wetting agent	5
Foam (soldered brass shells) (until 1/1/82)	5*
Foam (stainless steel shell)	5
Aqueous Film Forming foam (AFFF)	5
Loaded stream	5
Dry chemical with stainless steel	5
Carbon Dioxide	5
Dry chemical, stored pressure, with mild steel, brazed brass or aluminum shells	12
Dry chemical, cartridge or cylinder operated, with mild steel shells	12
Halon 1211	12
Halon 1301	12
Dry powder, cartridge or cylinder operated with mild steel shells	12
<p>* Footnote: Extinguishers having shells constructed of copper or brass joined by soft solder or rivets shall not be hydrostatically tested and shall be removed from service by January 1, 1982. (Not permitted)</p>	

- Assure that portable fire extinguishers are hydrostatically tested whenever they show new evidence of corrosion or mechanical injury, except under the conditions listed in paragraphs [\(f\)\(2\)\(i\)-\(v\)](#) of this section. [1910.157\(f\)\(4\)](#)
- Assure that hydrostatic tests are performed on extinguisher hose assemblies that are equipped with a shut-off nozzle at the discharge end of the hose. The test interval must be the same as specified for the extinguisher. [1910.157\(f\)\(5\)](#)
- Hydrostatically test carbon dioxide hose assemblies with a shut-off nozzle at 1,250 psi (8,620 kPa). [1910.157\(f\)\(6\)](#)
- Hydrostatically test dry chemical and dry powder hose assemblies with a shut-off nozzle at 300 psi (2,070 kPa). [1910.157\(f\)\(7\)](#) Hose assemblies passing a hydrostatic test do not require any type of recording or stamping. [1910.157\(f\)\(8\)](#)
- Test hose assemblies for carbon dioxide extinguishers within a protective cage device. [1910.157\(f\)\(9\)](#)
- Test carbon dioxide extinguishers and nitrogen or carbon dioxide cylinders used with wheeled extinguishers every five years at 5/3 of the service pressure as stamped into the cylinder. Nitrogen cylinders that comply with 49 CFR 173.34(e)(15) may be hydrostatically tested every 10 years. [1910.157\(f\)\(10\)](#)
- Hydrostatically test stored pressure and Halon 1211 types of extinguishers at the factory test pressure, not to exceed two times the service pressure. [1910.157\(f\)\(11\)](#)
- Test self-generating type soda acid and foam extinguishers at 350 psi (2,410 kPa). [1910.157\(f\)\(12\)](#)
- Not use air or gas pressure for hydrostatic testing. [1910.157\(f\)\(13\)](#)
- Remove extinguisher shells, cylinders, or cartridges that fail a hydrostatic pressure test, or that are not fit for testing. [1910.157\(f\)\(14\)](#)
- Ensure that the equipment for testing compressed gas type cylinders be of the water jacket type. The equipment must have an expansion indicator that operates with an accuracy within 1 percent of the total expansion or .1cc (.1mL) of liquid. [1910.157\(f\)\(15\)\(i\)](#)
- Ensure that the equipment for testing non-compressed gas type cylinders includes the following: [1910.157\(f\)\(15\)\(ii\)](#)
 - A hydrostatic test pump, hand or power operated, capable of producing at least 150 percent of the test pressure, which must include appropriate check valves and fittings; [1910.157\(f\)\(15\)\(ii\)\(A\)](#)
 - A flexible connection for attachment to fittings to test through the extinguisher nozzle, test bonnet, or hose outlet, as is applicable; and [1910.157\(f\)\(15\)\(ii\)\(B\)](#)
 - A protective cage or barrier for personal protection of the tester, designed to provide visual observation of the extinguisher under test. [1910.157\(f\)\(15\)\(ii\)\(C\)](#)
- Maintain and provide upon request to the Assistant Secretary evidence that the required hydrostatic testing of fire extinguishers has been performed at the time intervals shown in [Table L-1](#). Such evidence must be in the form of a certification record that includes:
 - The date of the test;
 - The signature of the person who performed the test; and
 - The serial number, or other identifier, of the fire extinguisher that was tested.

Such records must be kept until the extinguisher is hydrostatically retested at the time interval specified in [Table L-1](#) or until the extinguisher is taken out of service, whichever comes first. [1910.157\(f\)\(16\)](#)

Training and education

An employer must:

- Provide an educational program to familiarize employees with the general principles of fire extinguisher use and the hazards involved with incipient stage fire fighting. [1910.157\(g\)\(1\)](#)
Provide this education when employees are first hired and once a year thereafter. [1910.157\(g\)\(2\)](#)
- Train employees (who have been designated to use fire fighting equipment) in the use of the equipment. [1910.157\(g\)\(3\)](#) Provide this training when employees are first given this assignment and once a year thereafter. [.157\(g\)\(4\)](#)

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Where the employer has established and implemented a written fire safety policy that requires the immediate and total evacuation of employees from the workplace upon the sounding of a fire alarm signal and that includes an [emergency action plan](#) and a fire prevention plan that meet the requirements of [1910.38](#), and when extinguishers are not available in the workplace, the employer is exempt from all requirements of this section unless a specific standard in Part 1910 requires that a portable fire extinguisher be provided. [1910.157\(b\)\(1\)](#)

Where the employer has an [emergency action plan](#) meeting the requirements of [1910.38](#), which designates certain employees to be the only employees authorized to use the available portable fire extinguishers, and which requires all other employees in the fire area to immediately evacuate the affected work area upon the sounding of the fire alarm, the employer is exempt from the distribution requirements in the [Selection and distribution](#) section. [1910.157\(b\)\(2\)](#)

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Portable Fire Extinguishers - Test Your Knowledge

[Fight or Flee?](#) | [Extinguisher Basics](#) | [Extinguisher Use](#) | [Extinguisher Placement and Spacing](#)
[Hydrostatic Testing](#) | [OSHA Requirements](#) | [Test Your Knowledge](#)

Test Your Portable Fire Extinguisher Knowledge!

1. What type of fire extinguisher is this?

- Air Pressurized Water extinguisher
- CO2 (carbon dioxide) extinguisher
- Dry chemical extinguisher

Submit

Reset



2. For fire to exist, what elements must be present at the same time:

Check all that apply.

- Oxygen
- Fuel
- Heat
- Chemical Reaction

Submit

Reset



3. How do Portable fire extinguishers stop or put out a fire?

Check all that apply.

- by removing the ignition source
- by stopping the chemical reaction

- by cooling the burning fuel
- by removing the oxygen

4. What types of extinguishers would be effective for fires in paper, cloth, wood, rubber, and many plastics?

Check all that apply.

- Water
- CO2
- Dry Chemical
- Multi Purpose Dry Chemical

5. What types of extinguishers would be effective for fires in oils, gasoline, some paints, lacquers, grease, solvents, and other flammable liquids

Check all that apply.

- Water
- CO2
- Dry Chemical
- Multi Purpose Dry Chemical

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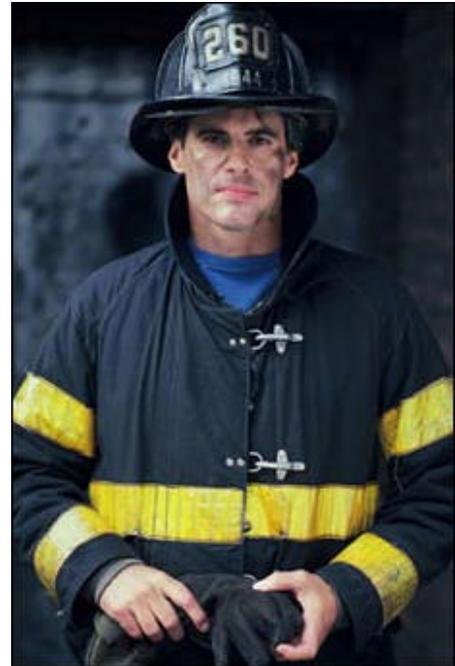
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How are fire rescue and medical services typically arranged?

Although most of us quickly move away from the hazardous environments created during emergency situations, a group of dedicated and well-trained professional emergency responders and medical service personnel are tasked with containing and mitigating these incidents, rescuing individuals at-risk, and providing medical assistance to the injured.

- [Using public resources](#)



Using public resources

Unless you are a large employer handling hazardous materials and processes or have employees regularly working in hazardous situations, you will probably choose to rely on local public resources to provide these specialized services. If you choose to use external departments or agencies, such as the local fire and police departments, medical clinics or hospitals, and ambulance services, make sure they are prepared to respond as outlined in your plan. For example:

- Have members of the local fire department conduct a walk-through of your workplace so they are familiar with the layout and any potential hazards.
- Establish a relationship with a local ambulance service so transportation is readily available for emergencies.
- Make arrangements with near by medical clinics or other facilities to handle emergency cases and to provide medical and first-aid services to employees.
- If an infirmary, clinic, or hospital is not close to your workplace, ensure that onsite person(s) have adequate first-aid training. The American Red Cross, some insurance providers, local safety councils, fire departments, or other sources may be able to provide



this training. Treatment of a serious injury should begin within three to four minutes of the accident. Consult with a physician or other professional to order appropriate first-aid supplies for emergencies.



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What are the options for reporting an emergency and alerting employees?

Employees must know how to report emergencies. Some use internal telephone numbers, intercom, or public address systems to notify other employees. It is important for employees to also notify the proper authorities such as fire, medical, or rescue services, if your company relies on this type of assistance during an emergency.

- [Reporting Emergencies](#)



Reporting emergencies

Dialing "911" is a common method for reporting emergencies if external emergency personnel are used at your workplace. Internal numbers may be used for reporting emergencies. If they are, they should be posted on, or near, each phone. Internal numbers sometimes are connected to intercom systems so that coded announcements may be made. In some cases, employees are requested to activate manual pull stations or other alarm systems. No matter what system is used, it is imperative that emergency situations be immediately reported. Fires and other emergency situations can reach dangerous levels in seconds and any delay in getting emergency responders to the scene can result in additional loss of life and property.



Telephones are often used to alert employees about an emergency.

Once an emergency that requires a response from employees is reported, a system -- typically an alarm system -- must be in place to notify employees. Alarms must be distinctive and recognized by all employees as a signal to evacuate the work area or perform other actions identified in your [emergency action plan](#). The alarm must be capable of being perceived above ambient noise and light levels. Sequences of horn blows or different types of alarms (bells, horns, etc.) can be used to signal different responses or actions from employees. Ideally, alarms will be able to be heard, seen, or otherwise perceived by everyone in the workplace including those who may be blind or deaf. Otherwise, floor wardens or others should be tasked with ensuring all employees are notified. You might want to consider providing an auxiliary power supply to your alarm system in the event of an electrical failure.



Your building should have an alarm that employees can activate in case of fire.

Consider making available an emergency communications system, such as a public address system, for broadcasting emergency information to employees.

- [OSHA's requirements for Employee Alarms](#)



Bells, whistles, and horns can all be used to alert employees about an emergency.



An intercom or public address system may also be used to report emergencies.

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Fire Prevention Plan (FPP)

The purpose of the fire prevention plan is to prevent a fire from occurring in a workplace. It describes the fuel sources (hazardous or other materials) on site that could initiate or contribute both to the spread of a fire, as well as the building systems, such as fixed fire extinguishing systems and alarm systems, in place to control the ignition or spread of a fire.

- [Fire Prevention Plan Requirements](#)

Additional links to fire extinguishing and alarm systems:

- [Fixed Extinguishing Systems](#)
- [Fire Alarm Systems](#)
- [Portable Fire Extinguishers](#)



Fire Prevention Plan Requirements

A fire prevention plan must be in writing, be kept in the workplace, and be made available to employees for review. However, an employer with 10 or fewer employees may communicate the plan orally to employees. [1910.39\(b\)](#)

At a minimum, your fire prevention plan must include:

A list of all major fire hazards, proper handling and storage procedures for hazardous materials, potential ignition sources and their control, and the type of fire protection equipment necessary to control each major hazard; [1910.39\(c\)\(1\)](#)

Procedures to control accumulations of flammable and combustible waste materials; [1910.39\(c\)\(2\)](#)

Procedures for regular maintenance of safeguards installed on heat-producing equipment to prevent the accidental ignition of combustible materials; [1910.39\(c\)\(3\)](#)

The name or job title of employees responsible for maintaining equipment to prevent or control sources of ignition or fires; and [1910.39\(c\)\(4\)](#)

The name or job title of employees responsible for the control of fuel source hazards. [1910.39\(c\)\(5\)](#)

An employer must inform employees upon initial assignment to a job of the fire hazards to which they are exposed. An employer must also review with each employee those parts of the fire prevention plan necessary for self-protection. [1910.39\(d\)](#)



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How do I evaluate my workplace to comply with OSHA's emergency standards?

