

## Section 10

# Fire Prevention and Protection

This section sets forth the requirements for fire prevention and protection. In addition to the fire prevention and protection requirements of this section, other sections of these standards address requirements relating to specific hazards and operations, welding and cutting, etc. Where these standards do not provide more specific instructions, they adopt, by reference, the current edition of the National Fire Codes, published by the National Fire Protection Association (NFPA).

### 10.1 Fire Prevention Requirements

**10.1.1 Fire Prevention Plans.** Write a fire prevention plan for each facility. Include a list of major workplace fire hazards; potential ignition sources; the type of fire suppression equipment of systems appropriate to control a fire; assignments of responsibilities for maintaining the equipment and systems; personnel responsible for controlling the fuel source hazards; and housekeeping procedures, including the removal of waste materials. Inform employees of the fire hazards of the materials and processes to which they are exposed. Brief new employees on the parts of the plan that are essential for their protection and emergency evacuations. Keep the written plan in the workplace and make it available for employee review.

Provide additional training for personnel assigned tasks that require them to remain in a facility during a fire emergency. The work area where these individuals remain during a fire emergency must be evaluated as an area of refuge in accordance with NFPA 101, Life Safety Code.

**10.1.2 Housekeeping.** Maintain good housekeeping. Promptly remove and dispose of accumulations of combustible scrap and debris in all areas of the job site. Use self-closing metal containers to collect waste saturated with flammable or combustible liquids. At all facilities, properly collect, store, and remove combustible and flammable waste products at the end of each workday or at the end of each work shift. Use only noncombustible or UL labeled, nonmetallic containers to dispose of waste and rubbish. Keep combustible items separate from each other and from noncombustible items. Label the contents of containers.

**10.1.3 Grounds Maintenance.** Don't allow rubbish and waste to accumulate. Prevent the growth of tall dry grass, brush, and weeds adjacent to facilities with a maximum 3-foot fire break. Place combustible waste materials outdoors to await subsequent disposal, at least 20 feet from a structure.

**10.1.4 Smoking.** Prohibit smoking and other sources of ignition in storage areas for flammable or explosive materials or near operations

that constitute a fire hazard. Conspicuously post “NO SMOKING OR OPEN FLAMES” in all such areas.

**10.1.5 Open Flame Devices.** Do not leave fires and open flame devices, such as incinerators, torches, and controlled fires, unattended unless they have automatic temperature control and cutoff devices.

**10.1.6 Cleaning and Degreasing.** Do not use gasoline or liquids with a flashpoint below 100 degrees Fahrenheit for cleaning and degreasing. Use only approved cleaners specifically for the type of equipment or material.

**10.1.7 Fireproofing.** Maintain adequate clearance between heating facilities and combustible materials.

**10.1.8 Explosive Gases and Vapors.** Do not use open flames or heating elements where flammable gases or vapors may be present.

**10.1.9 Buildings and Structures.** Ensure non-fire-resistive buildings or structures are at least 25 feet apart. However, consider a group of non-fire resistive buildings with a total ground floor area of no more than 2,000 square feet as one building for this purpose, provided that each building in the group is at least 10 feet away, on each side, from other buildings.

**10.1.10 Building Exits.** Ensure that exits from all buildings, shops, and other facilities in which personnel work, or which are open to the public, are sufficiently well marked and lighted. Evaluate the adequacy of the means of exit, based on NFPA 101 Life Safety Code.

**10.1.11 Inspections.** When justified by the size or nature of the operation, security services personnel or other assigned personnel must frequently inspect buildings, storage areas, employee quarters, and work areas.

## 10.2 Requirements for Heating Devices

**10.2.1 General.** The following requirements must be met prior to the use of heating devices:

**a. Approval.** Use only heating devices accepted by the area/office manager. Include the following items in acceptance requests:

1. The proposed placement, including distance from combustibles.
2. The service, maintenance, and surveillance schedules.
3. The proposed fuel storage and refueling system.
4. The method for prompt detection of gaseous contamination or oxygen deficiency.

**b. Data Plates.** Permanently affix a data plate to each heater that provides the following information:

1. Required clearances.
2. Ventilation requirements.
3. Fuel type and input pressure.
4. Lighting and extinguishing instructions.
5. Electrical power supply characteristics.

**c. Wood Floors.** Mark heaters that are not suitable for use on wood floors and do not place them on combustible materials. When using such heaters, rest them on appropriate noncombustible material equivalent to at least 1 inch of concrete. The noncombustible material must extend at least 2 feet beyond the heater in all directions.

**d. Combustible Covering.** Do not use heaters near covers such as tarpaulins, canvas, or similar combustible materials. Locate heaters at least 10 feet away from these and similar materials. Securely fasten or tie down the coverings.

