

# NFPA 303

## Fire Protection Standard for Marinas and Boatyards

### 1995 Edition



National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101  
An International Codes and Standards Organization

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**NFPA 303**  
**Fire Protection Standard for**  
**Marinas and Boatyards**  
**1995 Edition**

This edition of NFPA 303, *Fire Protection Standard for Marinas and Boatyards*, was prepared by the Technical Committee on Marinas and Boatyards and acted on by the National Fire Protection Association, Inc., at its Annual Meeting held May 22-25, 1995, in Denver, CO. It was issued by the Standards Council on July 21, 1995, with an effective date of August 11, 1995, and supersedes all previous editions.

This edition of NFPA 303 was approved as an American National Standard on August 11, 1995.

Changes other than editorial are indicated by a vertical rule in the margin of the pages on which they appear. These lines are included as an aid to the user in identifying changes from the previous edition.

**Origin and Development of NFPA 303**

This first NFPA standard on the subject of marinas and boatyards was adopted by the Association in 1940 on recommendation of the Committee on Boat Basins and Municipal Marinas of the then NFPA Marine Section. The following year the scope of the recommendations was enlarged to include boat service and storage yards. Minor amendments were adopted in 1952 and 1957. A revised edition was produced in 1960 by the Committee on Motor Craft and Marinas. In 1961, the Sectional Committee on Marinas and Boatyards was established to deal exclusively with these matters. A complete revision of NFPA 303 was developed and adopted in 1963, amendments to which were adopted in 1966, 1975, and 1984. In 1986 a complete revision of NFPA 303 was adopted; it incorporated boat condominiums and multiple berthing facilities and provided updated electrical and fire protection requirements. The 1990 edition of NFPA 303 contained amendments to the previous edition, while the 1995 edition contains amendments to Chapters 1, 2, 3, and 4 of the 1990 edition.

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**Committee Scope:** This Committee shall have primary responsibility for documents on fire prevention and protection in the design, construction and operation of marinas and boatyards.

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NOTICE: An asterisk (\*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Appendix A.

Information on referenced publications can be found in chapter 7 and Appendix C.

### Chapter 1 Introduction

**1-1 Scope.** This standard applies to the construction and operation of marinas, boatyards, yacht clubs, boat condominiums, docking facilities associated with residential condominiums, multiple-docking facilities at multiple-family residences, and all associated piers, docks, and floats. Single family residences with docking facilities for private, non-commercial use are not intended to be covered by this standard, but use of the standard by the authority having jurisdiction or by single-family residences shall be permitted.

**1-1.1** This standard also applies to support facilities and structures used for construction, repair, storage, hauling and launching, or fueling of vessels if fire on a dock would pose an immediate threat to these facilities, or a fire at a referenced facility would pose an immediate threat to a dock area.

**1-1.2** This standard applies to marinas and facilities:

(a) Servicing small recreational and commercial craft, yachts, and other craft of not more than 300 gross tons, and

(b) Not covered by NFPA 307, *Standard for the Construction and Fire Protection for Marine Terminals, Piers, and Wharves*; or NFPA 30A, *Automotive and Marine Service Station Code*.

**1-1.3** No requirement in this standard shall be construed as reducing applicable building, fire, and electrical codes.

**1-2 Purpose.** This standard is intended to provide a minimum acceptable level of safety to life and property from fire and electrical hazards at marinas and related facilities. The standard recognizes the following circumstances.

**1-2.1** Electrical wiring on and about piers and floats, and connected to craft, presents exceptional fire and shock hazard. This standard emphasizes, and in some cases exceeds, the requirements of NFPA 70, *National Electrical Code*®.

**1-2.2** Marinas and related facilities frequently are located in remote areas, isolated from public protection, or with dock areas not easily accessible to community fire equipment. Hence, the selection, location, and maintenance of fire-fighting equipment, and adequate training in its use, are essential.

**1-2.3** Continuing operations such as fiberglassing, woodworking, painting and paint removing, welding and cutting, and handling gasoline and other highly flammable liquids are hazardous operations that require careful vigilance and fire prevention effort by management.

**1-3 Retroactivity.** The provisions of this document are considered necessary to provide a reasonable level of protection from loss of life and property from fire and explosion. They reflect situations and the state-of-the-art prevalent at the time the Standard was issued.

Unless otherwise noted, it is not intended that the provisions of this document be applied to facilities, equipment, structures, or installations which were existing or approved for construction or installation prior to the effective date of the document, except in those cases where it is determined by the authority having jurisdiction that the existing situation involves a distinct hazard to life or adjacent property.

**1-4 Definitions.** Additional definitions specific to certain chapters of this standard are contained within the appropriate chapter.

**Approved.\*** Acceptable to the authority having jurisdiction.

**Authority Having Jurisdiction.\*** The organization, office, or individual responsible for approving equipment, an installation, or a procedure.

**Berth.** The water space to be occupied by a boat or other vessel alongside or between bulkheads, piers, piles, fixed and floating docks, or any similar access structure. (*See also Slip.*)

**Boatyard.** A facility used for constructing, repairing, servicing, hauling from the water, storing (on land and in water), and launching of boats. Boatyards are usually, but not necessarily, waterfront facilities. Boatyards provide facilities and services, as described above, that exceed the basic berthing or mooring of boats.

**Building.** A roofed-over structure with or without enclosed walls.

**Bulkhead.** A vertical structural wall, usually of stone, timber, metal, concrete or synthetic material, constructed along, and generally parallel to, the shoreline to retain earth as an extension of the upland, and often to provide suitable water depth at the waterside face.

**Combustible Liquid.** A liquid having a flash point at or above 100°F (37.8°C).

Combustible Liquids shall be subdivided as follows:

Class II liquids shall include those having flash points at or above 100°F (37.8°C) and below 140°F (60°C).

Class IIIA liquids shall include those having flash points at or above 140°F (60°C) and below 200°F (93°C).

Class IIIB liquids shall include those having flash points at or above 200°F (93°C).

**Covered Dock.** A fixed or floating dock structure that is provided with a roof system to protect berthed boats from the weather. (*See also Covered Slip.*)

**Covered Slip.** A building that contains slips.

**Covered Storage.** A structure or building capable of receiving and storing boats for extended periods of time while protecting the boats from exposure to the weather. The structure might or might not be heated or cooled.

**Crane.** A mechanical device used for lifting or moving boats. A crane can be fixed in position or mobile. Generally refers to a device having a movable projecting arm (boom), or a horizontal beam which translates on an overhead support.

**Dock.** A fixed or floating structure that provides access to boats in associated berths, and where boats are secured during periods of inactivity.

**Dry Stack Storage.** A facility, either covered or uncovered, constructed of horizontal and vertical structural members designed to allow placement of small boats in defined slots arranged both horizontally and vertically. Vertically, the boats are placed in tiers, or racks, 2 or more levels high. Boats are placed in the racks by use of a forklift or mobile crane. Also known as Dry Rack Storage or Stack Storage.

**Flammable Liquid.** A liquid having a flash point below 100°F (37.8°C) and having a vapor pressure not exceeding 40 lb per sq in. (absolute) (2,068 mm Hg) at 100°F (37.8°C) shall be known as a Class I liquid.

Class I liquids shall be subdivided as follows:

Class IA shall include those having flash points below 73°F (22.8°C) and having a boiling point below 100°F (37.8°C).

Class IB shall include those having flash points below 73°F (22.8°C) and having a boiling point at or above 100°F (37.8°C).

Class IC shall include those having flash points at or above 73°F (22.8°C) and below 100°F (37.8°C).

**Floating Piers or Floating Docks.** Piers or docks designed with inherent flotation capability that allows the structure to float on the water surface and rise and fall with water level changes.

**Fixed Piers or Fixed Docks.** Piers or docks constructed on a permanent, fixed foundation, such as on piles, that permanently establishes the elevation of the structure deck with respect to land.

**Fuel Product Lines.** Piping that connects the fuel storage tanks to the fuel dispensing pumps. Piping can be located above or below ground or a combination of above and below ground. General term includes associated fittings, valves, and hardware.

**Fuel Storage.** An area or structure (i.e., tanks) that contains fuel products in storage for subsequent dispensing.

**Fueling Station or Pier.** An area on a pier, dock, bulkhead, or similar structure that is specifically used for the dispensing of fuel products. Also known as a Marine Service Station, Fuel Dispensing Facility, or Fuel Dock.

**Labeled.** Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

**Listed.\*** Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets identified standards or has been tested and found suitable for a specified manner.

**Marina.** A facility, generally on the waterfront, that stores and services boats in berths, on moorings, and in dry storage or dry stack storage. A dry land marina would provide similar services, but might not be located on the waterfront. The services provided by a marina are those generally associated with active boat use, such as: berthing of boats, fueling, sanitary sewage pumpout, seasonal boat storage or short-term storage, seasonal boat painting, boat engine maintenance, and voyage repairs. Servicing of a greater nature is generally associated with boatyard facilities. A marina can also incorporate recreational facilities, ship's stores, offices, restaurants, or other upland amenities.

**Marine Railway.** A device used for hauling boats out of the water or placing boats into the water. Generally a structure comprised of a movable cradle, it is capable of accommodating a range of vessel sizes and types and operates on fixed, inclined tracks (ways) extending from the upland into the water. The cradle is moved up or down the tracks by a winched cable or chain.

