

Part II—General Safety Provisions

Chapter 3: General Requirements

General Comments

Fire is always a concern, whether a building is under construction, is occupied for normal use or is undergoing renovation, restoration, expansion or demolition. But careful planning combined with common sense can make buildings and premises much safer, regardless of the occupancy or other activities at the site.

The primary focus of the requirements in this chapter is making sure the three elements necessary for a fire—ignition source, fuel and oxygen—do not come in contact with one another. NFPA 550 describes in great detail the features of fire safety systems and includes a logic tree called “The Fire Safety Concepts Tree” to graphically show all the possible means of achieving user-defined fire safety objectives. A portion of that tree is reproduced here as Commentary Figure 3 to show how to avoid fire ignition. Activities on this diagram that follow a plus sign (+), also known as an “or” gate, may be undertaken independently of each other to arrive at the desired goal. Alternatives following a dot (·), also known as an “and”

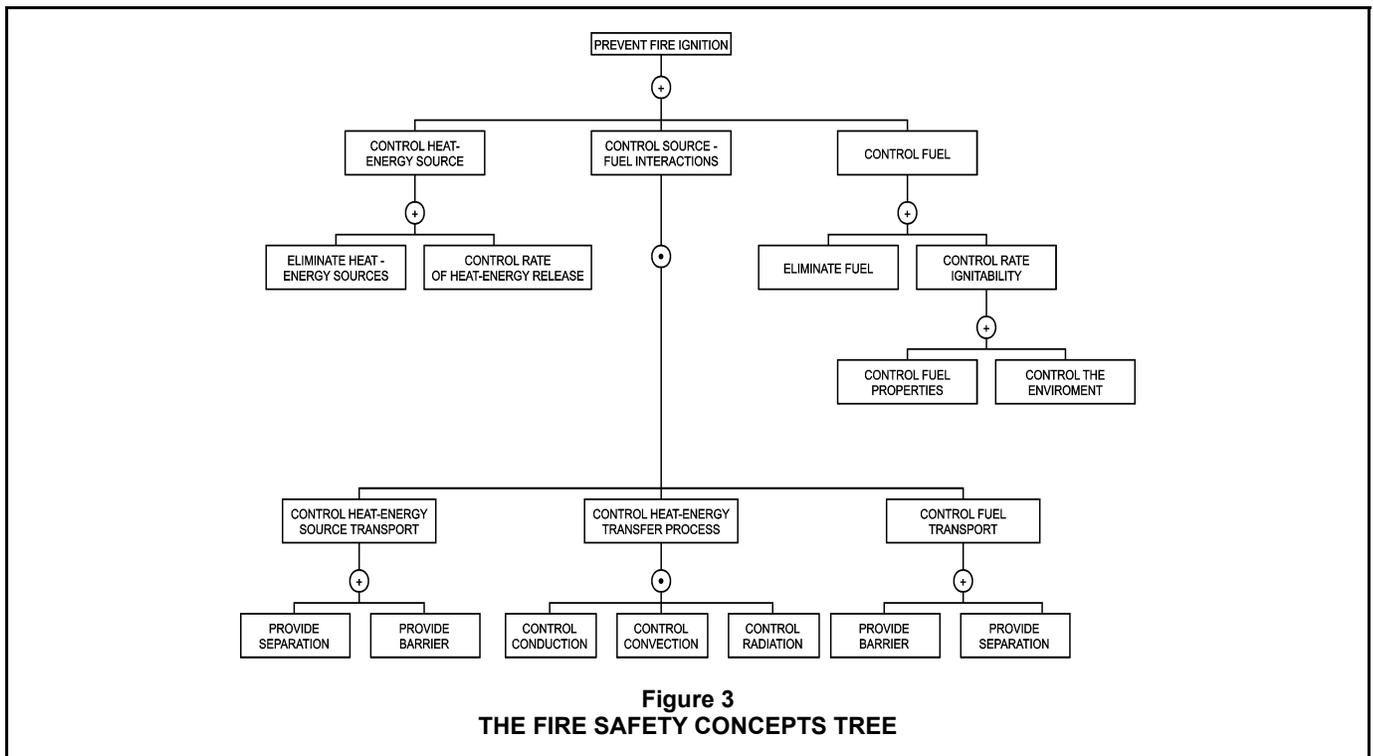
gate, must be combined to achieve the desired result.

