

CHAPTER 3

General Precautions against Fire



The general safety requirements in the IFC were developed to control a wide variety of fire safety concerns that may not need additional clarification or the level of detail that might be found in other chapters.

Chapter 3 covers combustible waste materials (such as wood, paper and plastics) and sources of ignition. Ignition sources include mechanical, chemical, electrical or optical energy. The chapter also addresses topics such as fire safety issues related to vacant premises, fueled equipment and mobile food preparation vehicles. Vacant premises can be a major fire hazard to communities because if they are not adequately secured they may be used for criminal activity or as illegal and substandard housing. “Fueled equipment” includes motorcycles, mopeds, lawn-care equipment and portable cooking equipment. Fueled equipment can be found in a variety of buildings and work sites, and represents another fire hazard because of the fuels used and the common indoor use of the equipment. While not a structure or building, mobile food preparation vehicles contain inherent fire and life safety hazards, such as cooking and storage of compressed or liquefied gases. Chapter 3 also contains requirements addressing hazards to fire fighters and fire-fighting operations.

COMBUSTIBLE MATERIALS

Combustible materials are natural or synthetic materials that can be ignited and support combustion. Combustible materials in the context of this chapter and IFC Chapter 3 are not combustible metals or flammable solids—these are hazardous materials that are regulated by other provisions in the fire code. Materials regulated by IFC Chapter 3 generally are organic materials such as sawn wood, dimensional lumber, waste paper or cardboard and baled cotton or paper, or synthetic materials such as plastics, fabrics or composite materials. Combustible materials are always solids and will have varying sizes and densities. The smaller the surface area of a combustible material and the lighter its density, the more easily it is ignited. The orientation of the combustible material, the strength of the ignition source and other variables can influence the ignition of combustible materials.

The fire code recognizes that combustible materials are an important part of businesses and industries. The combustible material requirements in IFC Chapter 3 address the orderly storage of these materials, locating the materials away from ignition sources and, if the storage is indoors, separating the combustible materials from means of egress components and concealed spaces where they could accelerate the rate at which an unwanted fire grows and spreads. Orderly storage can slow the rate of fire spread, which benefits fire fighters in the event that the materials are ignited (Figure 3-1). [Ref. 315]

While it is not within the scope of this chapter, fire code officials should understand that storage of many combustible materials over 12 feet in height inside of buildings introduces the potential for a fire that will exhibit a much faster growth rate when compared to the same materials stored at or near the floor level. Such storage can be found in many warehouses and mercantile occupancies and is required to comply with the requirements in IFC Chapter 32. Chapter 14 in this book introduces the reader to the hazards of high-piled combustible storage.

Combustible waste

When combustible materials become “waste,” the IFC takes a more aggressive approach: the materials must be removed and disposed of in a controlled manner. For most combustible wastes, the IFC requires that they be placed in noncombustible waste containers or plastic containers formulated from chemicals that reduce the amount of heat it releases if ignited. When materials are placed in bulk trash receptacles (dumpsters), the fire code requires the dumpsters be located at least 5 feet from combustible construction, wall openings and combustible roof eaves (Figure 3-2). Because of land use limitations, it is very common to place dumpsters inside



FIGURE 3-1 Ignition of combustible materials beneath the egress stairs can eliminate the stairs as an escape path, and therefore storage in that location is a violation of the IFC.

Code Essentials

The IFC requirements for combustible materials depend on whether the material is used as a material or goods or if it is waste material.

Combustible material must be stored in an orderly manner, away from ignition sources and in locations that do not disrupt the means of egress.

Combustible waste must be located in approved waste receptacles. The IFC has specific requirements for dumpsters located indoors and outdoors. ●



FIGURE 3-2 The IFC requires separation of outdoor dumpsters from buildings to limit the likelihood of the dumpster igniting an exposure building.