**Monorail.** Overhead track and hoist system for moving material around the boatyard or moving and launching boats.

**Moorings(s).** Any place where a boat is wet stored or berthed. Locally, can be used to differentiate between permanent anchored moorings and slips.

**Pier.** A structure extending over the water and supported on a fixed foundation (fixed pier), or on flotation (floating pier), that provides access to the water.

**Power Outlet.** An enclosed assembly that can include receptacles, circuit breakers, fused switches, fuses and watt-hour meter, and mounting means approved for marine use.

**Seasonal Storage.** Storage of boats for extended periods when not in use, i.e., winter storage.

**Shall.** Indicates a mandatory requirement.

**Should.** Indicates a recommendation or that which is advised but not required.

**Slip.** A berthing space between or adjacent to piers, wharves, or docks. The water areas associated with boat occupation. (*See also Berth.*)

**Stack Storage.** *See Dry Stack Storage.*

**Standpipe System.** An arrangement of piping, valves, hose connections, and allied equipment with the hose connections located in such a manner that water can be discharged in streams or spray patterns through attached hose and nozzles, for the purpose of extinguishing a fire and so protecting designated buildings, structures or property in addition to providing occupant protection as required.

#### Classes of Standpipe Systems:

**Class I Systems.** A Class I standpipe system shall provide 2<sup>1</sup>/<sub>2</sub>-in. (63.5-mm) hose connections to supply water for use by fire departments and those trained in handling heavy fire streams.

**Class II Systems.** A Class II standpipe system shall provide 1<sup>1</sup>/<sub>2</sub>-in. (38.1-mm) hose stations to supply water for use primarily by the building occupants or by the fire department during initial response.

**Wet Storage.** A term used to indicate that a boat is stored afloat in a partly or completely laid-up status.



## Chapter 2\* Management

**2-1 Smoking Restrictions.** Smoking shall be prohibited and “NO SMOKING” signs shall be posted in all areas where fuels and other flammable liquids are stored or dispensed, in all covered or enclosed boat storage areas, in battery rooms, and in other such locations as management or the authority having jurisdiction shall designate.

**2-2 Maintenance of Fire-Fighting Equipment and Systems.** A maintenance program that requires periodic inspection, testing, and operation of fire-fighting equipment and systems, and that assures access to all parts of the facility for fire-fighting personnel, shall be adopted.

**2-2.1** All fire-fighting equipment and systems shall be inspected and tested at regular intervals. As part of this requirement, fire extinguishers shall be inspected at least annually and provided with a tag showing the last date of inspection, and shall be emptied at the end of their service period, preferably as part of a training exercise (*see Section 2-3*).

**2-2.2** Hoses shall be unrolled, inspected, and tested (in accordance with the manufacturer’s instructions) at least once a year.

**2-2.3** The fire department shall have access to fenced, gated, or locked grounds or piers. Appropriate means of access (including keys, cardkeys, and combinations) shall be provided to the fire department or shall be permitted to be secured in a lock box on the premises accessible to the fire department. The fire department shall be notified immediately of any changes in the means of access.

**2-3 Employee Training.** The initial minutes are the most vital in fighting a fire. In order to ensure effective application of the available fire-fighting equipment, it is essential that employees of the facility be trained in the equipment’s use. This can only be achieved through regular training and practice. The interest taken by management through active leadership and participation in the training of their personnel in fire protection duties will have the effect of bringing and keeping all employees up to a high standard of responsibility relative to both fire prevention and fire protection.

**2-3.1** Practice drills shall be held at frequent intervals, preferably once a month and at a minimum of twice a year.

**2-3.2** All employees shall be given instruction in the procedures for response to a fire alarm, in reporting a fire to the proper authorities (and to designated facility employees), and in such matters as location of fire hydrants.

**2-3.3** Selected employees shall be given training in the use of fire-fighting equipment such as portable pumps, standpipe systems, wheel mounted extinguishers, auxiliary water sources, etc.

**2-3.4** All employees, including office personnel, shall be given training in the use of portable fire extinguishers and hoses in the fighting of fires.

**2-4 Fire Department Liaison.** The local fire department shall be encouraged to visit the facility annually to become acquainted with every part of the plant and to conduct employee training sessions. Management shall assist the fire department in prefire planning for:

(a) Entries and access routes for equipment within the premises.

(b) Location, construction, use, and accessibility of all buildings and all their subdivisions including basements, storage lockers, etc.

(c) Location and extent of outside working areas.

(d) Location and means of access to both dry and wet boat-storage areas.

(e) Type and capacity of water lines on piers and walkways, including all points where connection of hydrant or pumper supplies can be effected.

(f) Types and capacities of facility equipment, including work or tow boats, portable pumps, pier-mounted hose cabinets, all portable fire extinguishers, etc.

(g) Voltages and capacities of electrical systems, and location of electrical disconnecting means.

**2-5\* Watch Service.** If a watch person is employed, the route shall be laid out to include every important and potentially hazardous area within the premises. These areas shall be incorporated in a recognized watch person’s recording system, such as a portable watch clock or a computerized reporting system. The watch person’s first round shall consist of a complete inspection immediately at the close of the working day. Subsequent rounds shall be scheduled so that the interval between visiting each area shall not exceed one hour.

**2-6 Boat Owners and Guests.** A high percentage of fires in marinas and related facilities are attributable to boat owners and guests who cannot be expected to be aware of fire hazards to the level of a professional. Signs, posters, or posted instructions shall be provided where practicable to remind the public of basic fire safety practices and to warn of unusual or extreme fire hazards. All boat owners at the marina shall be provided with written instructions for reporting fires and other emergencies and actions to be taken in the event of a fire.

## Chapter 3 Electrical Wiring and Equipment

**3-1 General.** Electrical systems and electrical equipment in the marina and boatyard require special consideration because of the existence of some, or all, of the following conditions in these locations:

(a) Locations are wet or continuously damp, and are exposed to rain, wind-driven spray, atmospheric moisture, and severe corrosive effects including, but not limited to, salt contamination;

(b) Locations are exposed to excessively high or low temperatures;

(c) Locations are subject to flooding by abnormally high water;

(d) Locations where flammable or combustible liquids or gases are stored, dispensed, or used;

(e) Locations where electrical equipment and facilities are used by persons not under the control of the management, many of whom are unfamiliar with the possible hazards associated with such use, and the means to avoid them. Those persons need to be protected from electrical hazards when they are on the land, on boats, in storage or repair facilities, or going from one to the other.

(f) Locations where boats are moved to and from the water, and to and from storage or repair stations;

(g) Locations, e.g., floating pier, that are subject to movements such as mechanical shock and vibration.

**3-2 National Electrical Code.** NFPA 70, *National Electrical Code*, provides basic provisions to be observed in the design, selection, and installation of electrical wiring and equipment. The recommendations set forth herein supplement and relate the requirements of NFPA 70, *National Electrical Code*, to the specific conditions and combinations of conditions found in marinas and boatyards and shall be adhered to in addition to any requirements found in NFPA 70, *National Electrical Code*, including, but not limited to, Article 555.

**3-3 Listed or Labeled.** All electrical materials, devices, appliances, fittings, and other equipment shall be listed or labeled by a qualified testing agency and shall be installed and connected in accordance with listing requirements and/or manufacturer's instructions.

**3-4 Electrical Datum Plane.** The electrical datum plane is defined as follows:

(a) In land areas subject to tidal fluctuation, the electrical datum plane is a horizontal plane 2 ft (0.606 m) above the highest tide level for the area occurring under normal circumstances, i.e., highest high tide.

(b) In land areas not subject to tidal fluctuation, the electrical datum plane is a horizontal plane 2 ft (0.606 m) above the highest water level for the area occurring under normal circumstances.

(c) The electrical datum plane for floating piers and landing stages that are (a) installed to permit rise and fall response to water level, without lateral movement, and (b) that are so equipped that they can rise to the datum plane established for 3-4(a) or 3-4(b) is a horizontal plane 30 in. (0.762 m) above the water level at the floating pier or landing stage and a minimum of 12 in. (0.305 m) above the level of the deck.

**3-4.1** A bench mark indicating the electrical datum plane of the land area shall be permanently located on shore in the marina or boatyard.

**3-4.2** Electrical services shall be disconnected from the power source when the water level reaches the bench mark for the electrical datum plane.

**3-4.3** All electrical connections shall be located at least 12 in. (0.305 m) above the deck of a floating pier. All electrical connections shall be located at least 12 in. (0.305 m) above the deck of a fixed pier, but not below the electrical datum plane. See 3-14.1 for receptacle locations.

### 3-5 Power Supply.

**3-5.1** Poles or structures used to support electrical service shall be used for that purpose only.

*Exception:* These poles or structures shall be permitted to be used to support communications and television cables and lighting fixtures.

**3-5.2** Primary power, when introduced in excess of 250 volts phase to phase, shall be transformed to reduce the marina or boatyard system to be not in excess of 250 volts phase to phase.

*Exception No. 1:* 600 volts maximum shall be permitted to be used for a yard's distribution system where approved by the authority having jurisdiction.