The best way to protect yourself and others is to prepare for an emergency before it happens by doing a thorough assessment of the workplace. Think about possible emergency situations and check to see if your workplace is sufficiently prepared in the following areas:

- [Design and Construction Requirements for Exit Routes](#)
- [Maintenance, Safeguards, and Operational Features for Exit Routes](#)
- [Fire Detection Systems](#)
- [Employee Alarms](#)
- [Fixed Extinguishing Systems](#)
- [Portable Fire Extinguishers](#)



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Design and Construction Requirements for Exit Routes

[OSHA's Exit Routes demonstration #1](#)

[OSHA's Exit Routes demonstration #2](#)

This section contains requirements for the design and construction of exit routes. It includes a requirement that exit routes be permanent, addresses fire resistance-ratings of construction materials used in exit stairways (exits), describes openings into exits, defines the minimum number of exit routes in workplaces, addresses exit discharges, and discusses locked exit route doors, and exit route doors. It also addresses the capacity, height and width of exit routes, and finally, it sets forth requirements for exit routes that are outside a building.

Exit routes must meet the following design and construction requirements: [1910.36\(a\)](#)

- [What is an exit route?](#)
- [Basic Requirements](#)
- [Exit Routes](#)
- [Exit Discharge](#)
- [Exit Door Access](#)
- [Door Hinges](#)
- [Exit Route Capacity](#)
- [Height and Width Requirements](#)
- [Outdoor Exit Routes](#)



What is an exit route?

An exit route is a continuous and unobstructed path of exit travel from any point within a workplace to a place of safety. An exit route consists of three parts:

- Exit access - portion of an exit route that leads to an exit.
- Exit - portion of an exit route that is generally separated from other areas to provide a protected way of travel to the exit discharge.
- Exit discharge - part of the exit route that leads directly outside or to a street, walkway, refuge area, public way, or open space with access to the outside.

Basic Requirements

An exit route must be permanent. Each exit route must be a permanent part of the workplace.

[1910.36\(a\)\(1\)](#)

An exit must be separated by fire resistant materials. Construction materials used to separate an exit from other parts of the workplace must have a one-hour fire resistance-rating if the exit connects three or fewer stories and a two-hour fire resistance-rating if the exit connects four or more stories.

[1910.36\(a\)\(2\)](#)

Openings into an exit must be limited. An exit is permitted to have only those openings necessary to allow access to the exit from occupied areas of the workplace, or to the exit discharge. An opening into an exit must be protected by a self-closing fire door that remains closed or automatically closes in an emergency upon the sounding of a fire alarm or employee alarm system. Each fire door, including its frame and hardware, must be listed or approved by a nationally recognized testing laboratory. Section 1910.155(c)(3)(iv)(A) of this part defines "listed" and § 1910.7 of this part defines a "nationally recognized testing laboratory." [1910.36\(a\)\(3\)](#)

Exit Routes

The number of exit routes must be adequate. [1910.36\(b\)](#)

At least two exit routes must be available in a workplace to permit prompt evacuation of employees and other building occupants during an emergency, except as allowed in paragraph (b)(3) of this section. The exit routes must be located as far away as practical from each other so that if one exit route is blocked by fire or smoke, employees can evacuate using the second exit route. [1910.36\(b\)\(1\)](#)

More than two exit routes must be available in a workplace if the number of employees, the size of the building, its occupancy, or the arrangement of the workplace is such that all employees would not be able to evacuate safely during an emergency. [1910.36\(b\)\(2\)](#)

A single exit route is permitted where the number of employees, the size of the building, its occupancy, or the arrangement of the workplace is such that all employees would be able to evacuate safely during an emergency. [1910.36\(b\)\(3\)](#)

Note to paragraph [1910.36\(b\)](#): For assistance in determining the number of exit routes necessary for your workplace, consult [NFPA 101-2000, Life Safety Code](#).

In every building or structure exits shall be so arranged and maintained as to provide free and unobstructed egress from all parts of the building or structure at all times when it is occupied. No lock or fastening to prevent free escape from the inside of any building shall be installed except in mental, penal, or corrective institutions where supervisory personnel is continually on duty and effective provisions are made to remove occupants in case of fire or other emergency. [1910.36\(b\)\(4\)](#)

Every exit shall be clearly visible or the route to reach it shall be conspicuously indicated in such a manner that every occupant of every building or structure who is physically and mentally capable will readily know the direction of escape from any point, and each path of escape, in its entirety, shall be so arranged or marked that the way to a place of safety outside is unmistakable. Any doorway or passageway not constituting an exit or way to reach an exit, but of such a character as to be subject to being mistaken for an exit, shall be so arranged or marked as to minimize its possible confusion with an exit and the resultant danger of persons endeavoring to escape from fire finding themselves trapped in a dead-end space, such as a cellar or storeroom, from which there is no other way out. [1910.36\(b\)\(5\)](#)

In every building or structure equipped for artificial illumination, adequate and reliable illumination shall be provided for all exit facilities. [1910.36\(b\)\(6\)](#)

In every building or structure of such size, arrangement, or occupancy that a fire may not itself provide adequate warning to occupants, fire alarm facilities shall be provided where necessary to warn occupants of the existence of fire so that they may escape, or to facilitate the orderly conduct of fire exit drills. [1910.36\(b\)\(7\)](#)

Every building or structure, section, or area thereof of such size, occupancy, and arrangement that the reasonable safety of numbers of occupants may be endangered by the blocking of any single means of

egress due to fire or smoke, shall have at least two means of egress remote from each other, so arranged as to minimize any possibility that both may be blocked by any one fire or other emergency conditions. [1910.36\(b\)\(8\)](#)

Compliance with this subpart shall not be construed as eliminating or reducing the necessity for other provisions for safety of persons using a structure under normal occupancy conditions, nor shall any provision of the subpart be construed as requiring or permitting any condition that may be hazardous under normal occupancy conditions. [1910.36\(b\)\(9\)](#)

Exit Discharge

Each exit discharge must lead directly outside or to a street, walkway, refuge area, public way, or open space with access to the outside. [1910.36\(c\)\(1\)](#)

The street, walkway, refuge area, public way, or open space to which an exit discharge leads must be large enough to accommodate the building occupants likely to use the exit route. [1910.36\(c\)\(2\)](#)

Exit stairs that continue beyond the level on which the exit discharge is located must be interrupted at that level by doors, partitions, or other effective means that clearly indicate the direction of travel leading to the exit discharge. [1910.36\(c\)\(3\)](#)

Exit Door Access

An exit door must be unlocked from the inside. [1910.36\(d\)](#)

Employees must be able to open an exit route door from the inside at all times without keys, tools, or special knowledge. A device such as a panic bar that locks only from the outside is permitted on exit discharge doors. [1910.36\(d\)\(1\)](#)

Exit route doors must be free of any device or alarm that could restrict emergency use of the exit route if the device or alarm fails. [1910.36\(d\)\(2\)](#)

An exit route door may be locked from the inside only in mental, penal, or correctional facilities and then only if supervisory personnel are continuously on duty and the employer has a plan to remove occupants from the facility during an emergency. [1910.36\(d\)\(3\)](#)

Door Hinges

A side-hinged exit door must be used. [1910.36\(e\)](#)

A side-hinged door must be used to connect any room to an exit route. [1910.36\(e\)\(1\)](#)

The door that connects any room to an exit route must swing out in the direction of exit travel if the room is designed to be occupied by more than 50 people or if the room is a high hazard area (i.e., contains contents that are likely to burn with extreme rapidity or explode). [1910.36\(e\)\(2\)](#)

Exit Route Capacity

The capacity of an exit route must be adequate. [1910.36\(f\)](#)

Exit routes must support the maximum permitted occupant load for each floor served. [1910.36\(f\)\(1\)](#)

The capacity of an exit route may not decrease in the direction of exit route travel to the exit discharge. [1910.36\(f\)\(2\)](#)

Note to paragraph [1910.36\(f\)](#): Information regarding "Occupant load" is located in [NFPA 101-2000, Life Safety Code](#).

Height and Width Requirements

An exit route must meet minimum height and width requirements. [1910.36\(g\)](#)

The ceiling of an exit route must be at least seven feet six inches (2.3 m) high. Any projection from the ceiling must not reach a point less than six feet eight inches (2.0 m) from the floor. [1910.36\(g\)\(1\)](#)

An exit access must be at least 28 inches (71.1 cm) wide at all points. Where there is only one exit access leading to an exit or exit discharge, the width of the exit and exit discharge must be at least equal to the width of the exit access. [1910.36\(g\)\(2\)](#)

The width of an exit route must be sufficient to accommodate the maximum permitted occupant load of each floor served by the exit route. [1910.36\(g\)\(3\)](#)

Objects that project into the exit route must not reduce the width of the exit route to less than the minimum width requirements for exit routes. [1910.36\(g\)\(4\)](#)

Outdoor Exit Routes

An outdoor exit route is permitted. [1910.36\(h\)](#)

The outdoor exit route must have guardrails to protect unenclosed sides if a fall hazard exists; [1910.36\(h\)\(1\)](#)

The outdoor exit route must be covered if snow or ice is likely to accumulate along the route, unless the employer can demonstrate that any snow or ice accumulation will be removed before it presents a slipping hazard; [1910.36\(h\)\(2\)](#)

The outdoor exit route must be reasonably straight and have smooth, solid, substantially level walkways; and [1910.36\(h\)\(3\)](#)

The outdoor exit route must not have a dead-end that is longer than 20 feet (6.2 m). [1910.36\(h\)\(4\)](#)

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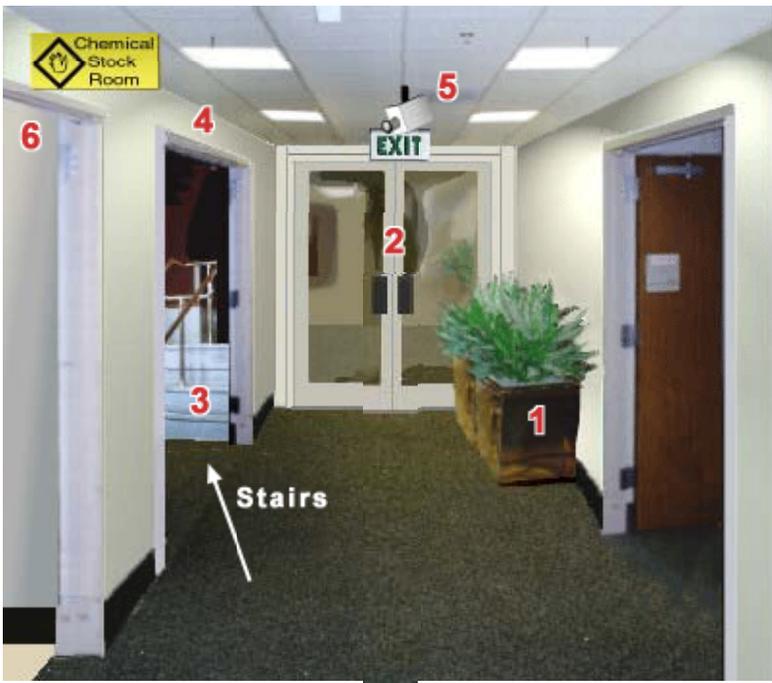
Each exit route door must be free of decorations or signs that obscure the visibility of the exit route door. 1910.37(b)(3)

The picture above illustrates an exit way with several elements not in accordance with OSHA's standards for exit routes. Move your mouse over the numbers on the image to learn which OSHA standards are not being followed and how you can begin to ensure that the exit routes in your work environment are safe and in compliance.