Commentary Figure 3 shows that eliminating any one of the three elements required for a fire to occur will prevent a fire from happening. If there is no ignition source, a fuel load of any size should not catch fire. If there is no fuel load, there is nothing for an ignition source to ignite. If there is little or no air available to sustain combustion, any fire ignited in a fuel load will quickly die.

The requirements and precautions outlined in this chapter, when applied using good judgment and the common sense mentioned above, will help to foster safety for everyone.

Purpose

The requirements and precautions contained in this chapter are intended to improve premises safety for everyone, including construction workers, tenants, operations and maintenance personnel and emergency response personnel.



**SECTION 301
GENERAL**

301.1 Scope. The provisions of this chapter shall govern the occupancy and maintenance of all structures and premises for precautions against fire and the spread of fire and general requirements of fire safety.

- ❖ The requirements of Chapter 3 prescribe fire safety precautions for conditions that are likely to cause or contribute to the spread of fire in any building or structure or on any premises, regardless of occupancy.

301.2 Permits. Permits shall be required as set forth in Section 105.6 for the activities or uses regulated by Sections 306, 307, 308 and 315.

- ❖ Issuing permits gives the fire code official an opportunity to carefully evaluate and regulate hazardous operations. Applicants for permits should be required to demonstrate that their operations comply with the intent of the code before the permit is issued. See the commentary to Section 105.6 for a general discussion of operations requiring an operational permit.

**SECTION 302
DEFINITIONS**

302.1 Definitions. The following terms are defined in Chapter 2:

BONFIRE.

HI-BOY.

HIGH-VOLTAGE TRANSMISSION LINE.

OPEN BURNING.

PORTABLE OUTDOOR FIREPLACE.

POWERED INDUSTRIAL TRUCK.

RECREATIONAL FIRE.

SKY LANTERN.

- ❖ Definitions of terms can help in the understanding and application of the code requirements. This section directs the code user to Chapter 2 for the proper application of the indicated terms used in this chapter. Terms may be defined in Chapter 2 or in another *International Code*[®] (I-Code[®]) as indicated in Section 201.3, or the dictionary meaning may be all that is needed (see also commentary, Sections 201 through 201.4).

**SECTION 303
ASPHALT KETTLES**

303.1 Transporting. Asphalt (tar) kettles shall not be transported over any highway, road or street when the heat source for the kettle is operating.

Exception: Asphalt (tar) kettles in the process of patching road surfaces.

- ❖ The hazards of hauling a fired kettle of molten asphalt over public ways are obvious. Most asphalt kettles for roofing, paving and similar uses are currently liquefied petroleum gas (LP-gas) fired. Contractors often wish to keep asphalt in a liquid state to save time between jobs and when work is interrupted. Once asphalt is transformed from a solid to a liquid by heating, it retains much of its heat for some time, and although it becomes increasingly viscous as it cools, it remains fluid for a considerable time. Maintaining a fire under a kettle during transport is usually unnecessary and, therefore, prohibited, since little additional heat is required to return the asphalt to a usable consistency. An accident, flat tire or anything else that could cause the kettle to overturn, spilling the molten asphalt in the presence of an open flame, could lead to a serious fire. Even hitting potholes or other bumps in the road could cause the molten asphalt to splash out of the kettle, causing injury to people nearby or damage to property.

The exception for asphalt being used for road repair is necessary for efficient operations for work crews sealing pavement joints and performing similar roadway repairs.

303.2 Location. Asphalt (tar) kettles shall not be located within 20 feet (6096 mm) of any combustible material, combustible building surface or any building opening and within a controlled area identified by the use of traffic cones, barriers or other *approved* means. Asphalt (tar) kettles and pots shall not be utilized inside or on the roof of a building or structure. Roofing kettles and operating asphalt (tar) kettles shall not block *means of egress*, gates, roadways or entrances.

- ❖ Asphalt kettles sometimes catch fire. Having one located inside a building would present a serious smoke problem, as well as the fire hazards of asphalt spills flowing to lower floors or the release of LP-gas inside the building. Having one located next to quantities of combustible materials would also represent a fire hazard, as well as the possibility that splashes and splatters could damage construction materials beyond use. Keeping egress pathways and other travel lanes free of obstructions provides a needed

immediate exit from an area where an asphalt kettle-related incident might occur and enhances access to such areas for the fire department.

303.3 Location of fuel containers. Fuel containers shall be located not less than 10 feet (3048 mm) from the burner.

Exception: Containers properly insulated from heat or flame are allowed to be within 2 feet (610 mm) of the burner.