*Exception No. 2:* 600 volts maximum shall be permitted to be carried to piers where design considerations require more than 250 volts maximum due to load requirements where approved by the authority having jurisdiction, provided that transformers are in locked vaults of design appropriate for the environment and all cable connections are in accordance with the National Electrical Code (NFPA 70).

**3-5.3** Transformers shall be installed, where located within the marina or boatyard property area, in compliance with the requirements of Article 450, NFPA 70, *National Electrical Code*, with the additional requirement that transformers shall not be located in a wet location as herein described.

**3-5.4** Transformers shall be permitted to be installed in locations exposed to weather and unprotected if they are specifically approved for that use.

**3-5.5** Service equipment, including service disconnecting equipment, meters, and associated equipment, and the main switchboard or panel, shall not be installed in wet locations, and shall be protected against access by unauthorized persons. In all other respects, the service installation shall be in compliance with the requirements of Article 230, NFPA 70, *National Electrical Code*.

*Exception:* Equipment shall be permitted to be installed in locations exposed to weather and unprotected if they are specifically approved for that use.

**3-5.6** Where auxiliary emergency standby power supply equipment with an output rating in excess of 5 kW is provided and is driven by an internal combustion engine, the emergency electric system shall be arranged as required by Article 700, NFPA 70, *National Electrical Code* and NFPA 110, *Standard for Emergency and Standby Power Systems*. The engine and generator shall be housed in a well-ventilated, fire-resistive enclosure that shall contain only the auxiliary power unit and the necessary controls. The engine and generator shall not be located below the electrical datum plane. Interior areas of the enclosure shall be lighted by a fixture connected to the normal power supply.

### 3-6 Grounding.

**3-6.1** Grounding of all noncurrent-carrying metal parts of the electrical system, and provision of suitable equipment-grounding facilities at all outlets provided for the connection of portable equipment and all outlets provided for the connection of shore power to vessels afloat, are of utmost importance in marinas, boatyards, boat basins, and similar establishments. The means and methods of grounding the noncurrent-carrying metal parts of the electrical system and for equipment and portable appliances connected thereto shall comply with the requirements of NFPA 70, *National Electrical Code* (Article 250).

**3-6.2** There shall be installed a common grounding conductor of not less than No. 12 AWG, arranged in accordance with the requirements of NFPA 70, *National Electrical Code* (Article 250), properly attached to the interior of all metallic boxes, housings, and enclosures and properly connected to the grounding facility of all receptacles. Metal inserts and metal attachments that are externally and internally exposed on nonmetallic boxes and enclosures shall be connected to the common ground. Said grounding conductor shall terminate at the distribution panel ground and shall specifically conform to the requirements of NFPA 70, *National Electrical Code* (Section 555-7).

**3-6.3** The partial or complete burial of a metal enclosure in earth shall not be accepted as a substitute for the grounding requirements as provided herein with respect to such enclosure, as required by NFPA 70, *National Electrical Code* (Section 250-51).

**3-6.4** Metal poles, lighting standards, and other metal supports that carry or enclose electrical wiring shall be grounded in accordance with NFPA 70, *National Electrical Code* (Section 250-51).

**3-7 Dry Locations.** The entire electrical system installed in a dry location shall comply with the requirements of NFPA 70, *National Electrical Code*.

**3-8 Damp Locations.** The entire electrical system installed in a damp location shall be composed of materials suitable for the purpose as defined in Article 100, NFPA 70, *National Electrical Code*.

**3-9 Wet Locations.** The entire electrical system in a wet location shall be suitable for wet locations as defined in Article 100, NFPA 70, *National Electrical Code*.

**3-10 Hazardous Locations.** The entire electrical system installed in a hazardous (classified) location shall comply with the requirements given in Article 500, NFPA 70, *National Electrical Code*, and where required by the conditions, to the requirements of this standard related to damp and wet locations.

**3-11 Electrical Installation.** Wiring electrical equipment and materials installed on piers, wharves, docks, or similar locations, and wiring methods shall specifically conform to the requirements of Article 555, and any other applicable requirements of NFPA 70, *National Electrical Code*.

**3-11.1** Electrical wiring shall be installed to avoid possible contact with masts and other parts of boats being moved in the yard. Underground electrical installations shall comply with the requirements of Section 230-30, 230-31, 230-48, and 230-49, NFPA 70, *National Electrical Code*. It shall be permitted to utilize “extra hard usage” cables (see Table 400-4, NFPA 70, *National Electrical Code*), such as Type G and Type W, as permanent wiring on the underside of piers (floating or fixed) provided that such cables are properly supported, are not subject to physical damage, and are installed in compliance with any listing requirements, manufacturer’s recommendations, and any applicable sections of NFPA 70, *National Electrical Code*.

*Exception: Temporary wiring shall not be used to supply power to boats.*

**3-11.2** If electrical wiring is not installed underground, the wiring within yard areas shall be routed to:

(a) Avoid wiring within or across any portion of the yard that might be used for moving vessels.

(b) Avoid wiring closer than 20 ft (6.1 m) from the outer edge or any portion of the yard that might be used for moving vessels or stepping or unstepping masts.

(c) Clearance for wiring in other portions of the yard, not inclusive of the areas described in (a) and (b) above, shall be:

1. Not less than 18 ft (5.49 m) above grade in open areas, and

2. Not less than 8 ft (2.44 m) above highest point of roof when above buildings.

(d) Proper warning signs to warn operators of the wire clearance to be encountered shall be located so as to be clearly visible.

**3-11.3** Wiring installed over and under navigable water shall be subject to approval by the authority having jurisdiction. Proper warning signs to warn operators and boaters of the wire clearance to be encountered shall be placed in suitable locations.

**3-11.4** Where flexibility is necessary as on piers composed of floating sections, the feeder conductors, if installed in a wet location, shall be cable listed for “extra hard usage” as identified in Table 400-4, NFPA 70, *National Electrical Code*, and rated not less than 167°F (75°C), 600 volts, of the required ampacity and shall include a common grounding conductor with an outer jacket rated to be resistant to temperature extremes, oil, gasoline, ozone, abrasion, acids, and chemicals. The cable shall be securely fastened by nonmetallic clips to structural members of the pier other than the deck planking.

(a) Where flexible cable passes through structural members it shall be protected against chafing by a permanently installed oversized sleeve of nonmetallic material.

(b) There shall be an approved junction box of corrosion-resistant construction with permanently installed terminal blocks on each pier section to which the feeder and feeder extensions are to be connected. Metal junction boxes and their covers, and metal screws and parts that are exposed externally to the boxes, shall be of corrosion-resisting materials, or protected by material resistant to corrosion.

**3-11.5\*** All exterior wiring and equipment shall have copper conductors and all connectors, bus bars, or splicing means shall be made of copper or copper with a plating of silver, tin, or zinc.

### **3-12 Circuit Breakers, Switches, Panels, and Power Outlets (Damp and Wet Locations).**

**3-12.1** Overcurrent protection as required by NFPA 70, *National Electrical Code*, shall be provided by the use of circuit breakers to avoid the difficulty of fuse replacement in gasketed enclosures.

**3-12.2** Circuit breakers and switches installed in gasketed enclosures shall be arranged to permit required manual operation without exposing the interior of the enclosure. All such enclosures shall be arranged with a weep hole to discharge condensation.

**3-13 Power Outlet.** A manufactured power outlet shall comply with ANSI/UL 231, *UL Standard for Safety Power Outlets*.

### **3-14 Receptacles.**

**3-14.1** Receptacles intended to supply shore power to boats:

(a) Shall be housed in power outlets approved for wet locations, and shall be in a weatherproof enclosure, the integrity of which is not affected when the receptacle is in use (attachment plug/cap inserted). The weatherproof receptacle covers of manufactured power outlets with more than one receptacle shall be capable of full closure when in use.

(b) Shall be mounted in power outlets or in other weatherproof enclosures at an angle to reduce the strain caused by the weight and catenary of the shore power cable. The receptacle face shall face downward at any angle from horizontal to 55 degree above horizontal.

(c) Shall not be mounted less than 24 in. (0.610 m) above the deck surface of the pier, and not below the electrical datum plane on a fixed pier.

**3-14.2** Receptacles that provide shore power for boats shall be rated not less than 20 amperes and shall be single outlet type.

(a) Receptacles rated no less than 20 amperes nor more than 50 amperes shall be of the locking type and shall conform to the configurations of ANSI/NEMA WD 6, *Wiring Devices—Dimensional Requirements*, as shown in Figure 1, Appendix B.

(b) Receptacles rated for 60 amperes or 100 amperes shall be of the pin and sleeve type and shall conform to the configurations of UL 1686, *UL Standard for Safety Pin and Sleeve Configurations*, as shown in Figure 2, Appendix B.

**3-14.3** Each single receptacle that supplies shore power for boats shall be supplied by an individual branch circuit of the voltage class and rating corresponding to the voltage class and rating of the receptacle.

**3-14.4** Fifteen- and 20-ampere outdoor receptacles, other than those supplying shore power to boats, shall be protected by ground-fault circuit-interrupters. They shall be permitted to be housed in power outlets with the receptacles that provide shore power to boats, provided a marking clearly indicates that they are not to be used to supply power to boats.

### 3-15 Disconnects.

**3-15.1** A readily accessible disconnecting means shall be provided by which each boat can be isolated from its supply circuit.