Access to Exits

Each exit must be clearly visible and marked by a sign reading "Exit." 1910.37(b)(2)



Discharge from Exits

Exit stairs that continue beyond the level on which the exit discharge is located must be interrupted at that level by doors, partitions, or other effective means that clearly indicate the direction of travel leading to the exit discharge. 1910.36(c)(3)



Exit Marking

Each doorway or passage along an exit access that could be mistaken for an exit must be marked "Not an Exit" or similar designation, or be identified by a sign indicating its actual use (e.g., closet). 1910.37(b)(5)



Exit Marking

If the direction of travel to the exit or exit discharge is not immediately apparent, signs must be posted along the exit access indicating the direction of travel to the nearest exit and exit discharge. Additionally, the line-of-sight to an exit sign must clearly be visible at all times.

1910.37(b)(4)



Access to Exits

Exit routes must be arranged so that employees will not have to travel toward a high hazard area, unless the path of travel is effectively shielded from the high hazard area by suitable partitions or other physical barriers.

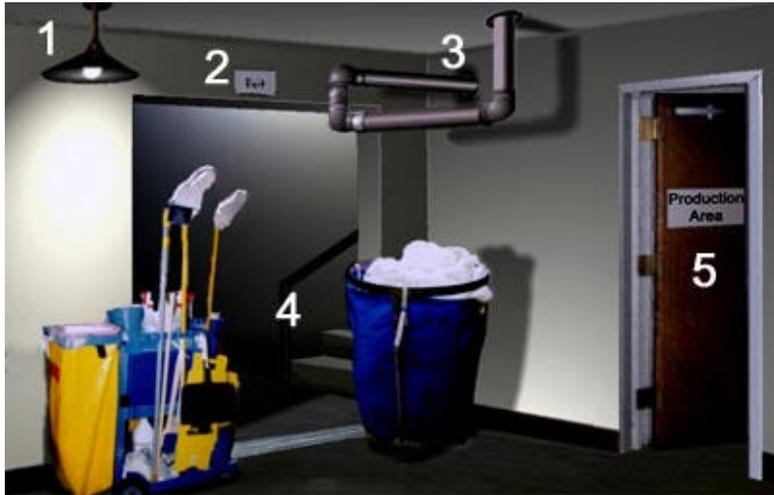
1910.37(a)(2)



Exit Lighting

Each exit route must be adequately lighted so that an employee with normal vision can see along the exit route.
1910.37(b)(1)

The picture above illustrates an exit route with several elements not in accordance with OSHA's exit route standards. Move your mouse over the numbers on the image to learn which OSHA standards are not being followed and how you can begin to ensure that the exit routes in your work environment are safe and in compliance.



Exit Marking

Each exit sign must have the word "Exit" in plainly legible letters not less than six inches (15.2 cm) high, with the principal strokes of the letters in the word "Exit" not less than three-fourths of an inch (1.9 cm) wide.
1910.37(b)(7)



Adequate Headroom

The ceiling of an exit route must be at least seven feet six inches (2.3 m) high. Any projection from the ceiling must not reach a point less than six feet eight inches (2.0 m) from the floor. 1910.36(g)(1)



Access to Exits

Exit routes must be free and unobstructed. No materials or equipment may be placed, either permanently or temporarily, within the exit route. The exit access must not go through a room that can be locked, such as a bathroom, to reach an exit or exit discharge, nor may it lead into a dead-end corridor. Stairs or a ramp must be provided where the exit route is not substantially level. 1910.37(a)(3)



Access to Exits

The door that connects any room to an exit route must swing out in the direction of exit travel if the room is designed to be occupied by more than 50 people or if the room is a high hazard area (i.e., contains contents that are likely to burn with extreme rapidity or explode). 1910.36(e)(2)



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Maintenance, Safeguards, and Operational Features for Exit Routes

This section includes the safe use of exit routes during an emergency, lighting and marking exit routes, fire retardant paints, exit routes during construction, repairs, or alterations, and employee alarm systems.

- [What is an exit route?](#)
- [Danger to Employees](#)
- [Lighting and Marking](#)
- [Fire Retardant Properties of Paints or Solutions](#)
- [Exit Route Maintenance During Construction, Repairs, or Alterations](#)
- [Employee Alarm System](#)

OSHA's Exit Routes demonstration #1

OSHA's Exit Routes demonstration #2



What is an exit route?

An exit route is a continuous and unobstructed path of exit travel from any point within a workplace to a place of safety. An exit route consists of three parts:

- Exit access - portion of an exit route that leads to an exit.
- Exit - portion of an exit route that is generally separated from other areas to provide a protected way of travel to the exit discharge.
- Exit discharge - part of the exit route that leads directly outside or to a street, walkway, refuge area, public way, or open space with access to the outside.

Danger to Employees

Exit routes must be kept free of explosive or highly flammable furnishings or other decorations. [1910.37\(a\)\(1\)](#)

Exit routes must be arranged so that employees will not have to travel toward a high hazard area, unless the path of travel is effectively shielded from the high hazard area by suitable partitions or other physical barriers. [1910.37\(a\)\(2\)](#)

Exit routes must be free and unobstructed. No materials or equipment may be placed, either permanently or temporarily, within the exit route. The exit access must not go through a room that can be locked, such as a bathroom, to reach an exit or exit discharge, nor may it lead into a dead-end corridor. Stairs or a ramp must be provided where the exit route is not substantially level. [1910.37\(a\)](#)

(3)

Safeguards designed to protect employees during an emergency (such as sprinkler systems, alarm systems, fire doors, exit lighting) must be in proper working order at all times. [1910.37\(a\)\(4\)](#)

Lighting and Marking

Each exit route must be adequately lighted so that an employee with normal vision can see along the exit route. [1910.37\(b\)\(1\)](#)

Each exit must be clearly visible and marked by a sign reading "Exit." [1910.37\(b\)\(2\)](#)

Each exit route door must be free of decorations or signs that obscure the visibility of the exit route door. [1910.37\(b\)\(3\)](#)

If the direction of travel to the exit or exit discharge is not immediately apparent, signs must be posted along the exit access indicating the direction of travel to the nearest exit and exit discharge. Additionally, the line-of-sight to an exit sign must clearly be visible at all times. [1910.37\(b\)\(4\)](#)

Each doorway or passage along an exit access that could be mistaken for an exit (such as a closet) must be marked "Not an Exit" or similar designation, or be identified by a sign indicating its actual use. [1910.37\(b\)\(5\)](#)

Each exit sign must be illuminated to a surface value of at least five foot-candles (54 lux) by a reliable light source and be distinctive in color. Self-luminous or electroluminescent signs that have a minimum luminance surface value of at least .06 footlamberts (0.21 cd/m²) are permitted. [1910.37\(b\)\(6\)](#)

Each exit sign must have the word "Exit" in plainly legible letters not less than six inches (15.2 cm) high, with the principal strokes of the letters in the word "Exit" not less than three-fourths of an inch (1.9 cm) wide. [1910.37\(b\)\(7\)](#)

Fire Retardant Properties of Paints or Solutions

Fire retardant paints or solutions must be renewed as often as necessary to maintain their fire retardant properties. [1910.37\(c\)](#)

Exit Route Maintenance During Construction, Repairs, or Alterations

During new construction, employees must not occupy a workplace until the exit routes required by this subpart are completed and ready for employee use for the portion of the workplace they occupy. [1910.37\(d\)\(1\)](#)

During repairs or alterations, employees must not occupy a workplace unless the exit routes required by this subpart are available and existing fire protections are maintained, or until alternate fire protection is furnished that provides an equivalent level of safety. [1910.37\(d\)\(2\)](#)

Employees must not be exposed to hazards of flammable or explosive substances or equipment used during construction, repairs, or alterations, that are beyond the normal permissible conditions in the workplace, or that would impede exiting the workplace. [1910.37\(d\)\(3\)](#)

Employee Alarm System

Employers must install and maintain an operable employee alarm system that has a distinctive signal

to warn employees of fire or other emergencies, unless employees can promptly see or smell a fire or other hazard in time to provide adequate warning to them. The employee alarm system must comply with [1910.165](#). [1910.37\(e\)](#)

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Evaluating the Workplace - Automatic Fire Detection Systems

[Print a Checklist](#)

Automatic fire detection systems, when combined with other elements of an emergency response and evacuation plan, can significantly reduce property damage, personal injuries, and loss of life from fire in the workplace. Their main function is to quickly identify a developing fire and alert building occupants and emergency response personnel before extensive damage occurs. Automatic fire detection systems do this by using electronic sensors to detect the smoke, heat, or flames from a fire and providing an early warning.



If your workplace uses a fire detection system that was designed and installed to meet the fire protection requirements of a specific OSHA standard, it must also comply with the "Fire Detection Systems" standard [1910.164](#).

This section will help you achieve the maximum benefit from your fire detection system by addressing the following issues:

- [Does the "Fire Detection Systems" standard apply to me?](#)
- [How do fire detectors work?](#)
- [Installation requirements and considerations](#)
- [Maintenance and testing](#)
- [Specific applications or uses](#)

Does the "Fire Detection Systems" standard apply to me?

If an OSHA standard specifically states that you must install a fire protection system, then you are required to follow this standard.

For example, if you install an automatic fire detection system to satisfy the alarm and signaling requirement of the "Fixed Extinguishing Systems" standard [1910.160](#), then you are also required to comply with the "Fire Detection Systems" standard [1910.164](#). But if you install a system only for insurance purposes and not to satisfy any OSHA regulation, you do not need to comply with this standard. However, employers not required to comply may find that the standard offers guidance that may permit them to more effectively protect employees and property in the event of a fire.



How do fire detectors work?

Fire detectors work by sensing one or more products of fire. The three most common detectors are:

- [Smoke detectors](#)
- [Heat detectors](#)
- [Flame detectors](#)



Smoke Detectors

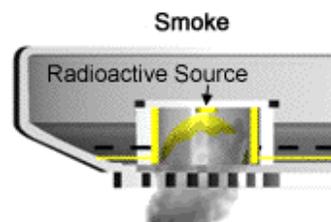
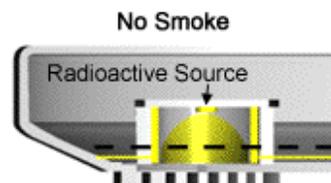
Smoke detectors detect the visible or invisible smoke particles from combustion. The two main types are ionization detectors and photoelectric detectors.

Ionization Detectors

The ionization detector contains a small radioactive source that is used to charge the air inside a small chamber. The charged air allows a small current to cross through the chamber and complete an electrical circuit.

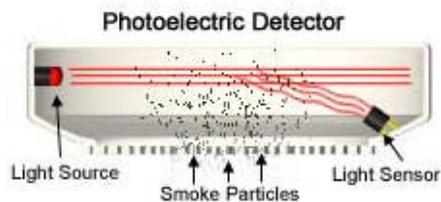
When smoke enters the chamber, it shields the radiation, which stops the current and triggers an alarm.

These detectors respond quickly to very small smoke particles (even those invisible to the naked eye) from flaming or very hot fires, but may respond very slowly to the dense smoke associated with smoldering or low-temperature fires.



Photoelectric Detectors

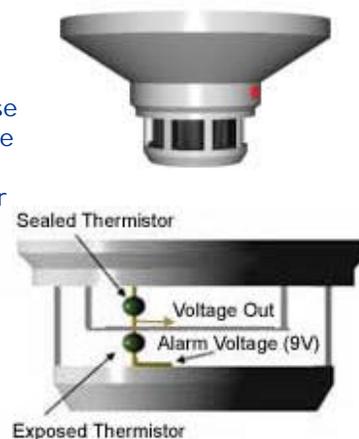
In a photoelectric smoke detector, a light source and light sensor are arranged so that the rays from the light source do not hit the light sensor. When smoke particles enter the light path, some of the light is scattered and redirected onto the sensor, causing the detector to activate an alarm. These detectors react quickly to visible smoke particles from smoldering fires, but are less sensitive to the smaller particles associated with flaming or very hot fires.



Heat Detectors

Heat detectors are normally used in dirty environments or where dense smoke is produced. Heat detectors may be less sensitive, but are more appropriate than a smoke detector in these environments. The most common heat detectors either react to a broad temperature change or a predetermined fixed temperature.