- ❖ This section reduces the likelihood that any gas or vapors escaping from fuel containers would be ignited by the open flame of the kettle burner and that the heat of the burner would cause overheating of the fuel containers.

The exception acknowledges the greater safety of insulated containers.

303.4 Attendant. An operating kettle shall be attended by not less than one employee knowledgeable of the operations and hazards. The employee shall be within 100 feet (30 480 mm) of the kettle and have the kettle within sight. Ladders or similar obstacles shall not form a part of the route between the attendant and the kettle.

- ❖ Having a trained attendant watch the kettle helps to create a safe operation. The attendant is usually responsible for making sure the asphalt is at the proper temperature, the level of liquid in the kettle is maintained at the required level and the fuel supply for the kettle burner is adequate. The attendant should watch for any change in the kettle that would signal the potential for a safety hazard, and adjust the burner output or other factors to keep the kettle in safe operating condition. The attendant is also often responsible for keeping the area surrounding the kettle free of combustible materials and other construction debris that could become a safety hazard.

303.5 Fire extinguishers. There shall be a portable fire extinguisher complying with Section 906 and with a minimum 40-B:C rating within 25 feet (7620 mm) of each asphalt (tar) kettle during the period such kettle is being utilized. Additionally, there shall be one portable fire extinguisher with a minimum 3-A:40-B:C rating on the roof being covered.

- ❖ This section defines the type and size of extinguisher that must be available for use, both on the ground near the kettle and on the roof level to which the asphalt is being applied. In the event of a kettle fire, water should not be used as an extinguishing agent because it could cause the molten asphalt to froth and possibly overflow the kettle or spatter over anything or anyone in the surrounding area. See also the commentary to Section 3317.3 for roofing operations during construction.

303.6 Lids. Asphalt (tar) kettles shall be equipped with tight-fitting lids.

- ❖ A tight-fitting lid on a hot kettle limits the air supply available to feed a kettle fire. Any fire that might start in a closed kettle will quickly burn itself out because of the limited amount of air available for combustion. The lid also helps prevent splashes and splatters that could cause personal injury.

303.7 Hi-boys. Hi-boys shall be constructed of noncombustible materials. Hi-boys shall be limited to a capacity of 55 gallons (208 L). Fuel sources or heating elements shall not be allowed as part of a hi-boy.

- ❖ Hi-boys are used on the roof of a building to transport hot asphalt from a point of supply near the edge of the roof to the site of the roofing application. Due to the hazards of molten asphalt discussed in Section 303.1, hi-boys are limited in size to control the maximum amount of potential spills on the roof, which could ignite and pose a high-challenge fire-suppression operation for the fire department. A limited size also enhances the movability and stability of the hi-boy, thus reducing the potential for a tip over. As a further safeguard against a fire incident, hi-boys are prohibited from being fired or equipped with a fuel source for firing. Hi-boys must also be constructed of noncombustible materials to enhance their durability and prevent the container from contributing fuel to a fire. Hi-boys should be well-maintained, including the frame; steering mechanism; tires or wheels; faucets and fill connections (see commentary, Section 202 for the definition of “Hi-boy”).

303.8 Roofing kettles. Roofing kettles shall be constructed of noncombustible materials.

- ❖ The requirement for noncombustible materials represents sound safety practice as well as good business practice. Portions of kettles constructed of combustible materials can be easily destroyed and could lead to larger fires. Replacement of destroyed kettles would be expensive. Paying for other fire damage would be even more costly.

Also note that roofing mops soaked in asphalt or pitch must never be left inside a building, near heating equipment or near combustible materials. These mops are subject to spontaneous heating no matter what material they are made of.

303.9 Fuel containers under air pressure. Fuel containers that operate under air pressure shall not exceed 20 gallons (76 L) in capacity and shall be *approved*.

- ❖ Limiting the size of pressurized fuel containers limits the probability of a container becoming a major fuel

GENERAL REQUIREMENTS

source in case of a kettle fire. Requiring the use of approved containers gives the fire code official more control over the type and suitability of the vessel to be used under pressure.

SECTION 304 COMBUSTIBLE WASTE MATERIAL

304.1 Waste accumulation prohibited. Combustible waste material creating a fire hazard shall not be allowed to accumulate in buildings or structures or upon premises.

❖ Accumulated waste, trash, construction debris and other natural materials, such as grass clippings, leaves and shrubbery cuttings, can become a serious fire hazard. The three subsections that follow this general statement address the most common situations.

