

FIRE SAFETY



A fire safety plan is an essential part of any workplace safety program. In fact, the Occupational Safety and Health Administration (OSHA) mandates one for industry in the 29 Code of Federal Regulations (CFR), Part 1910,

Subparts E (Exit Routes, Emergency Action Plans), L (Fire Protection), and Q (Welding, Cutting, and Brazing). These standards require that a written plan be prepared and communicated to all employees. OSHA standards can be readily accessed at <http://www.osha.gov>.

The goal of this publication is to give employers and those employees responsible for an organization's safety some basic information to research and prepare fire prevention and emergency action plans. It will also be useful for other emergency situations, including fires that might occur in the home. Remember that the OSHA standards are the MINIMUM requirements for protection. If you relied on these in a written test you would receive a grade of D. Standards published by the National Fire Protection Association (NFPA) are much more detailed. Best business practice is to exceed minimum requirements as much as possible in order to ensure maximum protection of life and property.

A good fire safety plan has three main elements, the first of which is prevention. The old saying 'An ounce of prevention is worth a pound of cure' is very true in this case. A fire that doesn't happen means savings in both property and, most importantly, possible human suffering. Evaluating the workplace for fire hazards and taking steps to reduce or eliminate those hazards benefits everyone in the long run. One immediate and positive effect for a business with a good fire safety plan is control of insurance premiums.

The second element of the plan is evacuation. Fires can spread with incredible speed. The ability for all occupants of any structure to quickly leave the danger zone is the best means of ensuring their safety in case a fire does break out. The third element is fire fighting. This is the final element because, although individuals can fight very small fires, the limited capacity of portable

fire extinguishers means that emphasis must always be placed on alerting and evacuating the workforce as the first priority in any fire emergency. Since it requires a substantial investment in equipment and training time for a private company to create an effective fire brigade, it is usually done only within large organizations. Most employers have to rely on the local fire department to tackle any serious fire.

FIRE PREVENTION

The OSHA standard for fire prevention plans is found under part 1910.38 (b). The NFPA standard number is 1. These two standards require a written fire prevention plan. The plan must contain a list of the major workplace fire hazards together with proper handling and storage procedures for them. It must contain a list of potential ignition sources and control procedures for them. The plan must identify the fire protection equipment to control these hazards. Also, it should include the job titles of employees who are responsible for maintaining fire detection and protection equipment, as well as those who are responsible for control of fuel source hazards.



In practical terms, the employer begins by conducting an initial evaluation of the workplace to determine the hazards. This is usually done in the planning stage of any new construction and is based on the building and fire codes of the state and locality. In the case of industries that handle flammable substances there will frequently be additional Federal standards that must be met. The expertise of architects, process design engineers, and fire protection engineers is utilized in this instance. If an existing structure is being leased or purchased, such an evaluation may not always be within the ability of many employers. It is a good idea to call upon the resources of the organization's insurance carrier for risk management

services prior to starting business operations. If the business expands, or processes are modified, it will be necessary to re-evaluate the possible hazards and update the prevention plan as changes take place.

When a company adopts a fire protection plan, it is necessary to explain the plan to each employee upon initial assignment of job duties. The employee must receive all information needed for their safety. The employer must keep the written plan on the premises and available to employees for review. When any change in the plan occurs, the employees should be notified prior to the change or at least prior to the beginning of the next shift after a change takes place. Schedule annual refresher training in the plan as well as a number of five-



minute safety talks throughout the year. Design these talks for the specific needs of work areas. Businesses with fewer than ten employees may communicate the plan orally to their staff but it must be maintained in written form to comply with the standard.

Proper safe storage of flammable or combustible liquids is covered in part 1910.106. This standard outlines the types of permitted containers and their capacities for all classes of these liquids. Flammables storage cabinets are very useful for businesses that use small to moderate amounts of solvents or flammable paints. Boldly label containers of substances that are fire hazards. Choose the hazard label system that is best suited to your operation. Employers can choose between three warning label systems, the NFPA diamond, the National Paint and Coatings Association's Hazardous Materials Information System (HMIS), or the American National Standards Institute's (ANSI) system. Carefully examine storage of combustible solids, like paper supplies. Never store them in electrical service rooms.

