

NFPA No.

303

MARINAS AND BOATYARDS 1975



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Fire Protection Standard for
MARINAS AND BOATYARDS

NFPA 303 — 1975

This edition incorporates extensive amendments to the 1969 edition, particularly in the area of wet and dry storage. It was adopted by the Association at its annual meeting in Chicago, Illinois, May 12-16, 1975 on recommendation of the Sectional Committee on Marinas and Boatyards and the Committee on Marine Fire Protection.

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 and 1969. The 1975 edition contains both revised and new materials and has been reorganized to conform with the NFPA Standard Style Manual.

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This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in the membership may have occurred.

**Interpretation Procedure of the Committee
on Marine Fire Protection**

Those desiring an interpretation shall supply the Chairman with five identical copies of a statement in which shall appear specific reference to a single problem, paragraph, or section. Such a statement shall be on the business stationery of the inquirer and shall be duly signed.

When applications involve actual field situations they shall so state and all parties involved shall be named.

The Interpretations Committee will reserve the prerogative to refuse consideration of any application that refers specifically to proprietary items of equipment or devices. Generally inquiries should be confined to interpretation of the literal text or the intent thereof.

Requests for interpretations should be addressed to the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

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Fire Protection Standard for Marinas and Boatyards

NFPA No. 303 — 1975

Chapter 1 General

1-1 Foreword. This standard is intended to provide a minimum acceptable level of safety to life and property from fire and related hazards at establishments used for the construction, repair, storage, launching, berthing and fueling of small craft. Where additional facilities are operated in conjunction therewith, reference to other applicable standards should be made.

Management is responsible for planning and implementing a program for fire prevention and fire protection, and its attitude toward such matters will inevitably be reflected in the attitudes and behavior of employees and boat owners.

Despite the most careful vigilance and effort, fire has many opportunities to strike active boat servicing establishments. Fiberglassing, woodworking, paint removing and spraying, welding and cutting, handling gasoline and other highly flammable liquids, etc., may be continuing operations, and all are extra hazardous. Further, the facilities are frequently in locations quite isolated from public protection. Hence, the selection, location and maintenance of the proper type of fire fighting equipment is essential.

1-2 Management. Management shall establish and enforce fire prevention regulations and be responsible for the provision and maintenance of fire protection equipment. It is essential that all applicable federal, state and local laws, ordinances and regulations be understood and complied with.

Management is responsible for the training of employees in fire prevention and the proper emergency action in event of fire, for providing the necessary equipment to control the spread of fire and to handle any necessary movement or evacuation of boats.

1-3 Service and dry storage areas shall be substantially fenced or otherwise enclosed to prevent unauthorized access.

1-4 Cleanliness.

1-4.1 Systematic procedures for the maintenance of clean premises shall be adopted.

1-4.2 Adequate, covered metal cans shall be provided for oily and soiled rags and other combustible refuse. Similar receptacles shall be provided at convenient locations throughout the facility for rubbish and debris.

1-4.3 All wood shavings, sawdust, light wood waste and other readily ignitable refuse shall be cleared away and disposed of daily in a safe manner.

1-4.4 Weeds, tall grass, brush and other similar dry weather fire hazards shall be destroyed by approved weed killers or by other fire-safe methods and removed after destruction. Weed or trash burners shall not be used.

1-4.5 Congestion in the storage of combustible equipment and supplies shall be avoided.

1-4.6 Public areas shall be inspected at regular frequent intervals for the express purpose of eliminating hazardous conditions.

1-5 Water Supply. An adequate water supply for fire fighting shall be provided to all areas of the property.

1-6 Smoking. Smoking shall be prohibited and "no smoking" signs posted in such locations as fueling stations, areas used for the storage and handling of fuel or other flammable liquids, boat storage areas, paint and woodworking shops, sail lofts, battery charging rooms, boat locker rooms, storage rooms, and such other locations as management may designate.

Chapter 2 Fire Protection

2-1 Classification of Fires. For all practical purposes there are three general classes of fires. Marinas and boatyards are exposed to all three.