**3-15.2 Disconnecting Means.** The necessary equipment consisting of a circuit breaker or switch, or both, shall be located within 50 ft (15.25 m) of the shore power connection and is intended to constitute the means of cutoff of the supply to the boat.

### 3-16 Lighting Fixtures.

**3-16.1** Lighting fixtures shall conform to the requirements of NFPA 70, *National Electrical Code* (Sections 410-4, 410-5, and 410-6), and, additionally, shall be located to prevent damage by contact with stored or moving material.

**3-16.2** Switches for control of individual lighting fixtures that are exposed to the weather or splash shall be of a type approved for that location.

### 3-17 Electrical Equipment Enclosures.

**3-17.1** Electrical equipment enclosures installed on piers above deck level shall be securely and substantially supported by structural members, independent of any conduit con-

nected to them. If enclosures are not attached to mounting surfaces by means of external ears or lugs, the internal screw heads shall rest on gaskets to prevent seepage of water through mounting holes.

**3-17.2** Electric equipment enclosures on piers shall be located so as not to interfere with mooring lines.

### 3-18 Feeders and Branch Circuits on Piers.

**3-18.1** The load for each ungrounded feeder and service conductor supplying receptacles for the connection of power to boats shall be calculated in accordance with Article 555 of NFPA 70, *National Electrical Code*.

General lighting and other loads shall be calculated, and the voltage drop based on the total load calculated as above shall be as required by Section 215-1, NFPA 70, *National Electrical Code*.

**3-18.2** Feeder circuits extending from the main service equipment that are intended for use in providing shore power to one or more boats, shall be of the 3-wire, grounded neutral, single-phase type of 110/220 volts, 115/230 volts, 120/240 volts, or 120/208 volts 3-phase Y, according to availability from the local public power source. The minimum feeder conductor size shall be No. 10 AWG; the minimum service conductor size shall be No. 8 AWG.

**3-18.3** Where feeder circuits extend on a pier to serve a group of shore power receptacles, the connecting wiring leading to individual devices that contain one or more such receptacles shall be considered feeder taps, coming under Exception No. 2, Section 240-21, NFPA 70, *National Electrical Code*. The branch circuits connecting the receptacles to the feeder tap shall be equipped with circuit breakers for overcurrent protection, located at the receptacle, with not more than one receptacle connected beyond the required circuit breaker. Rigid metallic or nonmetallic conduit shall be installed to protect wiring above the decks of piers and landing stages and below the enclosure that it serves. The conduit shall be connected to the enclosure by full standard threads. The use of special fittings of nonmetallic material to provide a threaded connection into enclosures on rigid nonmetallic conduit, employing joint design as recommended by the conduit manufacturer for attachment of the fitting to the conduit, will be acceptable provided the equipment and method of attachment are approved and the assembly meets the requirements of installation in a damp location.

**3-18.4** The disconnects for feeder circuits and branch circuits exceeding from the main service equipment shall be readily accessible and clearly marked.

### 3-19 Hazardous (Classified) Locations.

**3-19.1** Only qualified persons, as defined in Article 100, NFPA 70, *National Electrical Code*, shall be permitted to use, handle, install, or repair electrical systems or facilities within any area classified as "Hazardous."

**3-19.2** Only the electrical equipment and wiring necessary for the handling and dispensing of the fuels shall be installed within the hazardous area at any outdoor storage or dispensing station. Lighting fixtures for such locations, and the switches controlling them, shall be located beyond the hazardous area unless of a type approved for the location.

**3-19.3** The grounding wire of the electrical system, or other approved grounding connection, shall be arranged to provide adequate grounding protection to the metal nozzle of all fuel-dispensing equipment.

**3-19.4** When electrical equipment is installed in a location that is classified as both “Hazardous” and “Damp,” the construction shall include approved methods of meeting the requirements of both locations.

**3-20 Tests.** The following tests shall be conducted upon completion of the installation.

**3-20.1** The electrical system shall be subjected to an insulation test in the presence of the representative of the authority having jurisdiction. Such tests shall meet the requirements of Section 110-7, NFPA 70, *National Electrical Code*.

**3-20.2** All receptacles shall be tested for ground integrity and polarity. All improper conditions shall be corrected prior to use. Standard ground and polarity connections are as detailed in Section 200-10, NFPA 70, *National Electrical Code*.

### **3-21 Marine Hoists, Railways, Cranes, and Monorails.**

**3-21.1** Motors and controls for marine hoists and railways shall not be located in a wet location as defined in Section 3-4.

**3-21.2** Where it is necessary to provide electric power to a mobile crane or hoist in the yard, and a trailing cable is involved, it shall consist of listed portable power cables with ground conductors rated for the conditions of use and provided with a jacket of distinctive color for safety.

### **3-22 Maintenance of Electrical Wiring and Equipment.**

**3-22.1** An inspection of all electrical wiring, ground connections, conduit, hangars, supports, connections, outlets, appliances, devices, and portable cables installed or used in a marina, boatyard, boat basin, or similar establishment shall be made at regular intervals to ensure a complete inspection at least annually. Such an inspection shall include a ground integrity test and a polarity test. All corroded, worn, broken, or improper materials shall be replaced or repaired before further use. The use of tape to repair broken or cracked insulation of jackets on flexible cables or cords shall be prohibited. Splicing of flexible cord or cable shall be prohibited. The inspection shall take particular notice of the following conditions, and corrective action shall be taken as appropriate:

(a) Areas being used for purposes not originally contemplated and that introduce hazards greater than those for which the electrical system was designed.

(b) Locked or otherwise restricted areas or equipment being left open.

(c) The use of grounding-type portable electrical equipment that is not properly and adequately grounded.

(d) Special attention shall be given to shore power cable sets used by vessels for connection to shore power outlets. Shore power cable sets that lie across the surface of pier walkways shall be protected from mechanical abuse and shall be secured so as not to trail into the water.

(e) Flexible cords being used for purposes not in accordance with NFPA 70, *National Electrical Code*, i.e., used for permanent wiring.

*Exception: See Section 3-11.1.*

(f) Damaged or inoperative switches, lighting fixtures, and receptacle outlets.

(g) Overloading of electrical circuits.

(h) The introduction of unsuitable appliances into a hazardous area.

## **Chapter 4 Fire Protection**

**4-1 General.** Due to the unusually high concentration of combustibles and the presence of ordinary combustibles (Class A), flammable liquids (Class B), and electrical (Class C) fire hazards within virtually every area of the facilities covered by this standard, the placement and maintenance of both fixed and portable fire extinguishment equipment are extremely important.

**4-2 Planning.** Careful planning in the placement of fire extinguishment equipment shall be made in cooperation with the authority having jurisdiction and the local responding fire departments at least annually in order to accommodate changing conditions and personnel responsible for the fire control in the facility.

### **4-3 Portable Fire Extinguishers.**

**4-3.1** Placement of portable fire extinguishers shall be in accordance with Chapter 3, NFPA 10, *Standard for Portable Fire Extinguishers*.

**4-3.2** Placement of portable fire extinguishers on piers and along bulkheads where vessels are moored or are permitted to be moored shall be as follows.

**4-3.2.1** Extinguishers listed for Class A, Class B, and Class C fires shall be installed at the pier/land intersection on a pier that exceeds 25 ft (7.6 m) in length. Additional fire extinguishers shall be placed such that the maximum travel distance to an extinguisher does not exceed 75 ft (22.9 m).

**4-3.2.2** All extinguishers installed on piers shall meet the rating requirements set forth in Chapter 3 of NFPA 10, *Standard for Portable Fire Extinguishers*, for ordinary (moderate) hazard type.

**4-3.3** Portable fire extinguishers that meet the minimum requirements of Chapter 3, NFPA 10, *Standard for Portable Fire Extinguishers*, for extra (high) hazard type shall be installed on two sides of a fuel-dispensing area. On piers or bulkheads where long fueling hoses are installed for fueling vessels, additional extinguishers installed on the pier shall meet the requirements of Chapter 3, NFPA 10, *Standard for Portable Fire Extinguishers*, for extra (high) hazard type and 4-3.2.1 of this standard.

**4-3.4** All portable fire extinguishers shall be maintained in accordance with Chapters 4 and 5, NFPA 10, *Standard for Portable Fire Extinguishers*, and shall be clearly visible and marked.

### **4-4 Fixed Fire Extinguishment Systems.**

**4-4.1** Combustible buildings in excess of 500 ft<sup>2</sup> (46.45 m<sup>2</sup>) that are constructed on piers shall be protected by a fixed automatic sprinkler system installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

Noncombustible buildings in excess of 500 ft<sup>2</sup> (46.45 m<sup>2</sup>) that are constructed on piers, and contain combustible materials, the amount of which presents a hazard equal to a building of combustible construction as determined by the authority having jurisdiction, shall be protected by a fixed automatic sprinkler system installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

*Exception:* In existing facilities, considering water supply availability and adequacy, and size of facility, where clearly impractical for economic or physical reasons.

**4-4.2\*** Marina and boatyard buildings in excess of 5,000 ft<sup>2</sup> (464.5 m<sup>2</sup>) in total area shall be protected by a fixed automatic sprinkler system installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*. (See Section 5-2 for requirements for rack storage buildings.)