Heat detectors use a set of temperature-sensitive resistors called thermistors that decrease in resistance as the temperature rises. One thermistor is sealed and protected from the surrounding temperature while the other is exposed. A sharp increase in temperature reduces the resistance in the exposed thermistor, which allows a large current to activate the detector's alarm.



Flame Detectors



Flame detectors are line-of-sight devices that look for specific types of light (infrared, visible, ultraviolet) emitted by flames during combustion. When the detector recognizes this light from a fire, it sends a signal to activate an alarm.

Installation and restoration

For fire detection devices to give a prompt warning of a fire, they must be appropriate for the location you want to protect and approved by a nationally recognized testing laboratory such as Underwriters Laboratory (UL) or Factory Mutual (FM). [1910.164\(b\)\(1\)](#)

Detector selection

Fire detectors should be selected based on the burning characteristics of the materials present and the nature of location they will be used to protect.



Smoke detectors

Ionization or photoelectric smoke detectors are designed to identify a fire during its smoldering or early flame stages and will meet the needs of most areas containing primarily wood, paper, fabric, and plastic materials. During combustion, these materials produce a mixture of smoke types with detectable levels of both large and small smoke particles. Smoke detectors are suitable for:

- Indoor areas with low ceilings such as offices, closets, and restrooms.
- Areas that are relatively clean with minimal amounts of dust and dirt.
- Areas that contain solid fuels like wood, paper, fabric, and plastic materials.

Heat detectors

Heat detectors are ideal for areas where flammable gasses and liquids are handled or any area where a fire will quickly cause a large change in the surrounding temperature. Heat detectors are also suitable for:

- Dirty, dusty or smoky environments.
- Indoor areas without winds or drafts that can prevent heat from reaching the detector.
- Manufacturing areas where large quantities of vapors, gases, or fumes may be present.
- Areas where particles of combustion are normally present, such as in kitchens, furnace rooms, utility rooms, and garages or where ovens, burners or vehicle exhaust gases are present.

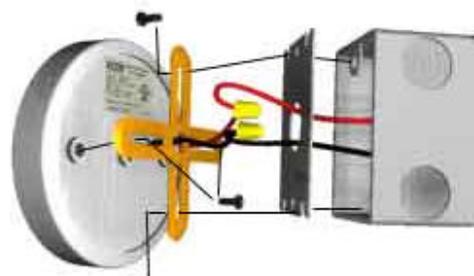
Flame detectors

Flame detectors are best for protecting:

- Areas with high ceilings and open-spaces, such as warehouses and auditoriums.
- Outdoor or semi-enclosed areas, where winds or draughts can prevent smoke from reaching a heat or smoke detector.
- Areas where rapidly developing flaming fires can occur, such as petrochemical production, fuel storage areas, paint shops, and solvent areas.
- Environments that are unsuitable for other types of detectors.

Protection of fire detectors

Fire detectors that may be exposed to corrosive



environments must be either made or coated with a non-corrosive material. [1910.164\(d\)\(1\)](#) In order to keep detection equipment operable, they must be located away from or out of contact with materials or equipment which may cause physical damage or be protected by a cage or metal guard. [1910.164\(d\)\(2\)](#) Detectors that are installed outdoors and need to be shielded from the weather to work properly must be protected with a canopy, hood, or other suitable device.

All detectors must be securely mounted to a solid surface, such as screwed to a junction box with a mounting plate or other appropriate method that prevents them from putting pressure or stress on attached wires or tubing. [1910.164\(d\)\(3\)](#)

Number, location and spacing of detecting devices

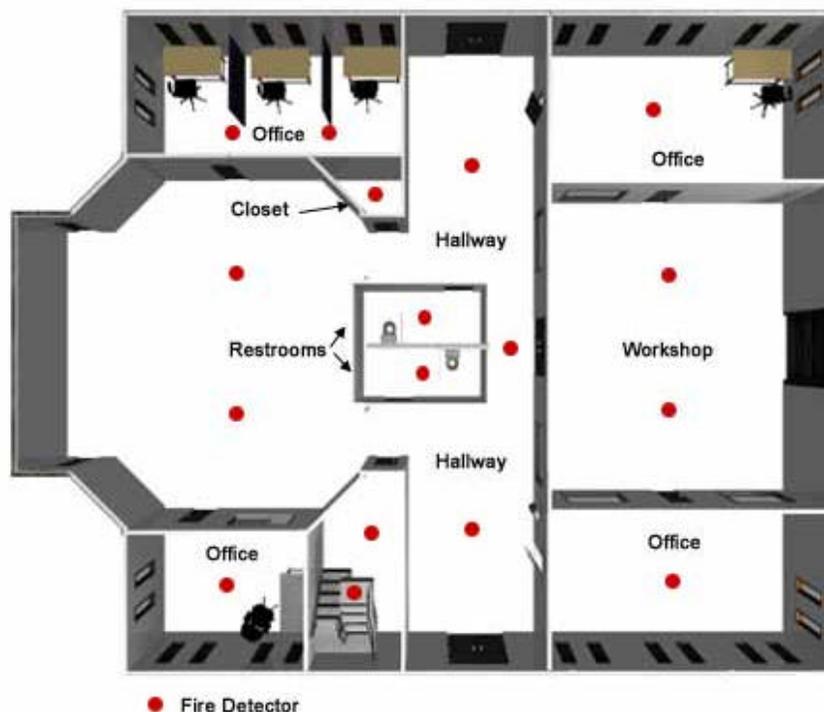
The number, spacing, and location of detectors must be based on:

- Field experience or testing,
- Engineering surveys,
- The manufacturer's recommendations, or
- A nationally recognized testing laboratory listing.

[1910.164\(f\)](#)

General guidelines for placing fire detectors:

- Put at least one detector in each room, storage area, and hallway. You may need more than one detector per room for those that exceed the manufacturer's spacing requirements. For example, if your detector is rated for 30 feet, install detectors so they are evenly spaced with no more than 30 feet between detectors.
- Place the detector as close to the center of the ceiling as possible when only one detector is required in a room or space.
- Put at least one detector in each closet, elevator and dumbwaiter shaft, stairwell, and other enclosed spaces.
- Place a detector at the top of each flight of stairs.
- Place the detectors in the path of the air flow toward the return air duct when air supply or return ducts are present in a room or space.
- Place all smoke detectors at least three feet from ceiling fans.



Maintenance and testing

Over time, dust, dirt, and other foreign material can build up inside a detector's sensing elements, resulting in reduced sensitivity, which can limit the amount of warning time given during a fire. Dirty or dusty detectors can also result in unwanted alarms that can desensitize occupants to the alarm system or produce more serious behavior (such as disconnecting the system altogether).

To avoid malfunctions and unwanted alarms and to make sure your fire detection system will perform as expected in the event of a fire, you are required to:

- Operate and maintain your system in a working condition, making sure it is always turned on, except during repairs or maintenance. [1910.164\(c\)\(1\)](#)
- Test and adjust fire detectors and fire detection systems often to ensure that they operate correctly and maintain reliability. [1910.164\(c\)\(2\)](#) Detectors found to be unreliable and/or with reduced sensitivity must be replaced or cleaned and recalibrated.
- Assure that pneumatic and hydraulic operated detection systems installed after January 1, 1981, are equipped with supervised systems. [1910.164\(c\)\(3\)](#)
- Have a qualified person service, maintain and test all fire detection systems, including cleaning and necessary sensitivity adjustments. [1910.164\(c\)\(4\)](#)
- Have fire detectors cleaned on a regular basis as necessary to assure their proper operation. [1910.164\(c\)\(5\)](#)

All fire detection equipment must be returned to normal operation as soon as possible after being tested, used, or accidentally activated. [1910.164\(b\)\(2\)](#)

Note: You are also required to have spare detection devices and components readily available in the workplace or from a local supplier to ensure prompt restoration of the system.

Specific applications or uses

The following applies to fire detection systems used for specific applications:

- When a fire detection system is installed for the purpose of activating a fire extinguishing or suppression system, it must be designed to respond in time to control or extinguish the potential fire. [1910.164\(e\)\(1\)](#)
- When a fire detection system is installed as an employee evacuation alarm, it must be designed and installed to provide a warning for emergency action and safe escape of employees. [1910.164\(e\)\(2\)](#)
- Do not delay alarms or devices actuated by fire detectors for more than 30 seconds, unless the delay is necessary for the safety of employees. For example, if a fire suppression system uses a compressed gas that will flood an occupied area, it will be necessary to give employees time to escape. If such a delay is necessary, it must be addressed in an [emergency action plan](#) meeting the requirements of [1910.38](#). [1910.164\(e\)\(3\)](#)



Fire Detection Systems Checklist

Installation and restoration	
<input type="checkbox"/>	Are all devices approved for use? 1910.164(b)(1)
<input type="checkbox"/>	Are fire detection systems and components returned to normal operating condition as soon as possible after each use or test? 1910.164(b)(2)

Maintenance and testing	
<input type="checkbox"/>	Are systems properly maintained and operated, except during repairs or maintenance? 1910.164(c)(1)
<input type="checkbox"/>	Are fire detectors and fire detection systems tested and adjusted often enough so that they operate correctly and maintain reliability? 1910.164(c)(2)
<input type="checkbox"/>	Are pneumatic and hydraulic operated detection systems installed after January 1, 1981, equipped with supervised systems? 1910.164(c)(3)
<input type="checkbox"/>	Are the servicing, maintenance, and testing of fire detection systems, including cleaning and necessary sensitivity adjustments, performed by a trained person? 1910.164(c)(4)
<input type="checkbox"/>	Are fire detectors cleaned on a regular basis when necessary to assure their proper operation? 1910.164(c)(5)

Protection of fire detectors	
<input type="checkbox"/>	Is outdoor fire detection equipment protected from the weather and corrosion? 1910.164(d)(1)
<input type="checkbox"/>	Is fire detection equipment protected from mechanical or physical impact? 1910.164(d)(2)
<input type="checkbox"/>	Are detectors supported independently, and not by their wires or tubing? 1910.164(d)(3)

Response time	
<input type="checkbox"/>	Do fire detection systems operate in time to control or extinguish a fire? 1910.164(e)(1)
<input type="checkbox"/>	Do fire detection systems provide a warning for emergency action and safe escape of employees? 1910.164(e)(2)
<input type="checkbox"/>	Do you prevent delaying alarms or devices for more than 30 seconds, unless the delay is necessary for the safety of employees? If a delay is necessary, it must be addressed in an emergency action plan meeting the requirements of 1910.38 , 1910.164(e)(3)

Number, location and spacing of detecting devices	
<input type="checkbox"/>	Are the appropriate number, spacing, and location of fire detectors provided? 1910.164(f)



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Workplace Evaluation - Alarm Systems

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The purpose of the employee alarm systems standard [1910.165](#) is to reduce the severity of workplace accidents and injuries by ensuring that alarm systems operate properly and procedures are in place to alert employees to workplace emergencies.



This section will help you to understand alarm system requirements for warning employees when a hazardous condition or event occurs.

- [Does the alarm standard \(1910.165\) apply to me?](#)
- [Types of alarm devices](#)
- [Emergency response plan](#)
- [Installation and restoration](#)
- [Maintenance and testing](#)
- [Employee training](#)

Does the standard apply to me?

OSHA's employee alarm systems standard [1910.165](#) applies to all employers that use an alarm system to satisfy any OSHA standard that requires employers to provide an early warning for emergency action, or reaction time for employees to safely escape the work place, the immediate work area, or both.