Class A fires, defined as fires in ordinary combustible materials such as wood, cloth and paper where the "quenching-cooling" effect of quantities of water or solutions containing large percentages of water is most effective in reducing the temperature of the burning material below the ignition temperature and is, therefore, of first importance.

Class B fires, defined as fires in flammable petroleum products or other flammable liquids, greases, etc., where the "blanketing-smothering" effect of oxygen-excluding media is most effective. Among the extinguishing agents for Class B fires are carbon dioxide, dry chemical, and foam.

Class C fires, defined as fires involving electrical equipment where the electrical nonconductivity of the extinguishing media is of first importance. Among the extinguishing agents for Class C fires are carbon dioxide and dry chemical.

NOTE: Combustible metals such as magnesium, titanium, zirconium, sodium and potassium are not normally present in marinas and boatyards and require special type of extinguishment.

2-2 Private Fire Protection.

2-2.1 Analysis of Hazards. The means and methods desirable for adequate first aid in fire protection will vary considerably for individual boat servicing establishments. Factors which influence the type and extinguishing power of fire fighting equipment selected include:

- (a) life and property values at risk
- (b) class, rapidity of spread, and intensity of fire anticipated
- (c) accessibility of area to be protected
- (d) temperature to which fire equipment may be exposed
- (e) time interval between transmission of alarm and arrival of public fire department.

2-2.2 Division of Plant into Fire Protection Areas.

2-2.2.1 Marinas and boatyards often present an extreme variation in the types and degrees of fire hazards associated with their diversified operations. Where such diversities exist, a full property layout plan can assist in determining the fire protection

required by the various separated working areas. Examples of areas to be differentiated in the layout are:

- (a) area, type of construction, usage, subdivision and spacing of all buildings
- (b) entries, internal roadways, and passages
- (c) outside boat storage areas
- (d) marine railways and lifts
- (e) docks and piers
- (f) fueling facilities including fuel storage
- (g) adjacent premises and their occupancies.

2-2.2.2 Consideration of the fire potential existing in adjacent premises is essential in measuring the degree of exposure from fire originating within those premises. Such exposures could materially influence the type and quantity of fire protection necessary as well as the degree of fire protection education and training required for yard employees.

2-2.3 Fixed Fire Extinguishing Equipment. Both automatic and hand operated devices of approved types are available which, when properly installed, maintained and handled, will provide means for controlling and extinguishing incipient fires. Among these are the following:

(a) **AUTOMATIC SPRINKLERS:** These are considered the most important of all fire protective devices when correctly installed, with an abundant and constant water supply at proper pressure, and maintained so as to be operative at all times. Sprinkler systems have been found very reliable and satisfactory for use in practically all types of structures and under nearly all conditions of fire hazards. Wet or dry pipe systems are available and, where subject to temperatures below freezing even for short periods, the dry pipe system is essential. Installation of sprinkler systems is normally done by reliable, specialized contractors in accordance with the *Standard for the Installation of Sprinkler Systems, NFPA 13, 1974*. Regular inspection and maintenance of systems at reasonable intervals is necessary.

(b) **STANDPIPE AND HOSE SYSTEMS:** These systems provide a quick means of applying an effective quenching stream on incipient fires and also can be used to control more advanced fires or to prevent their spread. Installations of such systems shall be in accordance with *Standpipe and Hose Systems, NFPA 14, 1974*.

(i) A systematic and regular check of all parts of a stand-pipe system is essential for the maintenance of the system in an instantly operative condition.

(c) **UNDERGROUND FIRE LINES WITH HYDRANTS:** For establishments encompassing considerable area, and having berthing facilities, underground fire line systems with hydrants are highly recommended. Such systems should be connected to the public water supply, if available, and this connection should be independent of other public water service lines within the premises. If a public water supply connection is not available or feasible, an underground fire line should be supplied by an approved fire pump of not less than 500-gpm capacity, depending upon the extent of the premises. It is preferable that fire pumps take suction from a fresh water supply but, if necessary, salt water may be used.

NOTE: Ordinary trade pumps, while efficient for general service, are seldom reliable under the stress of fire demands and are not approved for such purpose.