*Exception:* In existing facilities, considering water supply availability and adequacy, and size of facility, where clearly impractical for economic or physical reasons.

**4-4.3** Combustible piers and substructures in excess of 25 ft (7.6 m) in width or in excess of 5,000 ft<sup>2</sup> (464.5 m<sup>2</sup>) in area, or within 30 ft (11.4 m) of other structures or superstructures required to be so protected shall be protected, in accordance with Section 3-3, NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*.

*Exception No. 1:* In the case of fixed piers, where the vertical distance does not exceed 36 in. (0.91 m) from the surface of mean high water level to the underside of the pier surface. In the case of floating piers, where the vertical distance does not exceed 36 in. (0.91 m) from the surface of the water to the underside of the pier surface.

*Exception No. 2:* In existing facilities, considering water supply availability and adequacy, and size of facility, where clearly impractical for economic or physical reasons.

**4-4.4\*** An approved water supply shall be provided within 100 ft (30.5 m) of the pier/land intersection or fire department connection serving fire protection systems. Access between water supplies and pier/land intersections or fire department connections shall be by roadway acceptable to the authority having jurisdiction.

#### 4-5 Fire Standpipe Systems.

**4-5.1** Standpipe systems, where installed, shall be in accordance with NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*. Class I standpipe systems shall be provided for piers, bulkheads, and buildings where the hose lay distance from the fire apparatus exceeds 150 ft (45.8 m). Supply piping for standpipes on piers and bulkheads shall be sized for the minimum flow rate for Class II systems.

*Exception:* Hose racks, hoses, and standpipe cabinets shall not be required on piers and bulkheads.

**4-5.2** Manual dry standpipes shall be permitted.

**4-5.3** Flexible connections shall be permitted on floating piers subject to approval by the authority having jurisdiction.

**4-5.4** Listed nonferrous piping shall be permitted to be used in accordance with its listing.

**4-6 Hydrants and Water Supplies.** Hydrants and water supplies for fire protection in marinas and boatyards shall be provided in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*; NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*; and NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*.

**4-7 Fire Pumps.** Fire pumps when required shall be installed in accordance with NFPA 20, *Standard for the Installation of Centrifugal Fire Pumps*. Electrical components shall be installed in accordance with 3-5.6.

**4-8 Maintenance.** Portable fire extinguishers shall be maintained in accordance with NFPA 10, *Standard for Portable Fire Extinguishers*.

**4-8.1** All sprinkler systems, standpipe systems, water supply facilities and fire pumps shall be maintained in accordance with NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*.

**4-9 Exposure Protection.** The hazards of fire exposure and appropriate protection methods shall be evaluated. (See NFPA 80A, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures*.)

**4-10 Transmittal of Fire Emergency.** All marinas and boatyards shall have a means to rapidly notify the fire department in the event of an emergency. If a telephone is used for this purpose, it shall be available for use at all times and shall not require the use of a coin.

The street address of the facility and the emergency telephone number(s) shall be prominently displayed on a sign at the telephone.

NOTE: EMS and police numbers should be displayed in addition to fire department numbers unless 9-1-1 (E-9-1-1) is in use.

#### 4-11 Fire Detectors.

**4-11.1** Fire detection devices and installation shall be in accordance with NFPA 72, *National Fire Alarm Code*.

**4-11.2** Fire detectors shall be installed in the following interior or covered locations unless protected by a fixed automatic sprinkler system installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*:

- (a) Rooms containing combustible storage or goods.
- (b) Rooms containing flammable liquid storage or use.
- (c) Rooms containing battery storage or maintenance.
- (d) Rooms containing paint and solvent storage or use.
- (e) Enclosed or covered storage of vessels.
- (f) Areas used for enclosed or covered maintenance of vessels.
- (g) Areas used for public assembly, dining, or lodging.
- (h) Kitchens and food prep areas.
- (i) Dust bins and collectors.
- (j) Inside trash storage areas.
- (k) Rooms used for janitor supplies or linen storage.
- (l) Laundry rooms.
- (m) Furnace rooms.

## Chapter 5 Berthing and Storage

### 5-1 Wet Storage and Berthing.

**5-1.1** Each berth shall be arranged such that a boat occupying the berth can be readily removed in an emergency without the necessity of moving other boats.

**5-1.2** Ready access to all piers, floats, and wharves shall be provided for municipal fire-fighting equipment.

**5-1.3\*** Electrical lighting shall be provided to assure adequate illumination of all exterior areas, piers, and floats, but positioned so as not to interfere with navigation or aids to navigation.

**5-1.4** Only listed 120/240 volts ac electrical equipment shall be operated unattended.

### 5-2 Dry Storage.

#### 5-2.1 General.

(a) The use of portable heaters in a boat storage area shall be prohibited except where necessary to accomplish repairs, in which case they shall be used only when personnel are in attendance. No open flame heaters of any sort shall be used.

(b) Ladders long enough to reach the deck of any stored boat shall be located so as to be readily available.

(c) The use of blow torches or flammable paint remover shall be prohibited.

*Exception: Flammable solvents can be used as provided in 6-6.1.*

(d) The use of gasoline or other flammable solvents for cleaning purposes shall be prohibited.

(e) Where a boat is to be dry-stored for the season or stored indoors for an extended period of time, e.g., while awaiting repairs, the following precautions shall be taken:

1. The vessel shall be inspected for any hazardous materials or conditions that might exist and corrective action shall be taken.

2. LPG and CNG cylinders, reserve supplies of stove alcohol or kerosene and charcoal shall be removed from the premises or stored in a separate, designated safe area.

3. All portable fuel tanks shall be removed from the premises or emptied. If portable fuel tanks are emptied, the cap shall be removed and the tank left open to the atmosphere.

4. Permanently installed fuel tanks shall be stored approximately 95 percent full.

(f) No unattended electrical equipment shall be in use aboard boats.

(g) All storage areas shall be routinely raked, swept, or otherwise policed to prevent the accumulation of rubbish.

(h) Ready access of fire-fighting equipment shall be provided at all times for boats stored both inside and outside. In the case of inside storage areas, the local fire department authorities shall be appraised of the quickest way to gain access to the building in case of emergency.

#### 5-2.2 Indoors.

(a) When work is being carried out on board a vessel in an unsprinklered storage building, management shall require an inspection of the vessel at the end of the day to ensure that there are no hazards present resulting from the day's work. If

a guard is employed, the vessel shall be included in the regular rounds.

(b) No Class I flammable liquids shall be stored in an indoor boat storage area.

(c) All work performed on boats stored indoors shall be performed by qualified personnel only. Facility management shall maintain control over all personnel access to storage facilities and boats stored indoors.

#### 5-2.3 In-Out Dry Storage or Rack Storage.

(a) Any facility utilizing a rack storage system of more than one level shall be considered to fall under the definition of "in-out dry storage facility."

(b) Water supply and hoses, or portable fire extinguishers and wheeled cart assemblies equipped with discharge nozzles capable of reaching all boats on the highest racks shall be provided.

(c) Boats stored either inside or outside in single or multiple-level racks shall have unimpeded vehicular access at one end and shall have equipment available to remove any stored boat.

(d) \*Where boats are stored on multilevel racks in buildings, automatic sprinkler protection shall be installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

*Exception No. 1: Buildings under 5,000 ft<sup>2</sup> (464.5 m<sup>2</sup>) provided with an automatic fire detection and alarm system supervised by a central station complying with NFPA 72, National Fire Alarm Code. If such a system is not technically feasible, an automatic fire detection and alarm system supervised by a local protective signaling system complying with NFPA 72, National Fire Alarm Code, or a full-time watch service shall be utilized.*

*Exception No. 2: In existing facilities, considering water supply availability and adequacy and size of facility, where clearly impractical for economic or physical reasons.*

(e) Where boats are stored in multilevel racks, either inside or outside, for seasonal storage or for in-out operation, the following precautions shall be taken:

1. Drain plugs shall be removed (in sprinklered buildings).

2. Batteries shall be disconnected or the master battery switch turned off.

3. Fuel tank valves shall be closed.

4. For seasonal storage, the requirements of 5-2.1 shall apply.

(f) All repair operations while boats are on racks or inside an in-out dry storage building shall be prohibited.

(g) All portable power lines, such as drop cords, shall be prohibited from any boat in an in-out dry storage building. Portable battery chargers shall also be prohibited aboard any boat.

#### 5-2.4 Battery Storage.

(a) Lead-acid type batteries shall be removed for storage and recharging wherever practical. Where, due to size and weight, it is impractical to remove them for storage, batteries may be permitted to remain on board provided:

1. The battery compartment is arranged to provide adequate ventilation.

2. A listed battery charger shall be used to provide a suitable charge.

3. The power connection to the charger consists of a three-wire cord of not less than No. 14 AWG conductors connected to a source of 110-volt to 125-volt single phase current, with a control switch and approved circuit protection device designed to trip at not more than 125 percent of the rated amperage of the charger.

4. There is no connection on the load side of this device from this circuit to any other device and the boat battery switch shall be turned off.

5. The battery is properly connected to the charger and the grounding conductor effectively grounds the charger enclosure.