This standard also applies to you if an OSHA standard specifically states that you must install an employee alarm system. For example, some standards that specifically require or reference alarm systems include:

- [Employee Emergency Plans and Fire Prevention Plans \(1910.38\)](#)
- [Fire Detection Systems \(1910.164\)](#)
- [Fixed Extinguishing Systems \(1910.160\)](#)
- [Fixed Dry Chemical Extinguishing Systems \(1910.161\)](#)
- [Fixed Gaseous Agent Extinguishing Systems \(1910.162\)](#)
- [Flammable and Combustible Liquids \(1910.106\)](#)
- [Portable Fire Extinguishers \(1910.157\)](#)
- [Powered Platforms for Building Maintenance \(1910.66\)](#)
- [Hazardous Waste Operations and Emergency Response \(1910.120\)](#)
- [Means of Egress \(1910.37\)](#)



Note: This standard does not apply to discharge or

supervisory alarms unless they are intended to be employee alarm systems. [1910.165\(a\)\(1\)](#)

Types of employee alarms

An employee alarm system can be any piece of equipment and/or device designed to inform employees that an emergency exists or to signal the presence of a hazard requiring urgent attention. The two most common types of alarms are audible and visual devices.

Audible Alarms:

Audible alarms include bells, horns, sirens, voice announcement systems, and other devices that can be distinguished above and apart from the normal sound level within the workplace.

Bells

Vibrating bells are the most common signal device. Bells are commonly used in schools for fire alarms.



Horns

Horns produce a very loud distinctive sound that immediately attracts attention. Horns can be useful to call attention to critical situations.

Sirens

Sirens produce a loud piercing wail that makes them ideally suitable for initiating a site-wide evacuation.



Workplace Announcement System

Speakers can be used to play a live or recorded voice message. They are often ideally suited for large workplaces where phased or guided evacuations are needed.

Visual Alarms

Visual alarms use steady, flashing, or strobe lights to alert workers to an emergency situation in areas where noise levels are high, especially where ear protection must be worn and audible signals may not be heard or may be misunderstood. Visual signals also provide an effective way to alert workers with hearing loss about an emergency.

Flashing/Steady Lights

These lights are well suited for areas where ambient noise makes audible signals difficult to hear. These types of lights come with different colored covers for increased attention and can be ordered with rotating or flashing lights.



Strobe Lights

Strobe lights use high intensity flash tubes that are ideally suited for areas where high ambient light levels make traditional rotating or flashing lights difficult to distinguish or where ambient noise makes audible signals difficult to hear.

Installation and restoration

For alarm systems to provide adequate notification in the event of an emergency, they must be appropriate for the location you want to protect and either approved by an independent testing laboratory or they must be: [1910.165\(c\)\(1\)](#)

- Capable of being heard, seen, or otherwise perceived by everyone in the workplace; [1910.165\(b\)\(2\)](#)
- Distinctive and easily identified by all employees as a signal to [evacuate](#) the work area or perform actions identified in your emergency response plan, such as "[shelter-in-place](#)"; [1910.165\(b\)\(3\)](#)
- Supervised if they were installed after January 1, 1981 and contain circuitry that is capable of being supervised. These systems must also provide positive notification to assigned personnel whenever a deficiency exists in the system. [1910.165\(d\)\(4\)](#)



Alarm Selection Guidelines To get the most from an alarm system, follow these guidelines when selecting devices:

- Make sure the alarm's sound is as different from the background noise and light as possible. Audible alarms should exceed the ambient noise level by at least six decibels. The light intensity for visual alarms should be at least 75 candela.
- Use alarms with integrated audible and visual signals to accommodate the hearing and visually impaired, and for areas where a person may be working alone. This includes areas such as restrooms, storage areas, offices, and similar areas. (These devices are available for about the same cost as an audible or visual signal alone).
- Avoid using strobe devices that flash at rates above five flashes per second (fps). Rates above five fps can trigger seizures in people with certain forms of epilepsy. When multiple devices are used, either synchronize or reduce their flash rate so that the combined rate does not exceed five fps.

Did you know?

Research indicates high-intensity xenon strobe lamps to be the most effective and white light the most discernible. Colored lamps, particularly red, were found to be ineffective even at very high intensities.

Protection of Alarms To make sure devices stay operable, follow these guidelines:

- Alarm system components that may be exposed to corrosive environments should be either made or coated with a non-corrosive material.
- Position alarm devices away from or out of contact with materials or equipment which may cause physical damage.
- Alarms that are installed outdoors and need to be shielded from the weather to work properly must be protected with a canopy, hood, or other suitable device.
- All devices should be securely mounted to a solid surface, such as screwed to a junction box with a mounting plate or other appropriate method that prevents them from putting pressure or stress on attached wires or tubing.

Alarm Placement Guidelines To ensure your alarm system provides adequate coverage, follow these guidelines when placing alarm devices:

- Put at least one visual alarm in each room and any other general usage areas (guest restrooms, meeting rooms) which may be occupied by those with hearing impairments. You may need more than one alarm per room for those that exceed the manufacturer's spacing requirements. For example, if your alarm is rated for 50 feet, install alarms so they are evenly spaced with no more than 50 feet between devices.
- Mount visual and audible devices 80 inches above the highest floor level within the space or six inches below the ceiling, whichever is lower.
- Manually activated devices for use in conjunction with alarms must also be:

Unobstructed, conspicuous, and readily accessible. [1910.165\(e\)](#) Make available an emergency communications system such as a public address system, telephone, portable radio unit, or other means to notify employees of the emergency and to contact local law enforcement, the fire department, and others. [1910.165\(b\)\(4\)](#)

Emergency response plan

For an alarm system to be effective, you must have an emergency action plan that addresses how employees, including disabled workers, will be informed that an emergency exists and how they should respond. The alarm system must inform "all affected employees" that an emergency exists and what their immediate response should be based on the alarm sequence. This plan should include:

- How and what warning(s) will be provided through the employee alarm system for necessary emergency action as called for in the [emergency action plan](#), or for sufficient reaction time to allow the safe escape of employees from the workplace or the immediate work area, or both; [1910.165\(b\)\(1\)](#)
- Procedures for sounding emergency alarms in the workplace. For those employers with 10 or fewer employees in a particular workplace, direct voice communication is an acceptable procedure for sounding the alarm provided all employees can hear the alarm. Such workplaces do not need a back-up system. [1910.165\(b\)\(5\)](#)
- A current list of key personnel, such as the plant manager or physician, in order of priority, to notify in the event of an emergency during off-duty hours.

Employee Alarm Systems	Comments
<input type="checkbox"/> Is the emergency preparedness plan reviewed and revised periodically?	
Does each employee know the following?	
<input type="checkbox"/> How to report an emergency	
<input type="checkbox"/> The type and meaning of each emergency alarm or signal	Use distinct signals if the employee alarm system is used for alerting fire brigade members, or for other purposes; 1910.38(a)(3)(ii)
<input type="checkbox"/> Evacuation routes	
<input type="checkbox"/> Assembly areas	
<input type="checkbox"/> First aid / medical kit locations	
<input type="checkbox"/> Alarm pull box locations	
Are the following emergency phone numbers posted?	
<input type="checkbox"/> Local fire department	
<input type="checkbox"/> Hospitals and ambulances	
<input type="checkbox"/> Police departments	
<input type="checkbox"/> Emergency response team	
<input type="checkbox"/> Emergency agencies	
<input type="checkbox"/> Is the employee alarm system recognizable and perceptible in all areas during emergency conditions?	
<input type="checkbox"/> Are employee alarm systems properly maintained and tested regularly?	

Maintenance and testing

Employee alarm systems are important life safety devices and must be maintained in an operating condition at all times except during repairs or maintenance. [1910.165\(d\)\(1\)](#).

Routine Test and Maintenance

- Test the reliability and adequacy of non-supervised employee alarm systems every two months. Use a different actuation device in each test of a multi-actuation device system. [1910.165\(d\)\(2\)](#)
- Maintain or replace power supplies as often as necessary to ensure a fully operational condition. Provide a back-up means of alarm when systems are out of service. [1910.165\(d\)\(3\)](#)
- The servicing, maintenance, and testing of employee alarms must be done by properly trained persons. [1910.165\(d\)\(5\)](#)
- Do a visual check to ensure that employee alarm devices are not obstructed/installed in a manner that would prevent sound or light from reaching or entering the protected areas.

- Restore all employee alarm systems to normal operating condition as soon as possible after each test or alarm. Spare alarm devices and components must be readily available. [1910.165\(c\)\(2\)](#)

Employee training and education

Employees must know what types of emergencies may occur and what course of action they must take. Make sure all your employees understand the function and elements of your emergency action plan, including types of potential emergencies, reporting procedures, alarm systems, evacuation plans, and shutdown procedures. Discuss any special hazards your workplace may have such as flammable materials, toxic chemicals, radioactive sources, and/or water-reactive substances. Your training should address the following:



- Individual roles and responsibilities;
- Threats, hazards, and protective actions;
- Location and operation of manually activated pull stations and communication equipment;
- Emergency response procedures;
- Evacuation, shelter, and accountability procedures;
- Location and use of common emergency equipment; and
- Emergency shutdown procedures.

When your employees know how to sound an alarm and/or notifying emergency personnel at the first sign of an emergency, it may make the difference between life and death.

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Occupational Safety & Health Administration
200 Constitution Avenue, NW
Washington, DC 20210

Alarm Systems Checklist

General requirements	
<input type="checkbox"/>	Does your plan include a way to alert employees, including disabled workers, to evacuate or take other action, and how to report emergencies?
<input type="checkbox"/>	Have you established an employee alarm system that complies with 1910.165.1910.38(a)(3)(i) ?
<input type="checkbox"/>	If the employee alarm system is used for alerting fire brigade members, or for other purposes, is a distinctive signal used for each purpose?. 1910.38(a)(3)(ii)
<input type="checkbox"/>	Does the employee alarm system provide warning for necessary emergency action as called for in the emergency action plan , or for reaction time for safe escape of employees from the workplace or the immediate work area, or both? 1910.165(b)(1)
<input type="checkbox"/>	Can alarms be heard, seen, or otherwise perceived by everyone in the workplace? 1910.165(b)(2)
<input type="checkbox"/>	Do you provide an auxiliary power supply if electricity is shut off? 1910.165(b)(2)
<input type="checkbox"/>	Do you ensure that alarms are distinctive and recognized by all employees as a signal to evacuate the work area or perform actions identified in your plan? 1910.165(b)(3)
<input type="checkbox"/>	Have you made available an emergency communications system such as a public address system, portable radio unit, or other means to notify employees of the emergency and to contact local law enforcement, the fire department, and others. 1910.165(b)(4)
<input type="checkbox"/>	Have you established procedures for sounding emergency alarms in the workplace? 1910.165(b)(5)
Installation and Restoration	
<input type="checkbox"/>	Are only approved devices, components, combinations of devices, or systems used? Steam whistles, air horns, strobe lights or similar lighting devices, or tactile devices meeting the requirements of this section are considered to meet this requirement for approval. 1910.165(c)(1)
<input type="checkbox"/>	Are all employee alarm systems restored to normal operating condition as soon as possible after each test or alarm? Spare alarm devices and components must be readily available. 1910.165(c)(2)
Maintenance and Testing	
<input type="checkbox"/>	Are all employee alarm systems in proper working condition, except when undergoing repairs or maintenance? 1910.165(d)(1)
<input type="checkbox"/>	Is the reliability and adequacy of non-supervised employee alarm systems tested every two months? Use a different actuation device in each test of a multi-actuation device system. 1910.165(d)(2)
<input type="checkbox"/>	Are power supplies maintained or replaced as often as is necessary to assure a fully operational condition? Provide back-up alarms when systems are out of service. 1910.165(d)(3)
<input type="checkbox"/>	Is employee alarm circuitry installed after January 1, 1981 supervised and does it provide positive notification to assigned personnel whenever a deficiency exists in the system? 1910.165(d)(4)
<input type="checkbox"/>	Are the servicing, maintenance and testing of employee alarms done by properly trained persons? 1910.165(d)(5)
Manual Operation	
<input type="checkbox"/>	Are manually activated alarms unobstructed, conspicuous and readily accessible? 1910.165(e)



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Workplace Evaluation - Fixed Extinguishing Systems

[Print a Checklist](#)

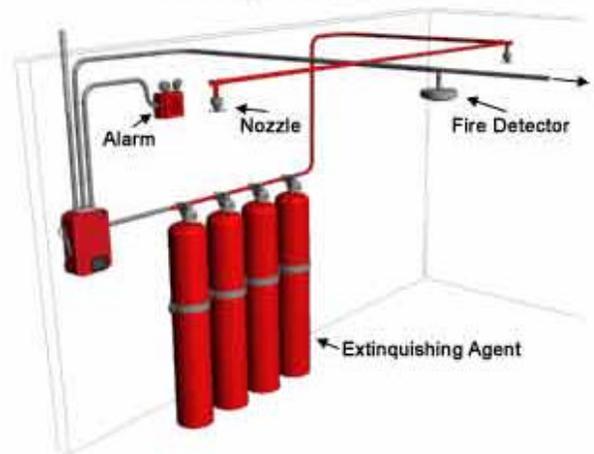
Fixed fire extinguishing/suppression systems are commonly used to protect areas containing valuable or critical equipment such as data processing rooms, telecommunication switches, and process control rooms. Their main function is to quickly extinguish a developing fire and alert occupants before extensive damage occurs by filling the protected area with a gas or chemical extinguishing agent.