304.1.1 Waste material. Accumulations of wastepaper, wood, hay, straw, weeds, litter or combustible or flammable waste or rubbish of any type shall not be permitted to remain on a roof or in any *court*, yard, vacant lot, alley, parking lot, open space, or beneath a grandstand, *bleacher*, pier, wharf, manufactured home, recreational vehicle or other similar structure.

❖ This section considers the kind of waste material that is most likely to accumulate during construction, renovation, additions or demolition and is often referred to as “the housekeeping section.” It prohibits disorderly, unkempt storage or accumulation of trash, waste rags, wastepaper, scrub brush and weeds, litter and other combustible materials. Litter and trash represent a serious fire hazard because of their ease of ignition and rapid heat release once ignited. The importance of maintaining property and buildings in good order seems obvious, but sloppy housekeeping still occurs and can be the cause of serious fires. In one of the most serious fires in recent years, improper storage of linseed-oil-soaked rags used to refinish paneling in a high-rise office building caused a fire that destroyed eight floors of the building and killed three fire fighters.

304.1.2 Vegetation. Weeds, grass, vines or other growth that is capable of being ignited and endangering property, shall be cut down and removed by the *owner* or occupant of the premises. Vegetation clearance requirements in urban-wildland interface areas shall be in accordance with the *International Wildland-Urban Interface Code*.

❖ Accumulations of natural waste, such as grass clippings, weed growth and shrubbery cuttings, are not only unsightly, but also represent a serious fire hazard. All too often these accumulations occur at or near fence lines that are adjacent to streets or alleys. This makes accidental ignition by a cigarette butt tossed from a passing vehicle a good possibility. Common sense tells us that removal of this kind of waste is beneficial. The rules of nearly all jurisdictions make waste control and removal the responsibility of the building or property owner, his or her agent, the

tenant or the contractor if work is being done on the site. Uncontrolled vegetation growth poses substantial risk to areas designated as wildland-urban interface areas. Accordingly, such areas must comply with the provisions of the *International Wildland-Urban Interface Code*® (IWUIC®).

304.1.3 Space underneath seats. Spaces underneath grandstand and bleacher seats shall be kept free from combustible and flammable materials. Except where enclosed in not less than 1-hour fire-resistance-rated construction in accordance with the *International Building Code*, spaces underneath grandstand and bleacher seats shall not be occupied or utilized for purposes other than *means of egress*.

❖ Numerous fires in grandstands and stadiums have shown over the years that the accumulation of flammable or combustible materials under grandstand seating areas can lead to fire disasters. Except as noted in the *International Building Code*® (IBC®), areas under grandstand seating must be kept free of flammable materials, including accumulations of waste or trash. One of the best ways to prevent a fire is to make certain there is no fuel to feed one.

The IBC does allow space under the stands to be used for purposes other than means of egress if that space is separated from the seating area by construction having at least a 1-hour fire-resistance rating. The separation is intended to allow time for occupants in the seating to vacate if a fire should occur. The fire code official would usually have to approve plans for use of space under the stands for concession stands, sales areas or storage areas.

304.2 Storage. Storage of combustible rubbish shall not produce conditions that will create a nuisance or a hazard to the public health, safety or welfare.

❖ Storage of combustible rubbish either indoors or outdoors must be approved by the fire code official. Combustibles should be accumulated in noncombustible containers, such as metal trash cans with tight lids, steel barrels or steel dumpster bins, which should be removed from the site regularly. The use of plastic waste containers should be discouraged due to the extremely high fuel content of such materials, which can sometimes be several times the fuel content of the waste material they contain. Such containers could, under fire conditions, cause rapid fire spread and overtax sprinkler systems, where installed. This section mentions public health as well as safety and welfare, indicating concern over retention of decomposing organic waste as well as flammable and combustible materials.

304.3 Containers. Combustible rubbish, and waste material kept within or near a structure shall be stored in accordance with Sections 304.3.1 through 304.3.4.

❖ Proper containers must be used to improve the safety of indoor or outdoor storage (in close proximity to buildings) of trash and isolate readily combustible materials. This section introduces the more detailed requirements in Sections 304.3.1 through 304.3.4.

304.3.1 Spontaneous ignition. Materials susceptible to spontaneous ignition, such as oily rags, shall be stored in a *listed* disposal container. Contents of such containers shall be removed and disposed of daily.