(i) In laying out a fire line system, the piping should be run to serve all buildings, piers, repair docks, outside boat storage areas, and areas used to store combustibles such as lumber. Hydrants should be so located as to keep hose lines as short as practicable, preferably not over 250 feet. The guiding requirement should be the ability to apply two effective streams to every exterior part of the area serviced by the hose normally attached to the hydrant. Hydrants should be located in relation to buildings so as to be accessible and usable under any anticipated conditions of fire.

(ii) Underground piping must be laid with due regard to climatic and seasonal conditions. During the winter season the system may require complete draining with water supply instantly available through control of a main valve located in a heated area, which may also house the pump if the system is privately charged. Such an area must be accessible and useful under any fire conditions within the premises. Underground piping should be not less than six inches in diameter and hydrants should conform to the National Standard.

(iii) Approved 1½-inch hose in 75-foot lengths should be provided and properly housed in hose houses equipped with play pipes, ordinary nozzles and fog nozzles, hydrant wrenches and spanners. Such equipment should be located at strategic points, for instance, where piers exceed 250 feet, each should be provided with a two-inch water line extending the length of the pier and be equipped with 1½-inch hose connections at 75-foot intervals. At shore ends these water lines should be equipped with 2½-inch hose adapters to permit connection to a fire hydrant outlet of the

same size. The pier water lines should be normally dry where freezing temperatures occur.

(iv) Where marina or boat basin facilities are extensive, turret nozzles located on shore, preferably of the spray type, are suggested as an effective supplementary means for controlling and preventing the spread of fire.

NOTE: For further information relating to underground fire lines with hydrants and fire pumps, see *Standard for Outside Protection, NFPA 24, 1973*, and *Standard for the Installation of Centrifugal Fire Pumps, NFPA 20, 1974*.

2-2.4 Portable Fire Extinguishing Equipment.

2-2.4.1 Portable fire extinguishing equipment is frequently referred to as first-aid fire fighting equipment because its successful use depends upon prompt application to incipient fires. It is essential that boat servicing establishments be well armed with the proper first-aid fire fighting equipment. Only extinguishers listed by Underwriters' Laboratories or approved by the Factory Mutual Laboratories or other recognized testing agency shall be used. It is equally essential that the equipment be maintained in operative condition, and that employees know how to use it effectively.

2-2.4.2 Distribution of portable fire extinguishing equipment shall be in accordance with the *Standard for Installation of Portable Fire Extinguishers, NFPA 10, 1974*.

2-2.5 Fire Alarm and Watch Service.

2-2.5.1 The initial minutes are the most vital in fighting a fire. Hence, prompt fire detection and alarm transmission are essential. Immediate transmission of an alarm to the municipal fire department upon the first discovery of a fire is a basic rule, following which prompt and effective use of the equipment at hand shall be made.

2-2.5.2 A distinctive sounding device, suitably located within the premises and capable of being heard in every part and building of the plant above all other sounds, shall be provided for giving prompt notification of the outbreak of fire.

2-2.5.3 The installation of an approved automatic fire detection system in key buildings is recommended. It is preferable that such system be arranged to sound an alarm at an attended location, or operate the yard alarm referred to, or both.

2-2.5.4 Where premises are under public fire protection, a municipal alarm box should be located at a convenient place

within or at the entrance to the premises. If permissible in the particular locality, the public alarm box should be connected to any automatic fire detection or extinguishing system employed and thus assure immediate transmission of the alarm to the public fire department.

2-2.5.5 If available, the employment of a central station signaling service, utilizing an approved system of combined watch and alarm boxes, is recommended for the two-fold purpose of watchman supervision and transmission of alarm to the public fire department.

2-2.5.6 Where the premises are not under public fire protection and no central station signaling service is available, the telephone must be relied upon for transmitting calls for assistance. The location, accessibility (during all hours of the day and night) and number of telephones is, therefore, important.

2-2.5.7 A regular watch service is highly desirable. The watchman must warrant and receive the implicit confidence of management and of the owners of boats using the facilities. Characteristics to be considered in his selection are good eyesight and hearing, an excellent sense of smell, mental alertness, bodily agility, general good health, sobriety, and a reasonable familiarity with boats.