Housekeeping is an important part of the plan. The standard states that the employer must control accumulation of flammable or combustible wastes so they do not contribute to a fire emergency. This is not necessarily limited to waste from manufacturing processes. It also includes office, shipping or mailroom paper and pasteboard waste. Remove combustible waste from the workplace or store the waste in containers such as safety cans. Empty these containers on a daily basis. The housekeeping procedures must be included in the written plan. Conduct periodic inspections of hazard areas. These inspections should be based on a written form that lists each hazard, provides a means of recording and fixing problems, and is required to be signed by the inspector. Make a sign-off form that verifies

completion of any repairs or corrections that are needed and maintain a file of completed forms.

Other sources of ignition include electric wiring and equipment. Power cords are often a source of problems if they become damaged. If a plug is found to be missing its grounding prong, or the cord is worn or cut, tag it immediately and remove it from service. Do not wrap cut or worn areas with tape because the internal insulation between the current and ground wires might be damaged and a short could occur. Never overload electrical outlets by using multiplex plugs to connect more than two appliances or tools. Do not use extension cords in place of permanent wiring. Do not staple extension or appliance cords to walls or to doorframes, route them through openings in walls, or wrap them around metal furniture. Periodically inspect fixed electrical equipment and controls for wear or lack of lubrication that could lead to overheating. Clean accumulations of grease and dust on air filter elements or fans in electric-powered machinery on a regular schedule. One more possible ignition source is static electricity. When flammable or combustible liquids are transferred from one container to another, use bonding wires to connect both containers and a grounding lead.



Cutting, welding, and grinding operations must be controlled as well. Fire protection standards for these operations are found in part 1910.252 (a). The basic precautions for welding and cutting are based on the premise that the object to be cut or welded cannot be moved. In these cases remove all fire hazards from the immediate area. If they cannot be moved, place fireproof guards to confine the heat, sparks, and slag. Trained firewatchers must be in place for operations in areas where other than a minor fire might develop. Develop a system of hot work permits to control all facets of these operations. Contractors performing hot work in the facility are subject to the same hot work rules as regular employees.

Designate smoking and non-smoking areas for each workplace and provide properly designed containers to hold cigarette butts in the smoking area. Clearly mark any fire hazard areas with signage forbidding any kind of smoking or open flame, even if the entire structure is already a no-smoking zone. Although it is not required, include a system of rules as part of the plan. Records and enforcement of infractions, such as smoking in forbidden areas or blocking exits, should be in written form with a graduated, fair system of penalties assessed for repeated violations. As part of the prevention plan, maintain records of infractions.

Create a written maintenance plan for fire suppression systems, as well as for systems installed on heat-producing equipment to prevent accidental ignition of combustibles.

EVACUATION

A written emergency action plan and procedures for reporting fires must be written into the plan. Emergency escape procedures and routes must also be a part of the action plan. Post floor plans of these routes in all rooms and work areas of the business. Show main and alternate routes on these plans whenever possible and define them by different colors. Some requirements in the OSHA standard 1910.37 include minimum width of the exit routes, access to exits, occupant load egress capacity, design of exit doors and walking surfaces. Clear marking of exits, as well as doors that are not exits, is mandated. The size of exit signs and sources of illumination for them must conform to this standard. Nothing must be allowed to obscure the view of any signage or exit doors. The NFPA's Life Safety Code 101-2000 contains extensive exit route standards for every type of public structure. This publication serves as the basis for many municipal codes in the United States and can be purchased from NFPA at <http://www.nfpa.org>. Compliance with the exit route provisions in 101-2000 meets OSHA's exit route requirements. OSHA requires an alarm system to alert employees to a fire emergency. Standards for these systems may be found in part 1910.165. Audible alarms must be distinctive and loud enough to be perceived above the ambient noise level in the workplace. If any employees have vision or hearing impairments, alarms must be designed to alert them. Otherwise a variety of alarms is acceptable. Test alarm systems every two months.