6. Unattended battery chargers are checked at intervals not exceeding 8 hours while in operation.

## Chapter 6 Operational Hazards

### 6-1 Conditions on Individual Boats.

**6-1.1** The management shall have an inspection made of boats received for major repair or storage. This shall be accomplished as soon as practicable after arrival of a boat and before commencement of any work aboard for the purpose of determining:

- (a) Presence of combustible vapors in any compartment.
- (b) General maintenance and cleanliness, and location of any combustible materials that require removal or protection for the safe accomplishment of the particular work involved.
- (c) Quantity, type, and apparent condition of fire extinguishing equipment on board.
- (d) Presence of appropriate listed shore power inlet(s) and listed ship-to-shore cable(s).

**6-1.2** The management shall, as a condition to accepting a boat received for major repair or storage, require the owner to correct any discrepancies found in 6-1.1 or to authorize management to do so.

**6-1.3** The following general precautions shall be observed:

- (a) Smoking in the working area shall be prohibited.
- (b) Loose combustibles in the way of any hazardous work shall be removed.
- (c) Unprotected battery terminals shall be suitably covered to prevent inadvertent shorting from dropped tools or otherwise. The ungrounded battery lead shall be disconnected.
- (d) Only experienced personnel shall be employed in the removal or installation of storage batteries.
- (e) Precautions recommended herein for specific kinds of work shall be followed.
- (f) When electric service is provided to boats in storage, the receptacle providing the power shall be protected with a ground-fault circuit-interrupter.

**6-1.4** The marina or boatyard operator shall post in a prominent location or provide to boat operators using a marina or

boatyard for mooring, repair, servicing, or storage, a list of safe operating procedures containing such information as:

- (a) The use of hibachis or any type of portable charcoal or wood cooking equipment shall be limited to specifically authorized areas where they can be used safely (not on the docks or near flammables).
- (b) Procedures for disposal of trash.
- (c) Nonsmoking areas.
- (d) Location of fire extinguishers and hoses.
- (e) Procedures for turning in fire alarm.
- (f) Fueling procedures.

**6-1.5** The information on fueling procedures referred to in 6-1.4(f) shall be as a minimum the following:

#### Before Fueling

- 1. Stop all engines and auxiliaries.
- 2. Shut off all electricity, open flames, and heat sources.
- 3. Check bilges for fuel vapors.
- 4. Extinguish all smoking materials.
- 5. Close access fittings and openings that could allow fuel vapors to enter the boat's enclosed spaces.
- 6. Remove all personnel from the boat except the person handling the fueling hose.

#### During Fueling

- 1. Maintain nozzle contact with fill pipe.
- 2. Fuel filling nozzle must be attended at all times.
- 3. Wipe up spills immediately.
- 4. Avoid overfilling.

#### After Fueling and Before Starting Engine

- 1. Inspect bilges for leakage or fuel odors.
- 2. Ventilate until odors are removed.

### 6-2 Heating.

**6-2.1** Heating equipment shall be installed in accordance with local ordinances and the following standards as appropriate:

NFPA 31, *Standard for the Installation of Oil-Burning Equipment*

NFPA 54, *National Fuel Gas Code*

NFPA 58, *Standard for the Storage and Handling of Liquefied Petroleum Gases*

NFPA 90B, *Standard for the Installation of Warm Air Heating and Air Conditioning Systems*

NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*.

**6-2.2** Adequate and suitable fire extinguishing equipment shall be supplied, installed, and maintained in an approved manner in proximity to heating equipment in accordance with Section 4-3.

**6-2.3** Heat generating plants for steam, hot water, or forced air systems shall be located in detached buildings or rooms separated from other areas by fire walls.

**6-2.4** Coal and wood burning stoves shall not be used unless such installations are periodically checked and found to possess adequate safeguards by the local fire authority having jurisdiction. If such stoves are used, the following precautions shall be in effect unless the authority having jurisdiction modifies the precautions specifically for each installation:



(a) A radial clearance of 36 in. (0.91 m) shall be maintained from any combustible material unless such material is effectively protected in accordance with NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances*.

(b) Combustible flooring under stoves shall be protected in accordance with NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances*.

(c) Chimney connectors shall be substantially supported and have a clearance of at least 18 in. (0.46 m) from all combustible material. Connectors passing through a combustible partition shall be protected at the point of passage by a metal ventilated thimble not less than 12 in. (0.31 m) larger in diameter than the protector, or in accordance with Chapter 5 of NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances*. Chimney connectors shall not pass through concealed spaces.

(d) Ready fuel supplies, particularly if scrap wood is used, shall be neatly stowed to maintain safe clearance from stoves.

(e) Substantial metal cans shall be provided for handling ashes. These cans shall not be used as receptacles for combustible waste.

**6-2.5** Heating devices employing a flame or exposed hot wires shall not be used in areas where flammable vapors or combustible dusts might be present.

### **6-3 Storage and Handling of Fuels.**

**6-3.1** The fueling station shall be located to minimize the exposure of all other plant facilities. All fueling stations shall be accessible by boat without entering or passing through the main berthing area.

*Exception:* Where inside fueling stations are made necessary by prevailing sea conditions (wake, surge, tide, etc.) such stations shall be located near an exit by water from the berthing area or at some other location from which, in case of fire aboard a boat alongside, the stricken craft can be quickly removed without endangering other boats nearby.

**6-3.2** All boat fueling operations shall be carefully accomplished in accordance with NFPA 302, *Fire Protection Standard for Pleasure and Commercial Motor Craft*, at the fueling station or other specifically designated remote location.

**6-3.3** No tank barge or other fuel supply boat shall be permitted within the berthing area. Outside berths and connections shall be provided for the use of tank barges or fuel supply boats.

**6-3.4** Fuel storage tanks shall be installed in accordance with NFPA 30A, *Automotive and Marine Service Station Code*, and in accordance with all state and local ordinances.

**6-3.5** Fuel storage tanks shall be securely anchored where they are located subject to flooding or tidal conditions, and the applicable precautions outlined in Chapter 2 of NFPA 30A, *Automotive and Marine Service Station Code*, shall be observed.

**6-3.6** Fuel storage tanks and pumps, other than those integral to approved dispensing units supplying gasoline, Class I, or Class II flammable liquids at marine service stations, shall be located only on shore, or with the express permission of the

authority having jurisdiction on a pier of solid-fill type. Approved dispensing units with or without integral pumps shall be permitted to be located on shore, on piers of solid-fill type, or on open piers, wharves, or floating piers.

**6-3.7** Tanks and pumps supplying diesel Class III flammable liquids at marine service stations shall be permitted to be located on shore, on piers of solid-fill type, or on open piers, wharves, or floating piers. Class III flammable liquid tanks that are located elsewhere than on shore or on piers of the solid-fill type shall be limited to 550 gal (2.08 m<sup>3</sup>) aggregate capacity. Pumps not a part of the dispensing unit shall be located adjacent to the tanks.

**6-3.8** Fuel pipelines shall be installed in accordance with the provisions of NFPA 30A, *Automotive and Marine Service Station Code*.

**6-3.9** Dispensing units for transferring fuels from storage tanks shall be in accordance with provisions of NFPA 30A, *Automotive and Marine Service Station Code*. Gasoline delivery nozzles shall be equipped with a self-closing control valve that will shut off the flow of fuel when the operator's hand is removed from the nozzle. The use of any device to override this safety feature is prohibited. The nozzle shall be inspected daily for proper operation. Any nozzle that shows evidence of possible malfunction or leaking shall be removed from service. The use of any automatic nozzle with a latch-open device is prohibited for the delivery of gasoline. In the construction of the fuel hose assembly, provision shall be made so the fuel delivery nozzle is properly bonded to the shore electric grounding facilities as required in Section 3-6 of this standard.

**6-3.10** Gasoline and other flammable liquids stored in drums or cans shall be kept separate from other plant facilities, and stored and dispensed in accordance with applicable requirements of NFPA 30A, *Automotive and Marine Service Station Code*.

**6-3.11** Hand carriage of gasoline within the plant area shall be restricted to containers designed for carrying and storage of such fuel. Open buckets, cans, or glass jars shall not be used.

**6-3.12** Only soaps, detergents, and approved solvents shall be used for cleaning purposes on the premises or on board boats. Gasoline or Class I flammable liquids shall not be used.

**6-4 Storage and Handling of Paints and Solvents.** Paint storage and mixing shall be segregated from other working and storage areas, preferably by provision of a well-separated and ventilated building of noncombustible construction, but otherwise by provision of a ventilated fire-resistive room with properly protected openings.

**6-5 Storage and Handling of Fiberglass Reinforced Plastic Materials.** Liquid materials used for the construction and repair of fiberglass reinforced plastic boats such as resins, catalysts, oxidizers, and solvents are usually flammable or combustible. Areas in which these materials are stored or used shall be well ventilated, constructed of noncombustible materials, and shall have particular attention paid to provisions for fire protection of such areas. Catalyzed resins shall be set and cooled before disposal of excess material or waste.

## 6-6 Paint Removal and Painting.

**6-6.1** Removal of paint or other finishes by use of flammable solvents shall be restricted to exterior surfaces of boats and shall be conducted only out-of-doors and well separated from other craft and adjacent (hazardous) operations.

**6-6.2** An adequate supply of approved fire extinguishing equipment of suitable type shall be readily accessible to all areas where paint removal, painting, or refinishing is in process.