FIGURE 3-3 Outdoor storage of idle pallets can pose a significant fire exposure.

of buildings. In such instances, the room housing the dumpster is required to be protected by an automatic sprinkler system. Sprinkler protection is not required when the dumpster is located in a building constructed of noncombustible, fire-resistive materials and used exclusively for dumpster or trash container storage. [Ref. 304.3.4]

Outdoor pallet storage

Transportation of products on pallets is a common occurrence in many different businesses. Whether the product is shipped off-site, or simply relocated within the facility, pallets are a useful tool providing quick access and mobility. A pallet adds a moderate fire load to the product it is carrying. When a pallet is not being used, it is considered an idle pallet. When idle pallets are stacked, the fire load and accompanying hazard increase dramatically. This occurs because each piece of wood in a wooden pallet is able to burn on all sides, and the typical construction of a pallet allows adequate air to reach all surfaces of the wood. So rather than burning from the outside in, like a stack of 2 × 4's each piece of wood can be burning at the same time (Figure 3-3).

[Ref. 315.7.5]

The outdoor storage of pallets is specifically regulated because a fire in the pallet storage area creates an enormous amount of heat and can easily impact any exposures. The separation of pallet piles from buildings, property lines and other pallet piles is contingent on the type of pallet and the construction of the building (Figure 3-4). Pallets that are of wood and plastic pallets that are labeled in accordance with UL 2335, Fire Tests of Storage Pallets, or FM 4996, Approval Standard for Classification of Pallets and Other Material Handling Products as Equivalent to Wood Pallets, are all treated as a group with regard to spacing and pile size requirements.

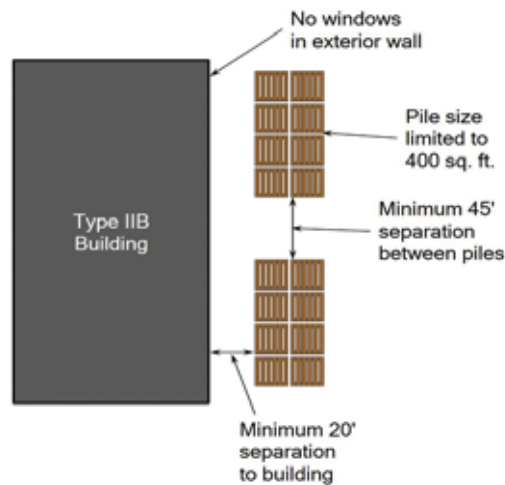


FIGURE 3-4 These outdoor pallet storage piles are separated from the building based on piles of more than 200 pallets. Note: if there were any windows in the exterior building wall, the separation distance would change from 20 feet to 90 feet.

Plastic pallets not in compliance with either standard are treated as a separate group since the heat release rate is considerably higher than wood pallets. [Ref. 315.7]

IGNITION SOURCES

Controls for ignition sources are dictated in several chapters of the IFC, including specific requirements for electrical equipment and hot work involving brazing, oxygen-acetylene cutting and welding. IFC Chapter 3 contains general requirements to address separating uses and activities involving potential sources of open flames from combustible materials. The provisions require adequate separation between open flames and combustible materials, open-flame warning devices such as road flares and negligent burning of combustible vegetation and materials. Cooking, decoration, theatrical or construction activities are regulated elsewhere in Chapter 3. [\[Ref. 305\]](#)

An open-ended requirement for the control of ignition sources and unwanted fires is included in IFC Section 305.5. This section states that when situations, uses or processes have repeatedly caused fires, the cause of the fire must be mitigated. This section can be used to address systems or situations that are not specifically regulated in the code, but are creating an unsafe situation resulting in repeat fires. There are no specific requirements to address the hazard other than the requirement to modify the situation to prevent further fires. [\[Ref. 305.5\]](#)

OPEN FLAMES

The IFC allows the use of open flames for theatrical performances, food preparation, religious ceremonies, decoration and paint removal. Open flames are prohibited in sleeping units of Group R-2 dormitories and for cooking on combustible balconies of Group R-1 and R-2 occupancies unless the balconies are protected by an automatic sprinkler system. Under very limited conditions, open flames are permitted in assembly (Group A) occupancies. The IFC requires an operational permit for using open flames in assembly areas, dining areas of restaurants and drinking establishments.