**e. Stability.** Place heaters on level surfaces to prevent tipping.

**f. Installation.** Install, vent, operate, and maintain heaters in accordance with the manufacturers' instructions.

**g. Spark arresters.** Install spark arresters on smokestacks that could otherwise permit sparks to escape.

**h. Carbon monoxide monitors.** Facilities where heating devices use combustible fuel require carbon monoxide (CO) monitors.

**i. Grounding.** Ground the non-current carrying metal parts of cord and plug connected heaters.

**10.2.2 Portable Space Heaters.** Use only electric-powered portable space heaters equipped with tipover safety devices and thermostatic controls in office spaces. Maintain 3 feet of clearance from combustible materials.

**10.2.3 Liquid-Fueled Heaters.** The following requirements govern the use of liquid-fueled heaters:

**a. General.** Heaters may be either direct or indirect fired. Kerosene, stove oil, fuel oil, and diesel oil are permissible fuels. The flashpoint of the fuel must be at least 100 degrees Fahrenheit.

**b. Stability.** Securely anchor liquid-fueled heaters or locate them to prevent tipping.

**c. Design.** Equip liquid-fueled heaters with an automatic flame loss device that will stop the flow of fuel when the flame is extinguished.

**d. Fueling.** Train employees tasked with fueling to be thoroughly familiar with the manufacturer's heater operation and fueling instructions. Before fueling, extinguish the heater and permit it to cool until cool to touch. Store fuel in, and dispense fuel from, approved flammable liquid containers.

**e. Maintenance.** Maintain heaters in good operating condition in accordance with the manufacturer's instructions.

**10.2.4 Natural Gas Heaters.** The following requirements apply to the use of natural gas heaters:

**a. General.** Install, operate, and maintain natural gas heaters in accordance with the manufacturer's instructions.

**b. Stability.** Securely anchor heaters or locate to prevent tipping.

**c. Piping.** Leak-test piping, tubing, or hose after installation, using a safe detection means, such as soap suds. When using flexible gas supply lines, they must not be more than 5 feet long. Supply lines and hose must have a minimum working gauge pressure of 350 pounds per square inch, a minimum burst gauge pressure of 1,750 pounds per square inch, and a pull test of 400 pounds without leakage.

**d. Fuel Cutoff.** Equip heaters with an automatic flame loss device that will shut off the gas supply if the flame or pilot light is extinguished.

**10.2.5 Liquefied Petroleum Gas (LPG) Heaters.** The following requirements apply to the use of LPG heaters:

**a. General.** Install, operate, and maintain LPG heaters in accordance with the manufacturer's instructions. Do not use, locate, or store LPG containers and heating devices below grade or in confined spaces.

**b. Protection.** Protect heaters, when in use, from damage by location, anchoring, or barricading.

**c. Testing.** Leak-test piping, tubing, hoses, and flexible hose connections following installation, using a means such as soap suds. Use only flexible gas supply lines that are less than 5 feet long. Supply lines and hose must have a minimum working gauge pressure of 350 pounds per square inch, a minimum burst gauge pressure of 1,750 pounds per square inch, and a pull test of 400 pounds without leakage.

**d. Hoses.** Use only a hose labeled "LP-gas" or "LPG." Hoses must have a minimum working gauge pressure of 350 pounds per square inch and a minimum burst gauge pressure of 1,750 pounds per square inch. Keep the hose as short as practical, although long enough to comply with specified safe spacing requirements without kinking or straining the hose or causing it to be close enough to a burner to be damaged by heat.

**e. Hose Connections.** The design capability of hose assemblies, after the application of connections, must withstand a pressure of at least 700 pounds per square inch. Do not leak-test such assemblies at pressures higher than the working pressure (350 pounds per square inch minimum) of the hose.

**f. Regulator.** Equip heaters with an approved regulator between the cylinder and the supply line.

**g. Check Valve.** Provide fuel cylinder connectors with an excess flow check to minimize the flow of gas in case of fuel line ruptures.

**h. Fuel Cutoff.** Equip heaters with an automatic flame loss device that will shut off the gas supply if the flame or pilot light is extinguished.