**6-6.3** The operation of open-flame devices shall not be permitted where painting, sanding, scraping, or wire brushing is being performed in confined areas such as boat interiors. The operation of spark-producing equipment shall not be permitted where painting is being performed in confined areas such as boat interiors.

**6-6.4** Portable electric lamps used in areas where flammable vapors may be encountered, such as in paint removal and painting locations, shall be of the explosionproof type and shall be equipped with guards.

**6-6.5** Only such quantities of paint and solvent as required for one day's operations shall be permitted in the work area.

**6-6.6** Where spray finishing is performed indoors repeatedly at a fixed location, it shall be conducted in accordance with NFPA 33, *Standard for Spray Application Using Flammable and Combustible Materials*. Where such spray finishing is performed occasionally and in varying locations either indoors or outdoors, suitable precautions shall be taken to assure that all possible sources of ignition are eliminated throughout and near to the area wherein the spray finishing is to be performed. Ample ventilation of the area shall be provided.

## 6-7 Lumber Storage.

**6-7.1** Main stocks of lumber shall be stored in a segregated area.

**6-7.2\*** Piles of lumber shall be neatly stacked, and unobstructed aisles of adequate width shall be maintained between individual piles, to limit spread of fire and permit access for fire-fighting personnel and equipment.

## 6-8 Welding, Brazing, Soldering, and Metal Cutting.

**6-8.1** These operations shall be restricted to a shop specifically provided for the purpose, or in an open area. The shop shall be of noncombustible or fire-resistive construction, including its flooring, and all combustibles shall be kept well away from the shop or area.

**6-8.2** Only experienced personnel shall be permitted to perform welding, brazing, soldering, and cutting work.

**6-8.3** When welding or cutting in or on a boat, the following precautions shall be taken:

(a) Before starting operations a proper fire watch equipped with appropriate fire extinguishers shall be established.

(b) All combustible materials in proximity to hazardous repair work shall, if possible, be moved to a safe location aboard or ashore. Noncombustible material or properly flameproofed tarpaulins shall be used to protect combustible materials that cannot be moved.

(c) The area shall be free of combustible vapor and flammable liquids.

(d) All hatches, ports, tank openings, etc., through which sparks might pass shall be protected.

(e) Noncombustible or properly flameproofed tarpaulins or metal shields shall be set around the work in progress to restrict the travel of sparks.

(f) Before welding or cutting is begun on decks or bulkheads, a careful check shall be made of conditions on the opposite side thereof to eliminate the possibility of damage by heat or fire.

(g) Safeguards shall be taken with any fuel tanks to prevent vapors from creating a fire hazard.

**6-8.4** Neither welding nor cutting shall be attempted on a fuel tank unless the tank has been cleaned or otherwise safeguarded in accordance with NFPA 327, *Standard Procedures for Cleaning or Safeguarding Small Tanks and Containers Without Entry*.

**6-8.5** All welding and cutting equipment shall be maintained in the best condition. Oxyacetylene hose shall be neatly coiled and stored in a cool location, free from grease, oil, etc. Spare gas cylinders shall be limited to five and kept in a well-ventilated locker. Electric welding equipment shall conform to the provisions of NFPA 70, *National Electrical Code*.

**6-8.6** Wherever welding or cutting operations are in process, adequate and suitable fire extinguishing equipment shall be supplied, installed, and maintained in an approved manner and a competent fire watch provided where deemed advisable.

**6-9 Woodworking.** Good housekeeping and clean premises being essential to health and safety, woodworking equipment and machinery shall be arranged in a manner to prevent accumulations of sawdust, shavings, and wood waste. The interior of woodworking areas shall be constructed so as to minimize pockets and ledges inaccessible to cleaning, and the following precautions shall be observed:

(a) Sawdust, waste, and refuse shall be removed daily, or more often if necessary, and safely disposed of.

(b) Exhaust systems shall be installed for automatic removal of sawdust and shavings from planers.

(c) Machines shall never be left unattended while in operation.

(d) The area provided to accommodate boats undergoing construction or repair shall be large enough to permit free access around and under them. A check shall be made of all boats in this area to make certain the area is free of flammable vapors and other hazards.

(e) All volatile liquids required shall be kept to a minimum and handled only in approved safety cans.

(f) Adequate and suitable fire extinguishing equipment shall be supplied, installed, and maintained in an approved manner.

(g) Open flames, lights, and smoking shall be prohibited.

## 6-10 Machine Shop.

**6-10.1** The machine shop shall be housed in a separate noncombustible or fire-resistive building or effectively segregated by means of a fire wall when it shares a building with other facilities. If a means of egress is necessary in the separating fire wall, it shall comply with the requirements of NFPA 80, *Standard for Fire Doors and Fire Windows*.

**6-10.2** Machines and motors shall be kept clean and in good repair at all times.

**6-10.3** All flammable liquids required shall be kept at a minimum and handled only in approved safety cans.

**6-10.4** Gravity feed from fuel tanks to test stands shall not be permitted.

**6-10.5** An adequate supply of approved portable fire extinguishers of suitable type shall be installed and maintained in an approved manner.

**6-11 Battery Service and Storage.**

**6-11.1** Hydrogen gas is formed during the functioning of wet cell storage batteries. Hydrogen gas is highly flammable, is much lighter than air, and will rise to the highest available space. The area used for service or storage of such batteries shall be designed to:

(a) Vent the gas to the exterior atmosphere, and

(b) Prevent ignition of such gas that might not be completely vented.

**6-11.2** A separate room or completely closed area shall be provided for battery charging and storage. The room shall be used for no other purpose, and materials not required for the designated use shall not be placed or stored therein. The access door and windows (if any) shall be kept locked when the room is unattended.

**6-11.3** The battery room shall be ventilated in the following manner: air inlets shall be provided at, or below, the level of the battery racks with adequate exhausts at the ceiling. A vent stack equipped with natural draft exhaust head shall be installed to aid in providing an upward draft.

**6-11.4** The room and the electrical equipment located within the described space shall conform to the applicable requirements of NFPA 70, *National Electrical Code*, for Class I, Division I, Group B, Hazardous Area.

**6-11.5** To minimize the hazard, switches for control of services and illumination shall be permitted to be located on the exterior of the room or enclosure, and, in such location, need not be rated explosionproof.

**6-11.6** Battery chargers used shall have separate control switches in addition to a master switch to control all units.

**6-11.7** Charging equipment shall be well secured, protected from physical damage, and so located as to permit good ventilation all around it. Metal enclosures of battery charging devices shall be bonded to the equipment grounding conductor of the electrical system (green wire).

**6-11.8** Racks for storing and charging use shall be substantial, suitably insulated, reasonably open, and shall permit the setting of batteries so that no pockets where gases might accumulate can be formed, and shall conform to the requirements of Section 480-7, NFPA 70, *National Electrical Code*.

**6-11.9** Insulated tools and battery clips equipped with insulated cuffs shall be used to avoid short circuits.

**6-11.10** All battery servicing work shall be conducted by experienced personnel only. The following specific precautions shall be followed:

(a) Smoking shall be prohibited in the battery room.

(b) No open flame or spark producing work shall be undertaken in the battery room.

(c) No volatile liquids shall be stored or used in the battery room.

(d) Cell caps shall be kept tight while connecting or disconnecting batteries, but shall be removed whenever possible while charging.

(e) Battery tongs or other appropriate carrying devices shall be used when removing or lifting batteries.

(f) Wiring connections shall never be connected or disconnected if power is being supplied to or released by batteries.

(g) When nickel-cadmium batteries are to be charged or serviced in the reserved area, the work shall be done in a separate work area from which servicing or charging is done on lead-acid types of storage batteries. Tools and equipment used in servicing or charging nickel-cadmium batteries shall be distinguished by an appropriate color applied to them and shall be at all times reserved only for such usage.

**6-11.11** One (or more) approved dry chemical portable fire extinguisher(s) shall be provided in a readily accessible location within the enclosed area and shall be maintained in an approved manner.

**6-12 Servicing Liquefied Petroleum and Compressed Natural Gas Systems.**

**6-12.1** Utmost care shall be exercised at all times in the servicing of liquefied petroleum gas and compressed natural gas systems and equipment.

**6-12.2** Changing of cylinders shall be performed in accordance with NFPA 302, *Fire Protection Standard for Pleasure and Commercial Motor Craft*.

**6-12.3** Checks for leaks in liquefied petroleum gas and compressed natural gas systems shall never be made with a flame.

**6-13\* Maintenance.** The marina or boatyard facility shall be maintained at all times in a state of general order and cleanliness.

**6-13.1** Covered metal containers approved for the purpose shall be provided at convenient locations in shop areas used for boat construction, service, or repair for storage of oily and soiled rags and other refuse subject to spontaneous combustion. These containers shall be clearly marked as to their purpose and the contents disposed of at least daily in a safe manner.

**6-13.2** Separate metal containers shall be provided in shop areas used for boat construction, service, or repair for storage of sawdust, wood chips, and other residue, and trash that is not readily subject to spontaneous combustion. These containers shall be emptied at least daily.

**6-13.3** Shop floors shall be swept at least once a day, and with greater frequency as necessary, to prevent accumulation of easily ignited residue such as sawdust, wood chips, scraps of fiberglass reinforced plastic (FRP) materials, etc., and to prevent accumulation of metal chips and other residue that presents hazards including fire hazards.