Teach each employee the action plan so they know what actions they must take in each type of emergency. The written plan must contain the job titles of persons who can be contacted by the employee for further explanation of duties under the plan. Teach all employees the correct sequence of actions in a fire emergency. When a fire is discovered, the first thing to do is sound the alarm. The second action is to call the fire department or company fire brigade if there is time to do so. The employee should identify her/himself and describe the location and type of fire. The third thing to do, but only

after completing the first two, is to try to fight a small fire. It must be emphasized that the employee should do this only if they have been trained in the use of the extinguisher and if the situation allows the following three conditions; the employee has their back to the exit route, another person is present to help out, and the room is not full of smoke.

In case of an emergency, some employees may be required to perform shutdown of critical operations or systems prior to evacuating the premises. Include these duties in the written plan with the job titles of these people. If any employees are assigned rescue or medical duties, such duties must be in writing. Appoint fire wardens and train them to aid in evacuations. The recommended ratio of employees to wardens is 20 to 1. In multi-story buildings, assign a minimum of one warden to each floor. For businesses that schedule work by shifts, wardens have to be present on all shifts. Wardens and employees should be aware of and ready to assist any fellow employees who are mobility impaired and might require assistance in an evacuation. The designated shutdown employees and wardens must be trained prior to implementation of the action plan.

Set up a safe area or refuge where all employees are to gather after the evacuation. It is important that the area be sufficiently far from the structure to be secure from possible further hazards that may occur after the evacuation and to allow emergency response personnel and vehicles free access. Develop a procedure to account for all persons who were in the structure prior to the evacuation. This should include any visitors, customers, contractors or delivery personnel who might be on the premises. This accounting is normally an assignment for supervisors and/or fire wardens.

Schedule fire escape drills at the startup of business operations and at least twice a year thereafter. Drills are important for checking and improving the effectiveness of the escape plan. Even more important, if duties and necessary actions are effectively conveyed, the employees will revert to their training in times of stress, which will combat panic. Panic is a major cause of injury and death in fire emergencies. As a key part of the training, make each employee simulate, in a safe manner, conditions of limited visibility on their route of egress. Some examples are to have employees memorize the number of footsteps and direction changes needed to reach safety or (for those who are able) practice moving to the exits in a position near the floor. For buildings where multiple businesses are located, all of the tenant companies should coordinate their evacuation plans and conduct joint drills.



FIRE FIGHTING

Federal, state, and local codes may require portable fire extinguishers to be available in an enclosed workplace. The OSHA standard is found in part 1910.157 along with some exemptions. The NFPA standard is number 10. Employers are required to provide, mount, and identify fire extinguishers so they are readily available to employees. These extinguishers must be approved types and be selected on the basis of the types of fires that are expected to occur in the workplace. It is best to purchase multi-rated extinguishers for general protection. The most widely produced type of extinguisher is the dry chemical type rated for class A, B, and C fires. Class A fires are those caused by burning of ordinary combustibles such as wood, paper, cloth or plastics. Class B fires are those involving flammable or combustible liquids. Class C fires are fires in energized electrical equipment. Class D fires are those of combustible metals such as magnesium. The initial evaluation of fire hazards will reveal the need for any specialized extinguishers. The employer is required to maintain the extinguishers in a state of readiness in their designated places at all times.



Extinguishers for class B fires must be located so that they are no more than 50 feet from the hazard area. Those for class A and C fires can be no more than 75 feet of travel distance from any employee. Do not mount extinguishers in any location that requires a portable device such as a ladder to

access them. All extinguishers must be visually inspected on a monthly basis. They must undergo a maintenance inspection annually and records of the inspection dates must be retained for one year. Rechargeable dry chemical extinguishers must be emptied and examined internally every six years and hydrostatically tested every twelve years. Carbon dioxide and nitrogen extinguishers and pressure bottles must be hydrostatically tested every five years. When extinguishers are removed for maintenance, they must be replaced while maintenance is in progress. If the employer does hydrostatic testing, all items under standard 1910.158 (f) apply. When an employer provides portable extinguishers for use by employees, training must be given in the use of the extinguishers and information provided on the hazards of fire fighting. Training in these hazards is very important. Once again, give this training upon initial assignment of job duties and on an annual basis thereafter.