In this section we will review the employer's responsibilities for operating, testing, and maintaining fixed extinguishing systems that are installed to meet a particular OSHA standard [1910.160\(a\)\(1\)](#), or where its extinguishing agent may expose employees to possible injury, death, or adverse health effects [1910.160\(a\)\(2\)](#). This section does not apply to automatic sprinkler systems (see [1910.159](#)) or to systems installed to protect areas where there is no potential for employee exposure.

This section will help you understand your requirements under the fixed extinguishing system standard by addressing the following issues:

- [Does the "Fixed Extinguishing System" standard apply to me?](#)
- [System Design and Application](#)
- [Operation, Maintenance, and Testing](#)
- [Total Flooding Applications](#)

Fire Suppression System



Does the "Fire Extinguishing System" standard apply to me?

OSHA's fixed extinguishing systems standard applies to all employers who have a fixed extinguishing system installed to meet a particular OSHA standard, with the exception of automatic sprinkler systems that are covered by [1910.159](#). This standard also contains specific provisions for any fixed system, regardless of why it was installed, that may expose employees to possible injury, death, or adverse health consequences caused by the extinguishing agent. These systems are

only subject to the requirements of paragraphs [\(b\)\(4\)](#) through [\(b\)\(7\)](#) and [\(c\)](#) of this standard.



Note: Systems installed to protect areas where there is no potential for employee exposure to the extinguishing agent are exempted from the requirements of this standard.

System Design and Application

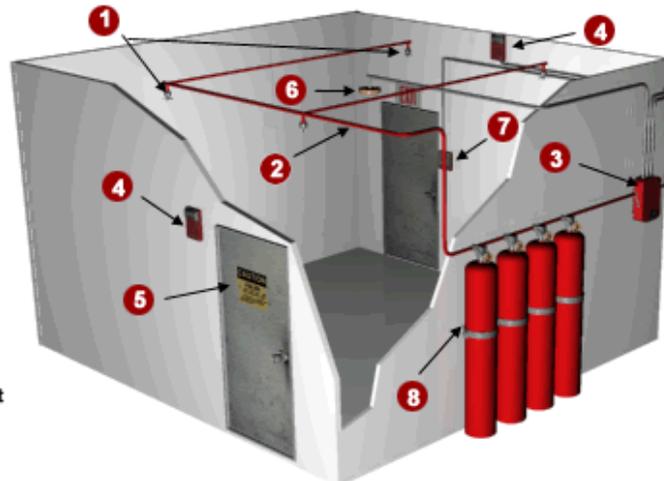
A fire extinguishing system is an engineered set of components that work together to quickly detect a fire, alert occupants, and extinguish the fire before extensive damage can occur. All system components must be:

- Designed and approved for use on the specific fire hazards they are expected to control or extinguish. [1910.160\(b\)\(1\)](#)
- Protected against corrosion or either made or coated with a non-corrosive material if it may be exposed to a corrosive environment. [1910.160\(b\)\(12\)](#)
- Designed for the climate and temperature extremes they will be exposed to. [1910.160\(b\)\(14\)](#)

Typical elements and components include:

System Components

- 1 Discharge nozzles
- 2 Piping
- 3 Control panel
- 4 Discharge or warning alarm(s)
- 5 Hazard warning or caution signs
- 6 Automatic fire detection device(s)
- 7 Manual discharge station(s)
- 8 Storage container(s) & extinguishing agent



Note: Use your mouse to explore the picture above. Click on any number to go to that component's requirements.

Discharge Nozzles A discharge nozzle is a device designed to release the extinguishing agent at a specific rate and pattern to quickly extinguish a fire. Discharge nozzles must be suitable for the fire it is intended to extinguish. [1910.160\(b\)\(1\)](#)

The nozzle pictured is designed for total flooding applications. Its bell shape and multiple small discharge openings will create a widely dispersed and diffused discharge pattern to quickly flood an enclosed area with an extinguishing agent. This type of nozzle

is common in paint spray booths, flammable liquid storage rooms or other similar areas.

Nozzles designed for local application usually consist of a cylindrical body with a straight unobstructed center opening. This type of nozzle produces a small discharge pattern that directs the agent toward a local application such as paint dip tanks, quench tanks or areas where a flammable liquid spill may occur.

 [System Components](#)

Discharge Nozzle



Discharge nozzles are used to disperse the extinguishing agent into the protected area

Piping

The piping network is designed to properly distribute the extinguishing agent to the protected areas. All fire protection systems must have pipes and fittings that are suitable for the expected temperature extremes with good corrosion resistance properties.

 [System Components](#)

Piping



The piping system is used to transport the extinguishing agent (carbon dioxide, halon, argon, etc.) from its storage container to the discharge nozzles.

Control Panel

The control panel monitors and integrates all components together and controls the audible and visual alarms and discharge functions. When an automatic or manual device is activated it sends a signal to the control panel where, depending on the type of system and hazards, can be programmed to:

- Activate a pre-discharge alarm
- Initiate agent release
- Shutdown ventilation systems
- Shutdown machinery or equipment
- Activate visual & audible fire alarms
- Notify emergency response personnel

 [System Components](#)

Control Panel



The control panel integrates all devices and displays their operational status and condition.

Discharge Alarm or Signaling Devices

Each area protected by a fixed extinguishing system must have a distinctive alarm or signal which complies with [1910.165](#) to alert occupants that the system is discharging. These alarms must be able to be heard or seen above ambient noise or light levels, unless the discharge is immediately recognizable. [1910.160\(b\)\(3\)](#)

If the alarm or signaling device is used on a total flooding system, it must also:

- Alarm before the system discharges, to give employees sufficient time to safely exit the space. [1910.160\(c\)\(3\)](#)
- Be connected to an approved fire detection device that automatically activates the pre-discharge alarm prior to the system discharge. [1910.160\(c\)\(4\)](#)
- Be addressed in an emergency action plan in accordance with [1910.38](#) for each area that is protected.

Note: Areas protected by a total flooding system where employees cannot enter during or after the system's operation are exempt from the requirements of paragraph (c) of this section. [1910.160\(c\)\(2\)](#)

[System Components](#)

Warning Signs and Safeguards

Warning signs must be posted to warn employees in advance about the hazards associated with the extinguishing agent. Hazard warning or caution signs must be posted at the entrance to and inside of areas protected by fixed extinguishing systems which use agents in concentrations known to be hazardous to employee safety and health. [1910.160\(b\)\(5\)](#)

Recommended guidelines for posting:

- To avoid confusion, keep hazard warning signs consistent by using standardized patterns, phrases, colors, shapes and pictures.
- Wording on signs should be concise, easy to read, and contain sufficient information that is easily understood.
- Warning signs must be in English and should also be posted in the native language spoken by the employees.

In addition to warning signs, the employer must also provide effective safeguards to warn employees when the atmosphere of a protected area remains hazardous to their safety or health as a result of a system discharged. [1910.160\(b\)\(4\)](#)

[System Components](#)

Automatic Fire Detectors

Automatic detection devices sense the smoke, heat, or flames from a fire and initiate an alarm. All automatic detection equipment must be approved, installed and maintained in accordance with [1910.164](#).

Automatic detection devices used on a total flooding system must:

- Automatically activate the pre-discharge alarm before the system discharges to give employees time to safely exit from the protected area. [1910.160\(c\)\(4\)](#)

Warning Alarm



Electronic devices that provide an audible or visual alarm when fire is detected

Warning and Caution Signs



Hazard warning signs must be posted at the entrance to, and inside, areas protected by fixed extinguishing systems.

Fire Detectors



A device that detects fire and causes an alarm signal to be generated

Note: Areas protected by a total flooding system where employees cannot enter during or after the system's operation are exempt from the requirements of paragraph (c) of this section. [1910.160\(c\)\(2\)](#)

[System Components](#)

Manual Discharge Station

A manual discharge station is a device usually mounted on a wall near the emergency exit(s) which will automatically sound an alarm and release the extinguishing agent. If your workplace is equipped with a fixed suppressant system, there must be at least one manual station for each protected area. [1910.160\(b\)\(15\)](#)

Pull Station Guidelines:

- Properly mark and/or label pull stations and other activation devices to indicate their function and the potential hazard to personnel. [1910.160\(b\)\(16\)](#)
- Pull stations must be clearly visible (not blocked or covered) and located near exits or escape routes.
- Operating instructions should be posted at each station.
- Employees should be trained to know when, where, and how to use pull stations.
- If possible, determine if someone is in the area and get them out before using a manual discharge station.



A device that provides a way to manually discharge the fire extinguishing system

[System Components](#)

Extinguishing Agent Storage Containers

Storage containers hold the extinguishing agent until it is needed and can be high or low pressure cylinders or tanks. These containers can be used to hold specialized fire suppression agents like carbon dioxide or halon to protect special work areas, such as computer rooms, chemical storage, or similar areas.

Storage Container Requirements:

- The weight and pressure of refillable containers must be checked at least semi-annually. If the container shows a loss in net content or weight of more than 5 percent, or a loss in pressure of more than 10 percent, it must be maintained. [1910.160\(b\)\(7\)](#)
- Factory charged non-refillable containers that have no means of pressure indication must be weighed at least semiannually. If the container shows a loss in net content



The storage system discharges agent into the piping and through the discharge nozzles when activated by a manual or automatic device.

or weight of more than 5 percent it must be replaced.

[1910.160\(b\)\(8\)](#)

- Inspection and maintenance dates must be recorded and kept until the container is checked again or for the life of the container, whichever is less. [1910.160\(b\)\(9\)](#)
- Avoid using chlorobromomethane or carbon tetrachloride as an extinguishing agent where employees may be exposed. [1910.160\(b\)\(11\)](#)

[System Components](#)

Operation, Maintenance, and Testing

Automatic fire suppression systems, particularly the total flooding variety, must be operated properly and regularly maintained and tested to guarantee worker safety and system effectiveness. To ensure your fire extinguishing system will perform as expected in the event of a fire, you are required to:

- Inspect each system annually, and operate and maintain them in a working condition, making sure they are always turned on, except during repairs or maintenance. [1910.160\(b\)\(6\)](#)
- Notify employees and establish measures to guarantee their safety if a fixed extinguishing system becomes inoperable. Any defects or impairments must be fixed by trained personnel. [1910.160\(b\)\(2\)](#)
- Ensure that the weight and pressure of refillable containers is checked at least semiannually. If the container shows a loss in net content, weight, or pressure, it must be subjected to maintenance. [1910.160\(b\)\(7\)](#)
- Assure that factory charged non-refillable containers that have no means of pressure indication are weighed at least semiannually. The container must be replaced if it shows a loss in net weight. [1910.160\(b\)\(8\)](#)
- Assure that inspection and maintenance dates are recorded and kept until the container is checked again or for the life of the container, whichever is less. [1910.160\(b\)\(9\)](#)
- Annually train employees who inspect, maintain, operate, or fix extinguishing systems. [1910.160\(b\)\(10\)](#)
- Train all employees with respect to the type of systems installed in the workplace, the hazards involved, proper activation in case of emergency, and the correct response to audible and visual pre-discharge alarms. Provide training for non-English speaking employees in languages understood by the affected employees and other individuals that may be exposed to the hazard.
- Provide and assure the use of personal protective equipment (PPE) for rescuing employees trapped in areas that have become hazardous due to an agent discharge. [1910.160\(b\)\(17\)](#)

Total Flooding Applications

Total Flooding Applications consist of protecting an enclosed space by flooding it with a gas, such as carbon dioxide or halon. This method is used to protect electrical equipment and other types of deep-seated smoldering fires that may re-ignite after the flame has been extinguished. Because these systems can create an oxygen deficit or toxic atmosphere they deserve special attention.