**6-13.4** Where tar paper, roofing paper, or similar floor covering is used for floor protection in shops where FRP work takes place, the floor covering shall be promptly removed and properly disposed of at the end of the specific job or on a regular schedule.

**6-13.5** Covered containers shall be provided throughout the facility, including locations convenient to moored boats, for garbage and trash. These containers shall be located in areas where ignition of contents will not pose a hazard to the surroundings. Emptying and cleaning of these containers shall be performed regularly.

**6-13.6** Walkways, piers, access roads, and other parts of the facilities shall be maintained free of obstructions at all times so as to provide safe and reasonable access to all parts of the facility by fire-fighting personnel and equipment.

## Chapter 7 Referenced Publications

**7-1** The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

**NOTE:** It is not the intent of this standard that the marina or boatyard owners/operators maintain copies of these standards as a requirement of this standard, nor is it expected that they be knowledgeable as to their detailed contents. The inclusion of these reference standards provides a ready source for specifying compliance in procurement of equipment, systems, and design or installation services. Key requirements of the referenced standards as they apply to marinas and boatyards have been included in Chapters 1 to 6 inclusive with reference to the appropriate NFPA or ANSI standards.

**7-1.1 NFPA Publications.** National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 10, *Standard for Portable Fire Extinguishers*, 1994 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 1994 edition.

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*, 1993 edition.

NFPA 20, *Standard for the Installation of Centrifugal Fire Pumps*, 1993 edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 1995 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 1995 edition.

NFPA 30, *Flammable and Combustible Liquids Code*, 1993 edition.

NFPA 30A, *Automotive and Marine Service Station Code*, 1993 edition.

NFPA 31, *Standard for the Installation of Oil-Burning Equipment*, 1992 edition.

NFPA 33, *Standard for Spray Application Using Flammable and Combustible Materials*, 1995 edition.

NFPA 54, *National Fuel Gas Code*, 1992 edition.

NFPA 58, *Standard for the Storage and Handling of Liquefied Petroleum Gases*, 1995 edition.

NFPA 70, *National Electrical Code*, 1996 edition.

NFPA 72, *National Fire Alarm Code*, 1993 edition.

NFPA 80, *Standard for Fire Doors and Fire Windows*, 1995 edition.

NFPA 80A, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures*, 1993 edition.

NFPA 90B, *Standard for the Installation of Warm Air Heating and Air Conditioning Systems*, 1993 edition.

NFPA 110, *Standard for Emergency and Standby Power Systems*, 1993 edition.

NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*, 1992 edition.

NFPA 302, *Fire Protection Standard for Pleasure and Commercial Motor Craft*, 1994 edition.

NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*, 1995 edition.

NFPA 327, *Standard Procedures for Cleaning or Safeguarding Small Tanks and Containers Without Entry*, 1993 edition.

**7-2 ANSI Publications.** American National Standards Institute, 1430 Broadway, New York, NY 10018.

ANSI/UL 231, *UL Standard for Safety Power Outlets*, 1994.

ANSI/NEMA WD6, *Wiring Devices-Dimensional Requirements*, 1988.

**7-3 UL Publication.** Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.

UL 1686, *UL Standard for Safety Pin & Sleeve Configurations*, 1993.

## Appendix A Explanatory Material

*This appendix is not a part of the requirements of this NFPA document but is included for informational purposes only.*

**A-1.4 Approved.** The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization concerned with product evaluations that is in a position to determine compliance with appropriate standards for the current production of listed items.

**A-1.4 Authority Having Jurisdiction.** The phrase “authority having jurisdiction” is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

**A-1-4 Listed.** The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The “authority having jurisdiction” should utilize the system employed by the listing organization to identify a listed product.

**A-2** While design of the marina or boatyard can reduce certain hazards, the fact remains that proper management of the facility or boatyard is an important element for reducing the risk of fire, electrical, and other hazards that threaten life and property. The guidelines in this chapter are specifically addressed to those management functions where implementation can significantly reduce the specific and overall hazard.

The marina or boatyard management should adopt procedures to show that facility and equipment comply with the requirements of this standard and to show that maintenance and inspection functions are carried out as specified in this standard.

**A-2-5 Watch Service.** A watch service has been shown to be one of the most important means for early detection of a fire during hours when marina or boatyard personnel are not working, and is required under certain circumstances in 5-2.3(d).

If a watch person is employed, he or she should be physically active, have good eyesight and hearing, and have a good record of health and sobriety. It is particularly important that the watch person have a reasonable familiarity with boats.

**A-3-11.5** The exterior environment in marinas and boatyards exposes electrical equipment and wiring to the highly corrosive conditions of acid rain, salt spray, and temperature extremes. These conditions greatly enhance the galvanic corrosion where dissimilar metals are used in the electrical circuitry, which can cause high resistance connections and the possibility of fires.

**A-4-4.2** The combustibility of the boats in storage should be considered in determining the hazard classification for appropriate sprinkler system design.

**A-4-4.4** In order to comply with this requirement, water supplies may consist of a hydrant that is part of an approved water supply system, drafting hydrant, or drafting site.

**A-5-1.3** It is recommended that an auxiliary power supply be provided to ensure lighting in the event of a power failure.

**A-5-2.3(d)** Multilevel racks with height of storage not exceeding 12 ft (3.66 m) are covered by NFPA 13, *Standard for the Installation of Sprinkler Systems*. The combustibility of the boats in storage should be considered in determining hazard classifications. Where boats are stored on racks and storage height exceeds 12 ft (3.66 m), guidance for the design of automatic sprinkler protection should be taken from NFPA 231C, *Standard for Rack Storage of Materials*. Combustibility of boat construction should be used in determining the appropriate commodity class for fire protection system selection and design. Plan view configuration of the boats in storage should be reviewed in determining whether in-rack sprinklers are needed and, to aid in the proper design of the in-rack portion of the sprinkler system. Sound engineering judgment is necessary in selecting sprinkler spacing, placement and design criteria.

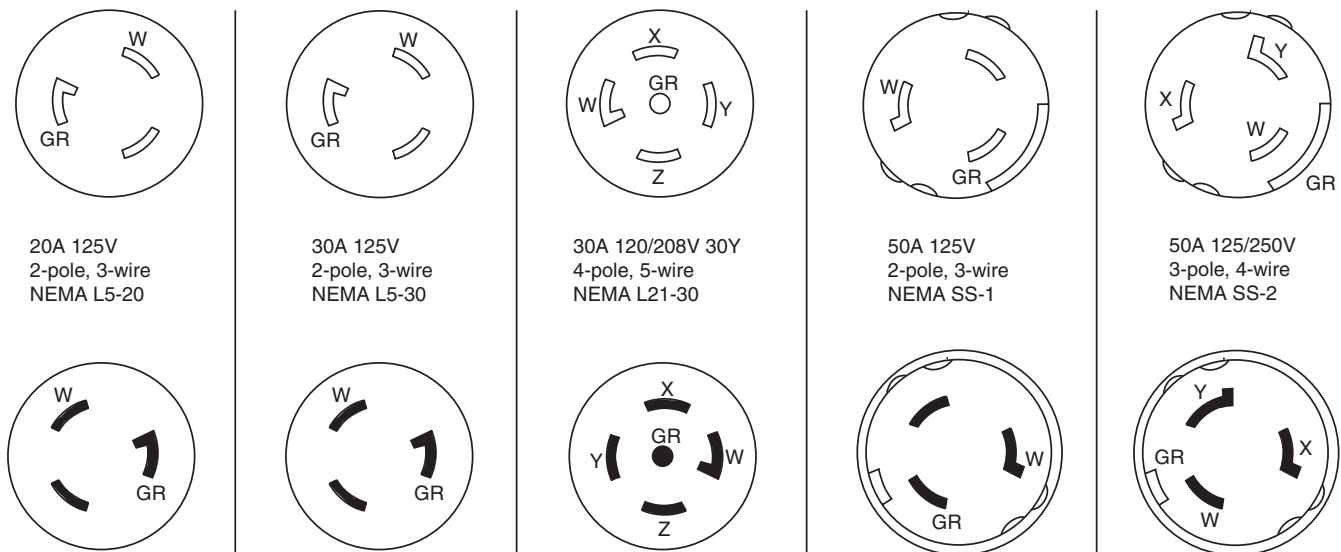
**A-6-7.2** See NFPA 46, *Recommended Safe Practice for Storage of Forest Products*, for additional guidance.

**A-6-13** The following list contains examples of conditions that should be eliminated or controlled:

- (a) Uncontained trash, wood scraps, sawdust, rags, etc.
- (b) Used engines and engine parts, miscellaneous metal, unused machinery, and similar items placed other than in a specifically designated and fenced area.
- (c) Unswept floors, particularly in shop areas.
- (d) Open paint cans or other flammable or combustible liquids.
- (e) Spills of oil, paint, or fuel.
- (f) Unmowed grass or weeds, brush, dead or dying trees, and other debris.

## Appendix B

*This Appendix is not a part of the requirements of this NFPA document but is included for informational purposes only.*



**Figure B-1** Receptacle configurations, 20 amperes to 50 amperes.