If a workplace contains only Class A hazards, the employer may choose to install a standpipe and hose system instead of portable fire extinguishers. That system will have to conform to standard 1910.158. The standpipes and hoses must be protected from damage so they will be available in an emergency. Cabinets or hose covers must be used to protect the hoses from weather, dirt, and possible damage. Access to the hoses must be unobstructed. Inspect all hoses on an annual basis and discard them when they deteriorate. A hose is considered deteriorated when it can no longer carry water at the required flow rate and pressure. Automatic fire control systems include sprinkler systems, dry chemical systems, systems that dispense gaseous agents and those that dispense foam or large amounts of water. Each has a standard assigned to it from parts 1910.159 to 1910.163.

Sprinkler systems that are required by OSHA in certain types of workplaces fall under standard 1910.159. Under this standard the following items apply. The system must provide complete coverage for the areas in which it is installed. The employer must maintain the system properly and perform a main drain flow test every year. Every two years the inspector's valve must be opened to assure the system operates correctly. Upon the completion of a new system, acceptance tests must be performed and documented. Water supply for the system must provide the designed flow for a minimum of 30 minutes. The employer may provide auxiliary hose connections to supply more water for fire fighting use provided that the water source satisfies the designed demand for the system. Protection for the system shall be provided against freezing and exterior corrosion. The sprinklers shall be protected against mechanical damage and must have the ability to be totally drained. A water flow alarm must be included on any system of more than 20 sprinkler heads. When materials are stored in sprinkler protected areas, a minimum clearance of 18 inches must be left between the sprinklers and the material below them.

Fixed extinguishing systems other than sprinkler systems that may, by means of their operation, expose employees to injury, death, or adverse health consequences from the extinguishing agent are covered under parts 1910.160 to 1910.163. Install a distinctive alarm to alert employees prior to the system discharging so that they may safely leave the area. Post hazard warnings at entrances to and inside areas where concentrations of the extinguishing agent may be hazardous to life and health. Provide safeguards to warn employees against entry into areas where the atmosphere remains hazardous after a

discharge. Inspect the system annually. Check pressure and contents of refillable containers every six months. Non-refillable containers must be weighed every six months. All inspection and maintenance dates must be recorded on the containers. Maintenance and inspection personnel must be trained and annually reviewed on their training. In addition to the automatic release mechanism, one manual release must be included in the system. When systems are recharged after use, it must be with an identical agent to that previously used in the system. Systems using gaseous agents have a set of required times for extinguishing concentrations of the gases. All gases other than Halon must reach the extinguishing level within 30 seconds after start of the discharge.



Fire brigades are not required under OSHA standards. Employers must decide whether organizing and properly equipping a fire brigade is needed and is within the ability of the organization. If it is decided to create a fire brigade, part 1910.156 will regulate it. Create a written policy that outlines the organizational structure and size of the brigade, as well as the type and frequency of training it receives and its duties in the workplace. Make sure that the members of the brigade are physically capable of performing the duties assigned to them. Conduct training at least annually. Content of the training must be equivalent to that conducted by recognized fire training schools in the various states. A large part of the standard is concerned with approved protective clothing and equipment for brigade members who are required to perform fire fighting inside structures.

SUMMARY

Budget enough time and resources in your business plan to create and maintain a fire safety program that exceeds government standards. Establish a good working relationship with your local fire marshal's office and request their help when necessary. Invite employee input via safety committees, suggestion boxes or other means. Consider programs to reward good safety program participation by employees at all levels. Rotate necessary training and inspections throughout the year rather than waiting to the end of the required period to conduct a large amount in a short time. This will prevent unexpected business demands from forcing postponements beyond the annual deadline dates.



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