**i. Fuel Supply in Buildings.** Allow gas cylinders or containers in buildings or structures only in accordance with the following provisions:

1. Keep the maximum water capacity of individual cylinders to 245 pounds (nominal 100 pounds LPG capacity) or less.
2. For temporary heating, such as curing concrete, drying materials, or similar uses, keep heaters (other than integral heater-container units) at least 6 feet away from any LPG container. However, you may use heaters specifically designed for attachment to the LPG container or to a supporting structure with connecting hose less than 6 feet long, provided the heater does not directly radiate heat onto the container. Do not direct blower-type or radiant heaters toward any LPG container that is within 20 feet of the heater.
3. Keep LPG supply containers at least 20 feet apart when two or more heaters are in an unpartitioned area on the same floor.
4. LPG containers manifolded together supplying one or more heaters in an unpartitioned area on the same floor must not exceed 300-pound nominal LPG capacity. Keep such manifolds at least 20 feet apart.
5. Containers may be manifolded together on floors where heaters are not connected for use, for connection to one or more heaters located on another floor, provided that: (a) the total nominal capacity of containers connected to any one manifold does not exceed 1,000 pounds LPG and (b) where more than one manifold having a nominal capacity exceeding 300 pounds LPG is located in the same unpartitioned area, the manifolds must be at least 50 feet apart.

**j. Storage of Containers.** Store LPG containers not in use outside, in accordance with the minimum distances identified in the section on material handling, storage, and disposal.

**10.2.6 Restricted Use.** The following restrictions apply to the use of heating devices:

- a. Open Flame-Type Heaters.** Do not use open flame-type heating devices with exposed fuel below the flame.
- b. Lubrication or Service Areas.** You may install an approved-type heater in lubrication or service areas where employees do not dispense or transfer flammable liquids, only if the bottom of the heater is at least 18 inches above the floor and protected from damage. If employees dispense flammable liquids in such areas, the heater must be of a type approved for garages and installed at least 8 feet above the floor.

### 10.3 Application of Fire Protection Requirements

**10.3.1 Fire Fighting Response.** Each facility must prepare an effective, detailed fire protection plan, including provisions for the fire protection and suppression equipment that are set forth in this section. The area/office manager will review and approve the plan.

When community fire department services are not available, or are insufficient, you may provide a trained firefighting brigade meeting NFPA criteria, at the discretion of the area/office manager. Fire brigades must be organized, trained, equipped, and protected as required by 29 CFR 1910.156. Provide and install mobile and fixed firefighting equipment in accordance with NFPA standards. The area/office manager may elect to evacuate all persons and not fight any fire.

Meet the following requirements in arranging for offsite assistance:

- a. Written Agreement.** Secure a written agreement for fire response covering the nature and type of assistance available, if possible. Otherwise, provide a letter to the area/office manager, stating the nature of the assistance, together with the details covering the equipment and personnel to be made available. The agreement must be signed and dated, and reviewed at least annually.
- b. Standpipe and Hydrant Connections.** When you receive offsite assistance, make sure that standpipe and hydrant connections are compatible with the equipment available from the fire department providing the assistance.
- c. Reporting.** Post emergency telephone numbers and reporting instructions at the job site.

**10.3.2 Maintenance.** Inspect and maintain fire protection systems, alarms, and fire extinguishers in accordance with NFPA standards. All equipment must be inspected periodically according to inspection table 10-1 and after each use.

**10.3.3 Fire Extinguishers.** Select fire extinguishers for a given situation according to the character of the fire(s) anticipated, the construction and occupancy of the facility, the vehicle or hazard to be protected, ambient-temperature conditions, and other factors identified in NFPA Standard 10. Select fire extinguishers for the class(es) of hazards to be protected in accordance with the following:

- a. Class A hazards—ordinary combustibles. Use water and multipurpose dry chemical type fire extinguishers.
- b. Class B hazards—flammable liquids. Use aqueous film forming foam (FFF), film forming fluoroprotein foam (FFFP), carbon dioxide, and dry chemical type extinguishers.
- c. Class C hazards—energized electrical equipment. Use carbon dioxide and dry chemical type fire extinguishers. *Note:* carbon dioxide fire extinguishers equipped with metal horns are not safe for use on fires in energized electrical equipment and, therefore, are not classified for use on Class C hazards.
- d. Class D hazards—combustible metals. Use fire extinguishers that are approved for use on the specific combustible metal hazard.

**10.3.4. Water Supply.** Install a temporary or permanent water supply with sufficient flow volume and duration to supply the standpipes, hose stations, and sprinkler systems, before or during the construction of the facility to be protected. In permanent structures under contract in which standpipes are installed, connect the standpipe to the water supply, install the standpipe concurrently with construction of the structure, and maintain the standpipe in operable condition for fire protection use. Provide the standpipes with fire department connections on the outside of the structure, conspicuously marked, and located in an accessible location at street or road level.