2-2.5.8 It is important that the watchman's route be carefully laid out to include every important and potentially hazardous area within the premises with such locations incorporated in a recognized watchman's recording system such as the portable watch clock. It is desirable that the route be prominently identified on the plant layout plan with all stops marked. The watchman's first round shall consist of a complete inspection immediately at the close of the working day. The frequency of rounds will depend upon the time required for each round with one-hour intervals recommended.

2-2.5.9 The watchman's duties can be considerably assisted by good illumination of the premises and approaches, good access to public alarm box and telephone, and specific instructions covering the desired procedures for the most important or most probable emergencies.

2-2.6 Fire Brigade.

2-2.6.1 In order to secure the effective application of the fixed and portable extinguishing equipment provided, it is necessary that owners, operators and personnel become fully familiar with that equipment and its operations. A fire brigade, consisting of

selected employees should be organized. The brigade's efficiency depends on thorough drilling in the location of and proper use of the fire fighting equipment, including the operation of fire extinguishers, the laying of hose lines and application of hose streams.

2-2.6.2 The enlistment of local fire department personnel to assist in instructing brigade personnel is recommended. Periodic practice drills should be held as frequently as practicable with not less than one per month recommended. It is suggested that specific duties be assigned to individual members of the brigade. This might be done on the basis of the normal area in which the various employees work and incorporated upon a chart showing the personnel organization of the brigade. Such a chart, together with the layout plan, will be found of great assistance in the preparation of the brigade for efficient operation when and if called upon.

2-2.6.3 The interest taken by managements through active leadership of, 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 protection.

NOTE: For further information, see *Private Fire Brigades, NFPA 27, 1967*.

2-2.7 Inspection and Maintenance of Fire Fighting Equipment. All fire protection equipment shall be inspected regularly and maintained in operating condition by a responsible person selected by management.

2-3 Public Fire Protection.

2-3.1 Successful fire protection may well depend upon intelligent, friendly and well-planned cooperation between plant managements and local fire departments.

2-3.2 Familiarity with Facilities. The chief of the local fire department and his assistants should be encouraged to become acquainted with every part of the plant. Their knowledge of the grounds, buildings, and berthing facilities should include:

- (a) Entries and means for mobility of equipment within the premises.
- (b) Location, construction, use and accessibility of all buildings and all their subdivisions, including basements, storage lockers, etc.
- (c) Location of and extent of outside working areas, including boat storage sections, piers, mooring slips, fueling stations, etc.

- (d) Suitable locations for stationing department pumpers accessible to water supply.
- (e) Fire protection equipment.

2-3.3 Transmission of Fire Alarm. The alarm shall be transmitted to the fire department immediately upon discovery of any fire. This should be a duty impressed upon all personnel and especially upon watchmen. Means for sounding an alarm of fire for notification of yard personnel and others on the premises shall be provided.

2-3.4 Maintenance of Access. All entries and internal passageways shall be maintained free of obstructions at all times. Fire protection equipment, either private or public, shall not be obstructed. Fencing shall be arranged to permit prompt access in an emergency to fire fighting forces and apparatus.

Chapter 3 Berthing and Storage Facilities

3-1 Design. Due to the many various configurations of land and water areas where marinas and boatyards are located, it is not practical to specify any details of layout. Each design, however, shall provide the following features:

(a) Each mooring or wharfage berth shall be arranged so that a boat occupying the berth can be readily removed in an emergency without the necessity of moving another boat.

(b) Mooring and wharfage areas shall be arranged to permit boats to enter or leave their berths with a minimum amount of maneuvering.

(c) Access from land to piers and floats shall permit municipal or other fire-fighting equipment to be located where hose lines may be extended to the full length of the pier or floats.

(d) Water lines for instant use in fire fighting shall be permanently installed accessible to all berthing piers and floats. They shall be protected from freezing where necessary. These water lines shall be connected to an adequate water supply ashore or to motor driven pumps capable of providing adequate water. The water line layout shall be approved by the authority having jurisdiction.