[\[Ref. 105.6.34, 308.1.4, 308.4.1\]](#)

When open flames are used for decorations, the fuel source cannot be liquefied petroleum gas or a liquid with a flash point temperature less than 140°F (Figure 3-5). If the device contains more than 8 ounces of fuel, it must be designed to be self-extinguishing and have a limited rate of fuel release if it is tipped over. The decorative flame source must be adequately secured and located so it is not an ignition source of interior finishes such as shades or curtains or other combustible materials. [\[Ref. 308.3.1\]](#)



FIGURE 3-5 An open-flame decorative device

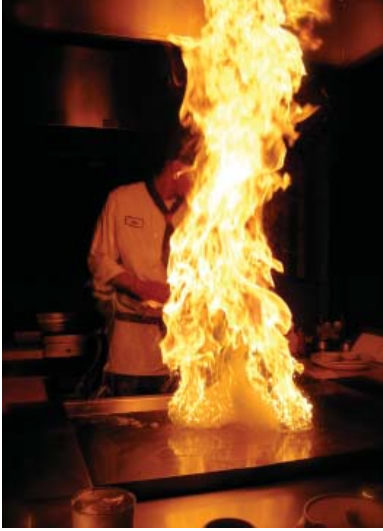


FIGURE 3-6 Open flames used to prepare food and beverages are regulated by the IFC.

Code Essentials

Vacant buildings must be safeguarded to limit the potential for vandalism or acts of arson. The IFC requires that the building's fire protection system be maintained and requires the removal of any combustible materials and hazardous materials. The fire code official is authorized to require placarding of a vacant building to identify fire-fighting hazards. ●

Open flames are commonly used in the table-side preparation of food and beverages (Figure 3-6). These activities commonly occur in assembly occupancies such as restaurants and nightclubs; therefore, the use of open flames in an occupancy with a large occupant load requires close supervision and detailed regulations. The IFC limits the volume of liquid that can be dispensed to 1 ounce or less per serving and limits the container volume to 1 quart. The activity must have a controlled flame height and is limited to the immediate area where the food is prepared for consumers. Flaming foods and beverages may not be carried through the restaurant or nightclub. The person who prepares the flaming food or beverage is required to have a wet cloth towel to extinguish the flame in the event of an emergency. [\[Ref. 308.1.8\]](#)

VACANT PREMISES

Vacant buildings can present a significant fire threat to a community. These buildings can be used by transients for housing or for illegal activities. The building itself can be made unsafe by the theft of plumbing and electrical components manufactured from copper, brass or other valuable materials. Thieves will open walls and shafts to remove these building materials, creating vertical paths for fire spread. To limit the risk of unwanted fires, the IFC has requirements for fire safety in vacant buildings.

Buildings that are vacated can be demolished by the jurisdiction (Figure 3-7). In many communities, the jurisdiction may place a lien on the property to recover the demolition costs. Demolition generally occurs when a building is continuously used for illegal activities, is structurally unsafe, presents a fire hazard or is a public nuisance. In other cases, the building may be secured and eventually reoccupied or even renovated. In such cases, the securing of the building or its renovation must comply with the IBC, the *International Property Maintenance Code* and the IFC (Figure 3-8). [\[Ref. 311.1.1\]](#)



FIGURE 3-7 This vacant building needs significant repair or it will be demolished. (Courtesy of New Orleans [LA] Fire Department)

Safeguarding a building requires that openings into the structure, such as doors and windows, are protected from unauthorized entry (Figure 3-9). Whenever possible, fire protection systems should be maintained in service; however, this can be difficult especially in cold weather environments that can freeze water in wet-pipe sprinkler or standpipe systems or in hot, humid environments that can cause corrosion in electronic components installed in fire alarm control units and smoke detectors. In these cases, the fire code official can permit the system to be disabled, provided that combustible materials and hazardous materials are removed from the building and the building's location in relation to other exposure buildings does not represent a fire hazard. In all cases, any fire-resistance-rated construction and assemblies must be maintained in vacant buildings to limit the spread of fire. [Ref. 311.2]