The following special provision apply to all fixed suppression systems used for total flooding applications:

- There must be an emergency action plan in accordance with [1910.38](#) to provide for the safe evacuation of employees from within each area protected by a total flooding system. [1910.160\(c\)\(1\)](#)
Systems installed in areas where employees cannot enter during or after the system's operation are exempt from the requirements of this section. [1910.160\(c\)\(2\)](#)
- Each area protected must be equipped with a pre-discharge alarm that complies with [1910.165](#) that is capable of being perceived above light or noise levels, and which gives employees time to safely exit the area before discharge. [1910.160\(c\)\(3\)](#)
- Install and connect fire detection devices to pre-discharge alarm systems which automatically activate total flooding systems. [1910.160\(c\)\(4\)](#)
- Signs must be posted in and at the entrance to areas protected by total flooding fire suppression systems which use agents that are a serious health hazard, such as carbon dioxide, Halon 1211, etc.
- Have personal protective equipment (such as 5-minute "escape packs") available and ready for rescuing employees trapped in areas that may become hazardous due to an agent discharge. [1910.160\(b\)\(17\)](#)

Safety and Health Hazards

The Material Safety Data Sheet for each extinguishing agent should be available in the workplace. It is important that employees know the potential hazards of the extinguishing agents they may be exposed to and how to protect themselves. Additionally, employees who are likely to enter such areas should receive a basic level of instruction into the operating principles of the system to include alarms and related hazards, as well as evacuation procedures. The two most common extinguishing agents used for total flooding applications are carbon dioxide and halon.

Carbon Dioxide Carbon dioxide, under normal conditions, is a colorless, odorless, electrically nonconductive gas that is approximately 1.5 times heavier than air. It will not disturb live electrical components, is non-corrosive, and leaves no residue to clean up.

Specific hazards include:

- Asphyxiation - Exposure to high concentrations of CO₂ gas may create an oxygen-deficient atmosphere.
- Cold Temperature - Direct contact with the vaporizing liquid during discharge can cause frostbite burns to the skin.

Halon Systems

Halon is a bromo freon that works by replacing oxygen, thus creating an oxygen-deficient atmosphere. This can be very dangerous to employees. The reaction products of halon on hot surfaces may result in the release of toxic substances and carcinogens. These areas should be clearly labeled as follows:



Specific halon hazards include:

- Asphyxiation - Exposure to high concentrations of halon can create an oxygen-deficient atmosphere.

- Cold Temperature - Direct contact with the vaporizing liquid during discharge can cause frostbite burns to the skin.
- Central Nervous System (CNS) - Inhaling high concentrations of halon gas can cause dizziness, tingling in extremities and, in severe cases, unconsciousness.
- Cardiovascular Effect - In some people, exposure to halon can cause an increased sensitivity of the heart to adrenaline resulting in irregular heartbeats and, in severe cases, heart attack.
- When halon is exposed to temperatures above 900 degrees F. it could break down and create high concentrations of toxic gases.

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Fixed Extinguishing Systems Checklist

General requirements	
<input type="checkbox"/>	Are fixed extinguishing system components and agents provided that are designed and approved for use on the specific fire hazards that they are expected to control or extinguish? 1910.160(b)(1)
<input type="checkbox"/>	Are employees notified and assured their safety if a fixed extinguishing system becomes inoperable? Any defects or impairments must be fixed by trained personnel. 1910.160(b)(2)
<input type="checkbox"/>	Is a distinctive alarm or signaling system provided that complies with 1910.165 and is capable of being perceived above noise or light levels? Discharge alarms are not required on systems where discharge is immediately recognizable. 1910.160(b)(3)
<input type="checkbox"/>	Are employees warned against entry into discharge areas that remain hazardous to their health? 1910.160(b)(4)
<input type="checkbox"/>	Are warning signs posted at the entrance to, and inside of, areas protected by fixed extinguishing systems that use hazardous agents? 1910.160(b)(5)
<input type="checkbox"/>	Are fixed systems inspected annually and maintained in good operating condition? 1910.160(b)(6)
<input type="checkbox"/>	Are weight and pressure of refillable containers checked at least semi-annually? If the container shows a loss in net content, weight, or pressure, it must be subjected to maintenance. 1910.160(b)(7)
<input type="checkbox"/>	Are factory charged nonrefillable containers that have no means of pressure indication weighed at least semi-annually? The container must be replaced if it shows a loss in net weight or content exceeding 5 percent. 1910.160(b)(8)
<input type="checkbox"/>	Are inspection and maintenance dates recorded and kept until the container is checked again or for the life of the container, whichever is less? 1910.160(b)(9)
<input type="checkbox"/>	Are employees who inspect, maintain, operate, or fix extinguishing systems trained and subsequently given annual review, as appropriate? 1910.160(b)(10)
<input type="checkbox"/>	Is use of chlorobromomethane or carbon tetrachloride prohibited as an extinguishing agent where employees may be exposed? 1910.160(b)(11)
<input type="checkbox"/>	Are systems that are susceptible to corrosion constructed of non-corrosive material or otherwise protected? 1910.160(b)(12)
<input type="checkbox"/>	Is automatic detection equipment approved, installed and maintained in accordance with 1910.164 . 1910.160(b)(13) ?
<input type="checkbox"/>	Do all systems work properly in areas with extreme climates? 1910.160(b)(14)
<input type="checkbox"/>	Is at least one manual station provided to activate each fixed extinguishing system? 1910.160(b)(15)
<input type="checkbox"/>	Are the hazards identified for which manual operating devices provide protection? 1910.160(b)(16)
<input type="checkbox"/>	Is the use of personal protective equipment (PPE) provided and assured for rescuing employees trapped in areas that have become hazardous due to an agent discharge? 1910.160(b)(17)
Total Flooding System Requirements	
<input type="checkbox"/>	Is an emergency action plan provided in accordance with 1910.38 for each area within a workplace that is protected by a total flooding system? 1910.160(c)(1) Systems installed in areas where employees cannot enter during or after the system's operation are exempt from the requirements of this section. 1910.160(c)(2)
<input type="checkbox"/>	Is a pre-discharge employee alarm on total flooding systems provided that complies with 1910.165 , which is capable of being perceived above light or noise levels, and which gives employees time to safely exit the area before discharge? 1910.160(c)(3)
<input type="checkbox"/>	Are approved fire detection devices installed and connected to pre-discharge alarm systems, which automatically activate total flooding systems, and which permit employees to safely exit the area before the system discharges? 1910.160(c)(4)



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OSHA's Expert Systems

1. [AM I REQUIRED TO HAVE AN EMERGENCY ACTION PLAN \(EAP\)?](#)

Based on an evaluation of your evacuation policy, the Expert System informs you if you are required to have an EAP.

2. [CREATE YOUR OWN EMERGENCY ACTION PLAN \(EAP\).](#)

This expert system will help you to create a basic EAP. This basic plan likely will be adequate for needs of many small and medium-sized entities. It may not be adequate for large establishments or those with unusual hazards. Users in such establishments should consider the special characteristics of their workplaces and can build upon this basic plan to address situations that require special attention. Most small and medium-sized entities can create basic plans using this system in 10 to 15 minutes.

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Do I Need an Emergency Action Plan?

Almost every business is required to have an [emergency action plan \(EAP\)](#).

If fire extinguishers are required or provided in your workplace, and if anyone will be evacuating during a fire or other emergency, then OSHA's [1910.157 standard](#) requires you to have an EAP.

The only exemption to this is if you have an in-house fire brigade in which every employee is trained and equipped to fight fires, and consequently, no one evacuates.

In most circumstances, immediate evacuation is the best policy, especially if professional firefighting services are available to respond quickly. There may be situations where employee firefighting is warranted to give other workers time to escape, or to prevent danger to others by spread of a fire. In this case, you as the employer are still required to have an [EAP](#).

To help you decide whether to have employees evacuate or fight fires, see the [Fight or Flee?](#) section of this eTool.

Still unsure about whether you are required to have an EAP??? Use [OSHA's Expert System](#) to help you determine whether you are required to have an [AP](#).

Ask the OSHA expert!



A helpful alternative to answer the question:

Am I required to have an EAP?

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OSHA's Expert System - Am I required to have an emergency action plan (EAP)?

Answer the questions in the box below to determine if you are required to have an emergency action plan (EAP).

Ask the OSHA expert!



A helpful alternative to answer the question:

Am I required to have an EAP?

Are fire extinguishers provided in the workplace?

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OSHA's Expert System - Am I required to have an emergency action plan (EAP)?

Answer the questions in the box below to determine if you are required to have an emergency action plan (EAP).

Ask the OSHA expert!



A helpful alternative to answer the question:

Am I required to have an EAP?

Are the fire extinguishers intended for employee use?

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OSHA's Expert System - Am I required to have an emergency action plan (EAP)?

Answer the questions in the box below to determine if you are required to have an emergency action plan (EAP).

Ask the OSHA expert!



A helpful alternative to answer the question:

Am I required to have an EAP?

Will any of your employees be required to evacuate the workplace?

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OSHA's Expert System - Am I required to have an emergency action plan (EAP)?

Answer the questions in the box below to determine if you are required to have an emergency action plan (EAP).

Ask the OSHA expert!



A helpful alternative to answer the question:
Am I required to have an EAP?

Since **all employees** are required to fight an incipient stage fire, you are **not required** to develop an emergency action plan (EAP). However, you must comply with all provisions in [1910.157](#).

[Go to OSHA HOME](#)

If you still want to use OSHA's Evacuation eTool for helpful advice on creating an emergency action plan, click on the button below.

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OSHA's Expert System - Am I required to have an emergency action plan (EAP)?

Answer the questions in the box below to determine if you are required to have an emergency action plan (EAP).

Ask the OSHA expert!



A helpful alternative to answer the question:

Am I required to have an EAP?

You **ARE REQUIRED** to have an emergency action plan (EAP) for workplace evacuations. Click on the 'BEGIN' button below to go back to the Evacuation eTool home.

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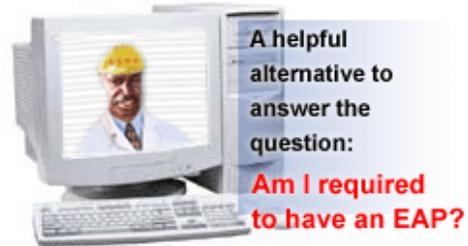
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OSHA's Expert System - Am I required to have an emergency action plan (EAP)?

Answer the questions in the box below to determine if you are required to have an emergency action plan (EAP).

Ask the OSHA expert!



The following questions will help determine the next step in deciding if you are required to have an EAP.

Note: Clicking "Yes" on any of the questions will automatically direct you to the next step.

QUESTION	YES	NO
<p>Does your facility use a total flooding extinguishing system that provides any one of the following design concentrations:</p> <ul style="list-style-type: none"> ■ 4% or greater of Halon 1211? ■ 4% or greater of carbon dioxide? ■ 10% or greater of Halon 1301, or concentrations exceeding 7% when egress from an area cannot be accomplished in one minute? 		
Does your facility use a fire detection system with alarms or devices that are delayed by more than 30 seconds for reasons other than a total flooding extinguishing system listed above?		
Are you required to comply with 29 CFR 1910.119 <i>Process Safety Management</i> ?		
Are you required to comply with 29 CFR 1910.272 <i>Grain Handling Facilities</i> ?		
Are you required to comply with 29 CFR 1910.1047 <i>Ethylene Oxide</i> ?		
Are you required to comply with 29 CFR 1910.1050 <i>Methylenedianiline</i> ?		
Are you required to comply with 29 CFR 1910.1051 <i>1,3-Butadiene</i> ?		
<p>Do you plan to evacuate all of your employees and to rely on an outside party to provide emergency response to a hazardous substance release?</p> <p>Note: if a hazardous substance emergency could occur at your facility and you plan to have any of your employees participate in the emergency response, you are required to have an emergency response plan consistent with 29 CFR 1910.120(q) (<i>Hazardous Waste Operations and Emergency Response</i>).</p>		
<p>If the answer to all of these questions is "no", you are not required to develop an emergency action plan (EAP). However, you must comply with all provisions in 1910.157</p>		



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OSHA's Expert System - Am I required to have an emergency action plan (EAP)?