❖ Disposal containers, often called “waste cans” or “oily rag cans,” used for storage of materials that might auto-ignite as a result of the spontaneous combustion process must be tested and listed for that use by a recognized testing laboratory or agency and must bear a label showing that they have been tested, along with the name of the testing agency. Such containers are most commonly round and generally available in sizes ranging from 5 to 40 gallons (19 to 151 L). They are equipped with a manual or foot treadle-operated lid that opens to a maximum angle of 60 degrees (1.05 rad) and closes by gravity. These containers are designed to prevent continuing combustion of the contents if ignition occurs. Container design includes features that keep the can body containing waste from coming into contact with combustible surfaces of walls or floors (see commentary, Section 202, for the definition of “Listed”). Daily disposal of container contents reduces the amount of time that oily materials will lie dormant, generating internal heat that can lead to ignition. UL 32 provides further information on the construction, testing and listing of these containers.

304.3.2 Capacity exceeding 5.33 cubic feet. Containers with a capacity exceeding 5.33 cubic feet (40 gallons) (0.15 m³) shall be provided with lids. Containers and lids shall be constructed of noncombustible materials or of combustible materials with a peak rate of heat release not exceeding 300 kW/m² where tested in accordance with ASTM E1354 at an incident heat flux of 50 kW/m² in the horizontal orientation.

Exception: Wastebaskets complying with Section 808.

❖ Requiring larger containers to meet stricter conditions is common sense. The larger the volume of waste each container holds, the larger the fire hazard. Isolating the containers from one another with lids helps reduce the possibility that a fire in one container will spread to nearby containers. The lid also helps to smother a fire within the container by limiting the oxygen available to feed it. Additionally, closed containers protect flammable and combustible materials from potential external ignition sources.

Combustible materials, used in such containers, must meet the performance criteria stated when tested in accordance with ASTM E1354. Most non-metallic waste containers are manufactured from polyethylene, which has a fuel value of 20,050 Btu per pound (46 636 kJ/kg). In comparison, the fuel value of newsprint paper is 9,000 Btu per pound (20 934 kJ/kg). To contain combustible waste in another combustible material that has twice the fuel potential value makes little sense. This section will prohibit the use of larger, nonfire-retardant polyethylene trash

containers within a structure. Several manufacturers have had the formulation for years to make a fire-retardant polyethylene.

The exception to this general provision points to more specific requirements for waste containers in Group I-3 facilities contained in Section 808.1.

304.3.3 Capacity exceeding 1.5 cubic yards. Dumpsters and containers with an individual capacity of 1.5 cubic yards [40.5 cubic feet (1.15 m³)] or more shall not be stored in buildings or placed within 5 feet (1524 mm) of combustible walls, openings or combustible roof eave lines.

Exceptions:

1. Dumpsters or containers in areas protected by an *approved automatic sprinkler system* installed throughout in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3.
2. Storage in a structure shall not be prohibited where the structure is of Type I or IIA construction, located not less than 10 feet (3048 mm) from other buildings and used exclusively for dumpster or container storage.

❖ Although waste containers of this size are nearly always constructed of welded steel because of the weight of the waste load, the very fact that the waste load is large makes the containers a large fire hazard. Keeping these large containers in the open and away from combustible construction is the obvious way to keep the fire hazard low.

Exception 1 permits storage of these large containers indoors if the area is protected by an approved sprinkler system. It would be up to the fire code official to determine the maximum quantities that could be stored under these conditions.

Exception 2 applies only to buildings that are of fire-resistance-rated construction and are used exclusively for container storage. Such facilities might be found in scrap yards or at recycling centers, but rarely, if ever, in other occupancies.

304.3.4 Capacity of 1 cubic yard or more. Dumpsters with an individual capacity of 1.0 cubic yard [200 gallons (0.76 m³)] or more shall not be stored in buildings or placed within 5 feet (1524 mm) of combustible walls, openings or combustible roof eave lines unless the dumpsters are constructed of noncombustible materials or of combustible materials with a peak rate of heat release not exceeding 300 kW/m² where tested in accordance with ASTM E1354 at an incident heat flux of 50 kW/m² in the horizontal orientation.

Exceptions:

1. Dumpsters in areas protected by an *approved automatic sprinkler system* installed throughout in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3.
2. Storage in a structure shall not be prohibited where the structure is of Type I or IIA construction, located

GENERAL REQUIREMENTS

not less than 10 feet (3048 mm) from other buildings and used exclusively for dumpster or container storage.