(e) An electrical lighting system shall be provided to assure adequate illumination of all exterior shore areas, piers, and/or floats. The wiring, fixtures, and fittings shall be provided and installed in accordance with Chapter 5 of this standard.

(f) If an auxiliary power supply, arranged to provide lighting for pier and dock areas is not provided, an approved battery-powered emergency lighting fixture conforming to the requirements of Section 700-6, *National Electrical Code*, and protected from the weather shall be installed at the outboard end and the shore end of each pier.

NOTE: All references in this standard to the *National Electrical Code* are to the 1975 edition.

3-2 Construction.

3-2.1 Except for service piers, ordinary catwalk construction is suitable for mooring piers provided they are not less than two feet in width and not more than 50 feet in length. Mooring piers exceeding 50 feet in length shall be not less than four feet wide. Floating piers shall provide adequate freeboard and stability in relation to weather and water conditions, with a minimum width of three feet for finger floats not over 50 feet in length and a minimum width of five feet for floats exceeding 50 feet in length.

3-2.2 Gangways leading to floats shall be not less than three feet wide, with a handrail not less than 42 inches high on each side

with a midrail, and shall be arranged to accommodate normal movement of the float to which it provides access.

3-3 Dry Storage of Boats.

3-3.1 In addition to compliance with other sections of this standard, dry storage areas require additional protection due to the greater degree of congestion and the decreased inspection frequency of each vessel.

3-3.2 Separation of Areas. When work is carried out on board a vessel in an unsprinklered storage building, an approved fire detection device shall be maintained within the vessel for the duration of repairs; and the vessel shall be included on the watchman's regular rounds.

3-3.3 Suitable lockers or facilities shall be provided for boat gear, with great care exercised to see that no items subject to spontaneous heating are included, such as oilskin clothing, etc.

3-3.4 The use of heaters in a boat storage area shall be prohibited except when necessary to accomplish repairs, in which case they shall be regularly attended.

3-3.5 No flammable liquids or materials shall be kept in boat storage areas.

3-3.6 Fixed or portable ladders of sufficient length to reach every stored boat shall be so located as to be readily available for use.

3-3.7 When a boat is to be dry stored for the season, the following precautions shall be taken in addition to normal winter lay-up preparations:

(a) The entire vessel shall be inspected for any hazardous materials or conditions that may be present.

(b) All loose combustibles shall be removed and stored in suitable lockers or segregated safe areas.

(c) Liquefied petroleum gas cylinders, alcohol or kerosene from galley fuel tanks, and any reserve fuel supplies for the galley shall be removed and stored in a safe area.

(d) Batteries of the lead-acid type shall be removed for storage and recharging whenever practicable. When, for reasons of size and weight, it is impractical to remove batteries for storage and recharging, they may be permitted to remain on board provided:

(i) The compartment in which the batteries are located is arranged to provide adequate ventilation to prevent entrapment of released gases;

(ii) An approved type battery charger is permanently installed on the boat, so arranged as to provide a suitable trickle charge;

(iii) The power connection to the trickle charger consists of a three-wire circuit of not less than No. 12 AWG conductors, connected to a source of 110 to 125 volts single phase, with a control switch and approved circuit protection device arranged to trip at not more than 125 percent of the rated amperage of the charger;

(iv) There is no connection on the load side of the circuit protection device from this circuit to any other device;

(v) The electrical wiring complies with all of the requirements of this standard, and the *National Electrical Code*, and

(vi) The battery is permanently connected to the outlet terminals of the charger and the grounding conductor effectively grounds the charger enclosure.

3-3.8 Boats stored outside in either single or multiple levels shall have unimpeded vehicular access at one end and have available equipment capable of removing any stored boat.

3-3.9 Where boats are stored at a single level in any building, ready access shall be provided to every boat for men and fire fighting equipment.

NOTE: The above access may be accomplished by either allowing a minimum of three feet separation at the gunwale level with a portable ladder for each four boats, or by the installation of a substantial catwalk raised above the deck level and leading to every boat.

3-3.10 Boats stored on inside multi-level racks shall be provided the same access described in 3-3.8.