The IFC authorizes the fire code official to placard unsafe buildings to warn fire fighters of interior hazards (Figure 3-10). The placard is used to indicate if a structure is safe to enter during fire-fighting operations or to indicate certain structural and life safety hazards to fire fighters. For example, the placard could indicate that the roof is open, fire escapes are unsafe, holes exist in the flooring or stairways are unsafe. Placards are required on all sides of a building and at entry doorways. The IFC dictates the minimum size and symbols required on the placard. [Ref. 311.5]



FIGURE 3-8 A vacant building that is not properly safeguarded.



FIGURE 3-9 A safeguarded vacant building

You Should Know

IFC Chapter 3 stipulates the minimum precautions against fire. The requirements address ignition sources, open burning and recreational fires, open flames, powered industrial trucks and equipment, smoking, vacant premises, indoor displays and miscellaneous combustible materials storage. ●

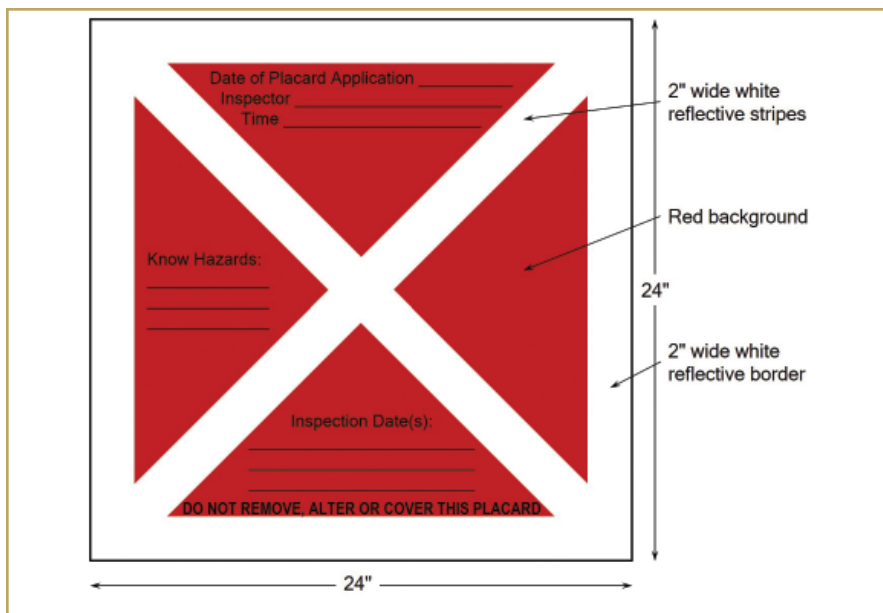


FIGURE 3-10 Fire-fighter building warning placard



FIGURE 3-11 A vehicle display inside a covered mall building

INDOOR DISPLAYS

Indoor displays of goods, vehicles or exhibitions must be located and arranged so they are not an obstruction to the means of egress. The IFC prohibits the indoor display of fireworks, flammable and combustible liquids, liquefied compressed flammable gases, oxidizers, agricultural goods and pyroxylin plastics in main exit access aisles, malls and corridors or within 5 feet of any means of egress opening if the fire code official believes a fire could prevent or otherwise obstruct egress. [Ref. 314.3]

Vehicle displays inside of buildings must be adequately safeguarded to limit the amount of fuel and ignition sources (Figure 3-11). The IFC requires that such displays limit the amount of fuel to 5 gallons or one-quarter of the tank volume, whichever is smaller, and that the fuel tank fill opening is sealed and the batteries are disconnected. [Ref. 314.4]