- ❖ Medium-density polyethylene dumpsters up to 9 cubic yards [27 ft³ (0.76 m³)] in capacity and that have a fuel content of 20,020 Btu per pound (46 567 kJ/kg) [by comparison, municipal solid waste averages 4,500 Btu/lb (10 467 kJ/kg)] are now being distributed and used. Medium-density polyethylene is essentially equal to the fuel value for gasoline and becomes a burning liquid that spreads and flows when involved in a fire. As such, placing them 5 feet (1524 mm) away from a nearby structure will be of little value unless their flammability hazard is mitigated. This section does that by limiting container heat release rate and heat flux using the test parameters of ASTM E1354. The peak rate of heat release criterion is consistent with the one in Sections 304.3.2 and 808.1.

Exception 1 permits storage of these containers indoors if the area is protected by an approved sprinkler system. It would be up to the fire code official to determine the maximum quantities that could be stored under these conditions.

Exception 2 applies only to buildings that are of fire-resistance-rated construction and are used exclusively for waste container storage. Such facilities might be found in scrap yards or at recycling centers, but rarely, if ever, in other occupancies.

SECTION 305 IGNITION SOURCES

305.1 Clearance from ignition sources. Clearance between ignition sources, such as luminaires, heaters, flame-producing devices and combustible materials, shall be maintained in an *approved* manner.

- ❖ Establishing safe clearances will usually mean following the requirements of the IBC or other codes adopted by the jurisdiction as well as having the approval of the fire code official.

305.2 Hot ashes and spontaneous ignition sources. Hot ashes, cinders, smoldering coals or greasy or oily materials subject to spontaneous ignition shall not be deposited in a combustible receptacle, within 10 feet (3048 mm) of other combustible material including combustible walls and partitions or within 2 feet (610 mm) of openings to buildings.

Exception: The minimum required separation distance to other combustible materials shall be 2 feet (610 mm) where the material is deposited in a covered, noncombustible receptacle placed on a noncombustible floor, ground surface or stand.

- ❖ This section covers two different, but equally serious, ignition source problems. First, hot ashes, embers and cinders from fireplaces, stoves or other fireboxes must never be placed in a combustible container. This point seems almost too obvious to be mentioned, but every year fires are started when someone carelessly scoops ashes containing glowing

embers into paper bags or cardboard cartons. It is also not uncommon to see construction scrap being burned in steel drums on construction sites in cold weather. Care must be taken when emptying ashes from those containers to make sure no hot coals get dumped on paper waste or other combustible materials.

The second problem, greasy or oily materials subject to spontaneous combustion, is addressed by requiring such materials to be placed in listed containers (see commentary, Section 304.3.1).

In both cases, safe distances must be maintained from combustible construction and building openings for added protection.

The exception recognizes the added protection of tight-fitting covers on noncombustible trash containers as well as the reduced fire hazard when the containers are placed on a noncombustible surface.

305.3 Open-flame warning devices. Open-flame warning devices shall not be used along an excavation, road, or any place where the dislodgment of such device might permit the device to roll, fall or slide on to any area or land containing combustible material.

- ❖ Open-flame warning devices other than fusees used to mark road accidents or other short-term emergencies are rarely used today. The old-fashioned kerosene pots used to mark construction hazards in dark areas have been largely replaced by “sawhorse” barriers with battery-powered flashing lights. But, even though use may be limited, the warning in this section is nonetheless real. One fusee not firmly fixed in the ground or on another stable surface can fall into a roadside ditch filled with dry weeds and cause a roadside fire that could spread into dry woodland or cropland, causing enormous fire damage. Likewise, a burned-out hand-held fusee that is carelessly tossed aside while still hot could ignite dry refuse.

305.4 Deliberate or negligent burning. It shall be unlawful to deliberately or through negligence set fire to or cause the burning of combustible material in such a manner as to endanger the safety of persons or property.

- ❖ The deliberate setting of fires, whether in a structure or in a waste container located where it could endanger a structure or its occupants, is normally considered arson, which is a felony that is punishable by a lengthy prison sentence. Fortunately, arson is not that common. More likely, a fire would be caused by carelessness or by someone not considering the consequences of his or her actions.

Regardless of the circumstances, fires must be avoided. Following the requirements in the code as well as those in the IBC will help to maintain a safe, fire-free site. On construction or demolition sites, secure fencing around the site and its waste containers is good protection. Following good housekeeping practices, including routine disposal of combustible materials, is also an excellent first line of protection against fire. An ignition source cannot cause damage