**10.3.5 Burning Areas.** Do not burn waste materials, except in an approved and permitted incinerator.

**Table 10-1.—Inspection schedule for fire protection equipment**

Item	Inspection interval	Procedure
1. All portable and wheeled extinguishers	Monthly	Ensure that all extinguishers are in the proper locations, have clear access, and are plainly visible. Visually inspect extinguishers for damage, leakage, and to determine if they are fully charged and operable. If necessary, recharge extinguisher and correct deficiencies.
	Annually	Reference NFC Standard 10, "Standard for Portable Fire Extinguishers." Ensure annual maintenance of extinguishers according to specific type.
2. Main generator CO <sub>2</sub> system	Weekly	Check nozzles for physical damage. Ensure that self-closing doors or automatically releasing doors are in place. For low-pressure CO <sub>2</sub> systems, check the liquid level in each low pressure gauge and refill if loss is greater than 10 percent.
	Monthly	Check electrical control circuits and indicating lights. Check for signs of leakage at cylinders. Check for signs of physical damage to system components.
	Semi-annually	Weigh all cylinders and refill if necessary. Operate control heads. Test and check system in accordance with the manufacturer's recommendations.
	Annually	Conduct an actuating test of the system. Test all system components without discharging CO <sub>2</sub> .
3. Sprinkler systems	Weekly	Inspect sealed control valves. Check that water supply valves are open. Inspect condition of sprinkler heads. Maintain an 18-inch clear space. For dry pipe systems, inspect air and water pressure gauges, and record readings.
	Monthly	Inspect fire department connections. Inspect control valves. Ensure that water supply valves are open.
	Quarterly	Determine dry pipe priming water level. Flow- test main drains. Test water flow alarms in wet pipe systems. Test low-air pressure alarms and water flow alarms in dry pipe systems. Exercise post indicator and valves.
	Semi-annually	Close and drain cold weather valves in the fall, before freezing weather, and again in the spring, after freezing weather has passed.
	Annually	Test the freezing point of antifreeze solutions. Trip-test the dry pipe valve on dry pipe systems. Lubricate all valve stems. Clean strainers, if installed. Drain all low pint drains on dry pipe systems.

**Table 10-1.—Inspection schedule for fire protection equipment (continued)**

Item	Inspection interval	Procedure
3. Sprinkler systems (continued)	After 50 years	After the first 50 years that a sprinkler system has been in place, remove a representative sample of heads and send to a lab for testing.
4. Fire pumps	Monthly	Check the pressure of all gauges. Check for automatic indication of controller lights. Ensure that all valves are open. Conduct operational test, check packing gland tightness, suction, and discharge pressure gauges.
	Annually	Test pump performance. Test waterflow and alarm switches. Check valve position. Verify pump speed at each flow. Record suction and discharge pressure at each flow.
5. Fire doors and dampers	Monthly	Inspect and manually operate doors.
	Quarterly	Test operation of automatic fire doors.
	Annually	Lubricate rollers, clean-out channels, and moving parts. Check operation of dampers and moving parts.
6. Water supply systems	Weekly	Check air pressure in pressure tanks. Check water level in storage and pressure tanks. Check control valves (usually in open position).
	Annually	Check accessibility and condition of fire department connections. Check condition of storage tanks for scale or rust; check storage tank access; check condition of paint or fabric. Conduct a flow test.
7. Fire hose stations	Monthly	Inspect nozzles, hoses, and connections. Replace defective hose and discard old hose.
	Semi-annually	Check dry barrel hydrants for leaks and cracks; check the operating nut for wear and the nozzle threads for damage.
	Annually	Test flow and hydrant pressure. Wet barrel hydrants are checked for leaks and cracks, wear on the operating nut and nozzle threads. Thoroughly inspect and rerack hoses. Use graphite to lubricate swing-out hose racks or hose reels.
	Every 5 years	Hydrostatically test dry standpipes.

**Table 10-1.—Inspection schedule for fire protection equipment (continued)**

Item	Inspection interval	Procedure
8. Fire alarm systems	Monthly	Ensure that all equipment is operable. Illuminate lamps and LEDs on fire alarm annunciator panels. Conduct operational test of engine generator (if connected to system). Check water level of rechargeable batteries. Test initiating and signaling device circuits.
	Quarterly	Test two-way communications.
	Semi-annual	Check fuse ratings; check voltage of each rechargeable battery cell. Test all remote annunciators. Test smoke detectors.
	Annually	Test supervisory device circuits. Test primary and secondary power supply. Test lamps and LEDs.
9. Transformer fog system	Weekly	Check pilot lights indicating that system is operable and that all control valves are open. Check that nozzles have not been blocked or repositioned.
	Annually	Test the control valve and automatic detection equipment (a full operational test with water flowing is not necessary). Inspect all piping for corrosion and ensure proper drainage.
	Every 5 years	A full flow test of the system is required at least every 5 years. This should be conducted when the transformer bank is out of service.