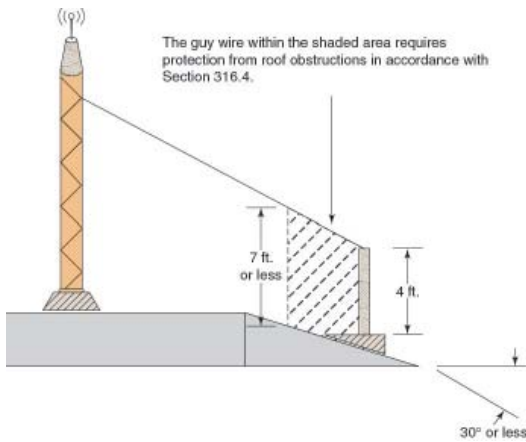


FIGURE 3-12 Obstructions on rooftops must be protected so as not to create a hazard to fire-fighting operations.

HAZARDS TO FIRE FIGHTERS

Each year, thousands of fire fighters are either hurt or fatally injured during fire-fighting operations. To help to limit these tragedies, the IFC addresses some potential hazards inside buildings and on the roofs of buildings. Doors providing access to shaftways must be identified where there is no landing on the opposite side of the door. Trapdoors to basements or scuttle covers need to be closed when not in use. Obstructions on rooftops that could “clothesline” a fire fighter during roof operations need to be protected (Figure 3-12). [Ref. 316]



FIGURE 3-13 This grass-covered roof provides a park-like area for recreation.

ROOFTOP GARDENS AND LANDSCAPED ROOFS

Planting vegetation on building rooftops is becoming a common occurrence. The vegetation provides several functions. It provides a pleasing area for recreational activities or meetings, as well as a significant level of thermal insulation for the building (Figure 3-13). The vegetation also creates several concerns for the inspector and fire fighter. Roof ventilation is no longer a viable solution when the roof is covered with several feet of soil, and dying or dead vegetation creates a fire hazard.

The IFC regulates rooftop gardens and landscaped roofs. The landscaped portion of the roof is limited in size to a maximum area of 15,625 square feet with a maximum dimension of 125 feet. The limitation on size provides a fire break and a location for roof ventilation. Additional landscaped areas can be provided as long as they are separated by a distance of not less than 6 feet. This separation must consist of a Class A-rated roof system (Figure 3-14). IFC Section 905.3.8 requires that when a stand-pipe is installed in the building, it must be usable and available for the landscaped roof. [Ref. 317.2, 317.3, 905.3.8]

A landscape maintenance plan can be required that would include trimming of trees and shrubs, watering schedule and a list of vegetation species. The plan should provide for the removal of dead and decaying material at least twice a year. [Ref. 317.4]



FIGURE 3-14 Landscaping on the roof must be maintained in a safe condition and allow fire-fighting access.

MOBILE FOOD PREPARATION VEHICLES

Mobile food preparation vehicles equipped with appliances that produce smoke or grease-laden vapors are regulated in IFC Section 319. These vehicles present the same hazards as commercial cooking operations in a restaurant. The difference is that these vehicles are mobile and customers normally are not inside the vehicle. The customers being outside provides them with an easier escape, but the occupants of the vehicle typically have a single exit door available at one end of the vehicle. There have been incidents within the past several years resulting in injuries and fatalities. In order to regulate these vehicles, an operational permit is required in IFC Section 105.6.30. [Ref. 319.1]

Mobile food preparation vehicles are required to be provided with an exhaust hood over the cooking appliances generating the smoke or grease-laden vapors. The exhaust hood must be equipped with a fire-extinguishing system and a portable fire extinguisher must be provided. [Ref. 319.3, 319.4]

The fuel gas system supplying the cooking appliances is regulated whether the fuel is LP-gas or CNG. With either gas, the on-board quantities are limited. Cooking oil is also limited and cooking oil storage tanks must be listed. [Ref. 319.7]

You Should Know

The new requirements for mobile food preparation vehicles only applies to those vehicles producing smoke or grease-laden vapors. ●



FIGURE 3-15 Mobile food-preparation vehicle