Use the following Expert System questions (as few as one, or as many as seven depending upon your answers) to determine whether OSHA requires you to have an [emergency action plan](#).

The Expert will start by asking you a set of questions regarding who evacuates your workplace during an emergency. Based on your answers, the Expert can then determine and inform you if you are required by OSHA to develop an [emergency action plan](#).

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Ask the OSHA expert!



A helpful alternative to answer the question:

Am I required to have an EAP?

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OSHA's Expert System - Am I required to have an emergency action plan (EAP)?

Do you want to adopt a policy requiring complete and immediate evacuation in the event of a fire?

--OSHA does not require any employer to assign firefighting duties to an employee.

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OSHA's Expert System - Am I required to have an emergency action plan (EAP)?

Is your workplace in an area that is easily accessible to emergency medical professionals? (e.g. Can emergency crews respond to your site in a short amount of time?)

--If medical support will not be able to respond in a timely manner, you may want employees to fight fires. If medical support is readily available, an evacuation may be the best choice.

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OSHA's Expert System - Am I required to have an emergency action plan (EAP)?

Choose one of the following:

A. You want **ALL** employees to fight fires.

A

OR

B. You want **SOME** employees to fight fires while other employees evacuate.

B

OR

C. You want to adopt a policy requiring **COMPLETE** and immediate evacuation in the event of a fire.

C

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OSHA's Expert System - Am I required to have an emergency action plan (EAP)?

Do you have the resources to properly train and equip your employees to fight fires?

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OSHA's Expert System - Am I required to have an emergency action plan (EAP)?

You have decided to have your employees fight fires, yet you do not currently have the resources to accomplish this. **YOU NEED ADDITIONAL HELP -- YOUR LOCAL FIRE DEPARTMENT IS A GOOD PLACE TO START. ALSO, CHECK WITH YOUR [REGIONAL OSHA OFFICE](#).**

Start Over

To choose a different evacuation policy, click the 'Start Over' button to the right.

Go to eTool

If you still want to use OSHA's Evacuation eTool for helpful advice on creating an [emergency action plan](#) (EAP), click the 'Go to eTool' button to the right. Realize that if none of your employees will be evacuating, then your workplace is exempt from having to follow the listed requirements.

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OSHA's Expert System - Am I required to have an emergency action plan (EAP)?

You **ARE REQUIRED** to have an [emergency action plan](#) (EAP) for workplace evacuations. Click on the 'BEGIN' button below to go back to OSHA's Evacuation eTool.

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OSHA's Expert System - Emergency Action Plan

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Introduction to the Emergency Action Plan Expert System

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An emergency action plan (EAP) is a written document required by particular OSHA standards. The purpose of an EAP is to facilitate and organize employer and employee actions during workplace emergencies. The elements of the plan must include, but are not limited to:

- Evacuation procedures and emergency escape route assignments.
- Procedures to be followed by employees who remain to operate critical plant operations before they evacuate.
- Procedures to account for all employees after an emergency evacuation has been completed.
- Rescue and medical duties for those employees who are to perform them.
- Means of reporting fires and other emergencies.
- Names or job titles of persons who can be contacted for further information or explanation of duties under the plan.

This expert system will help you to create a simple EAP. This basic plan will be adequate for needs of many small and medium-sized entities. This basic plan may not be adequate for large establishments or those with more significant hazards. Users in such establishments should consider the special characteristics of their workplaces. Users can supplement this basic plan to address any situations that require special attention.

Most small and medium-sized entities will get their basic plans from this system in 10 to 15 minutes. Please remember that this system does not save the plan it helps you to write, so you should save and/or print your plan when it is completed.

This OSHA Expert only provides information based on Federal OSHA Emergency Action Plan requirements. If you are covered by a state OSHA plan you may need to contact [your local state OSHA office](#).

Please visit the [OSHA Expert User Guide](#) to obtain further instruction.

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Additional Assistance

OSHA provides a wide range of references and services to help employers and employees improve workplace health and safety and comply with regulatory requirements. These include the following:

- [Education and Training Opportunities](#),
- [Publications](#),
- [Consultation Services](#),
- [Voluntary Protection Programs](#),
- [Partnership Opportunities](#),
- [Safety and Health Programs](#),
- [State Programs](#), and
- [Other Groups or Associations](#).



To file a complaint, report an emergency, or seek OSHA advice, assistance, or products, call 1-800-321-OSHA or your nearest [regional office](#). The teletypewriter (TTY) number is 1-877-889-5627.

What education and training does OSHA offer?

OSHA [area offices](#) offer a variety of information services including publications, audiovisual aids, technical advice, and speakers for special engagements. In addition, OSHA's Training Institute in Des Plaines, IL, provides basic and advanced courses in safety and health for federal and state compliance officers, state consultants, federal agency employees, and private-sector employers, employees, and their representatives.

Due to the high demand for OSHA Training Institute courses, OSHA Training Institute Education Centers also offer some courses at sites throughout the United States. These centers are nonprofit colleges, universities, and other organizations selected through a competitive process. OSHA also provides grants to nonprofit organizations to conduct specialized workplace training and education not available from other sources. Grants are awarded annually. Recipients contribute 20 percent of the total grant cost.

For more information on grants, training, and education, contact the OSHA Training Institute, Office of Training and Education by mail at 1555 Times Drive, Des Plaines IL 60018; by phone at (847) 297-4810, or by fax at (847) 297-4874.

What other publications does OSHA offer?

OSHA offers more than 100 documents, including brochures, fact sheets, posters, pocket cards, flyers, technical documents, and a quarterly magazine. These documents are available [online](#) or by calling (202) 693-1888. Among the titles are the following:

- [Access to Medical and Exposure Records - OSHA 3110](#)
- [All About OSHA - OSHA 2056](#)
- [Chemical Hazard Communication - OSHA 3084](#)
- [Consultation Services for the Employer - OSHA 3047](#)
- [Controlling Electrical Hazards - OSHA 3075](#)
- [Employer Rights and Responsibilities Following an OSHA Inspection - OSHA 3000](#)
- [Employee Workplace Rights - OSHA 3021](#)
- [Hazardous Waste and Emergency Response - OSHA 3114](#)
- [How to Plan for Workplace Emergencies and Evacuations - OSHA 3088](#)
- [Job Hazard Analysis - OSHA 3071](#)
- [OSHA Handbook for Small Business - OSHA 2209](#)
- [Personal Protective Equipment - OSHA 3077](#)
- [Respiratory Protection - OSHA 3079](#)

What free onsite consultation services does OSHA provide?

The OSHA Consultation Service offers free onsite safety and health consultation services to help employers establish and maintain safe and healthful workplaces. The service is funded largely by OSHA and is delivered by professional safety and health consultants within state governments. Developed primarily for smaller employers with more hazardous operations, the service includes an appraisal of all mechanical systems, physical work practices, environmental workplace hazards, and all aspects of the employer's job safety and health program.

The onsite consultation program is separate from OSHA's inspection efforts. No penalties are proposed or citations issued for safety or health problems identified by an OSHA consultant. The service is confidential. The employer's and firm's name, and any information about the workplace, including any unsafe or unhealthful working conditions the consultant identifies, are not reported routinely to the OSHA inspection staff. The employer, however, is obligated to correct any serious job safety and health hazards identified in a timely manner, and commits to do so when requesting the service.

For more information, [click here](#) for a list of contact telephone numbers.

What are the Voluntary Protection Programs?

The Voluntary Protection Programs, or VPPs, recognize and promote effective safety and health program management. Companies in the VPP have strong safety and health programs, implemented and managed cooperatively by their management and labor forces in cooperation with OSHA. Sites approved for VPP's three programs - Star, Merit, and Demonstration - meet and maintain rigorous standards. Benefits to participants include the following:

- Lost-workday case rates generally 60 to 80 percent below industry averages;

- Reduced workers' compensation and other injury- and illness-related costs;
- Improved employee motivation to work safely, leading to better quality and productivity;
- Positive community recognition and interaction;
- Further improvement and revitalization of already good safety and health programs; and
- Partnership with OSHA.

For more information, contact the VPP manager in your [OSHA regional office](#).

What partnership opportunities does OSHA provide?

OSHA has initiated partnerships with employers, employees, and employee representatives in a wide range of industries to encourage, assist, and recognize efforts to eliminate workplace hazards. Participants work together to identify a common goal, develop plans to achieve it, and implement those plans in a cooperative way. Partnerships can transform relationships between OSHA and an employer or entire industry. Former adversaries recognize that working together to solve workplace safety and health problems is to everyone's advantage.

For more information, contact your [OSHA regional office](#).

What is the value of a good safety and health program?

A good, effectively managed worker safety and health program can be a big factor in reducing work-related injuries and illnesses and their related costs. OSHA offers voluntary guidelines to help employers and employees in workplaces it covers develop effective safety and health programs. Safety and Health Program Management Guidelines (*Federal Register* 54(18): 3908-3916, January 26, 1989) identifies four general elements critical to a successful safety and health management system. These are:

- Management leadership and employee involvement;
- An analysis of worksite hazards;
- Use of hazard prevention and control initiatives; and
- Safety and health training.

These [guidelines](#) are posted on the OSHA website. Also, see [OSHA's Safety and Health Management Systems eTool](#).

What is the role of state programs?

The Occupational Safety and Health Act of 1970 encourages states to develop and operate their own job safety and health plans. States that do so must adopt standards and enforce requirements that are at least as effective as federal requirements. Twenty-four states and two territories have adopted their own plans, three of which cover only public employees. For more information, [here is a listing of states and territories with approved plans](#).

What other groups or associations can help me?

Various organizations can provide you with safety and health information that may help you in formulating your [emergency action plan](#), or in taking steps to protect your employees during an emergency. A few are listed here.

Safety Data Sheets, Guides and Manuals

- AIHA Hygienic Guide Series. American Industrial Hygiene Association, 2700 Prosperity Avenue, Fairfax, VA 22031.
- ANSI Standards, Z37 Series, Acceptable Concentrations of Toxic Dusts and Gases. American National Standards Institute, 11 West 42nd Street, New York, NY 10036.
- ASTM Standards and Related Material. American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

Safety Standards and Specifications Groups

- American National Standards Institute, 11 West 42nd Street, New York, NY 10036. Coordinates and administers the federal voluntary standardization system in the United States.
- American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103. The world's largest source of voluntary consensus standards for materials, products, systems, and services.

Fire Protection Organizations

- Factory Insurance Association, 85 Woodland Street, Hartford, CT 06105. Composed of capital stock insurance companies that provide engineering, inspection, and loss-adjustment services.
- Factory Mutual System, 1151 Boston-Providence Turnpike, Norwood, MA 02062. An industrial fire protection, engineering, and inspection bureau established by mutual fire insurance companies.
- National Fire Protection Association, 470 Batterymarch Park, Quincy, MA 02269. A clearinghouse for information on fire protection and prevention as well as NFPA standards.
- Underwriter Laboratories, Inc., 207 East Ohio Street, Chicago, IL 60611. A nonprofit organization that publishes annual lists of manufacturers that provide products meeting appropriate standards.

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Other Resources

- OSHA Emergency Standards
- OSHA Publications

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This eTool is not a new standard or regulation, and creates no new legal obligations. The eTool is advisory in nature, informational in content, and is intended to assist employers in providing a safe and healthful workplace through effective prevention programs adapted to the needs of each place of employment.

The Occupational Safety and Health Act requires employers to comply with hazard-specific safety and health standards. In addition, employers must provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm under Section 5(a)(1), the General Duty Clause of the Act. Employers can be cited for violating the General Duty Clause if there is a recognized hazard and they do not take steps to prevent or abate the hazard. However, failure to implement these guidelines is not, in itself, a violation of the General Duty Clause. Citations can only be based on standards, regulations, and the General Duty Clause.

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