3-3.11 When boats are seasonally stored on inside multi-level racks as described in 3-3.7, a fire alarm and watchman service shall be provided in accordance with 2-2.5.

3-3.12 When boats are temporarily stored on inside multi-level racks for "In-Out" operation, automatic sprinkler protection shall be provided for each boat in accordance with the *Standard for the Installation of Sprinkler Systems, NFPA 13, 1974*.

3-3.13 When boats are stored in the multi-level racks for "In-Out" operation, either inside or outside, the following precautions shall be taken before the boat is stored:

- (a) Drain plugs shall be removed;
- (b) Batteries shall be disconnected; and
- (c) Fuel tank valves shall be closed.

Chapter 4 Operational Hazards

4-1 Conditions on Individual Boats.

4-1.1 The management shall have an inspection made of boats received for repair, servicing, 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 which 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) The use of hibachis or any type of portable charcoal or wood-fired cooking equipment shall be prohibited on any boat berthed or moored in a marina or boatyard or at any pier or float.

The resulting information, along with directions covering necessary precautions, shall be made known to the employees responsible for accomplishing the servicing work, and any basically unsafe conditions and desirable corrections shall be discussed with the boat owner.

4-1.2 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) Protective coverings or shields, used to protect engines, accessories or combustibles, shall be of fire resistant materials.
- (f) Precautions recommended elsewhere herein for specific kinds of work shall be followed.

4-2 Heating.

4-2.1 Heating equipment shall be installed in accordance

with local ordinances and the following standards as appropriate:

Installation of Oil Burning Equipment, NFPA 31, 1974

National Fuel Gas Code, NFPA 54, 1974

Warm Air Heating and Air Conditioning Systems, NFPA 90B, 1973

Chimneys, Fireplaces and Vents, NFPA 211, 1972.

4-2.2 Adequate and suitable fire extinguishing equipment shall be supplied, installed, and maintained in an approved manner in proximity to heating equipment.

4-2.3 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.

4-2.4 All heating equipment shall be approved for the purpose of its use.

4-2.5 Coal and wood burning stoves are not recommended 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 inches shall be maintained from any combustible material unless such material is effectively protected.

(b) Combustible flooring under stoves shall be protected by a sheet of $\frac{1}{4}$ -inch asbestos covered by a sheet of metal at least 24 U. S. Gage and extended at least 12 inches beyond each stove on all sides. Stoves shall have legs of sufficient length to raise ash pit bottoms at least six inches above the metal.

(c) Chimney connectors shall be substantially supported and have a clearance of at least 18 inches from all combustible material. Double metal ventilating thimbles shall be used where chimney connectors pass through combustible partitions or roofing and these should be at least twice the diameter of the chimney connector. 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.

4-2.6 Heating devices employing a flame or exposed hot wires shall not be used in areas where flammable vapors or combustible dusts may be present.

4-3 Storage and Handling of Fuels.

4-3.1 The fueling station shall be located to minimize the exposure of all other plant facilities. Where tide and weather exposure conditions permit, all fuel handling shall be outside the main berthing area.

NOTE : Fuel suppliers are urged to clearly display a placard cautioning boat operators to observe the following precautions:

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.

During Fueling

1. Maintain nozzle contact with fill pipe.
2. Wipe up spills immediately.
3. Avoid overfilling.

After Fueling and Before Starting Engine

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

4-3.2 All boat fueling operations shall be carefully accomplished in accordance with the *Fire Protection Standard for Motor Craft, NFPA 302, 1972*, at the fueling station or other specifically designated remote location.

4-3.3 Inside fueling 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 may be quickly removed without endangering other boats nearby.

4-3.4 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 when filling storage tanks.

4-3.5 Outside berths and connections shall be provided for the use of tank barges or fuel supply boats when filling storage tanks.

4-3.6 Fuel storage tanks shall be installed in accordance with the *Flammable and Combustible Liquids Code, NFPA 30, 1973*, and in accordance with all state and local ordinances.

4-3.7 Fuel storage tanks shall be securely anchored where they are located subject to flooding or tidal conditions, and the applicable precautions outlined in *Protection of Tanks Containing Flammable Liquids in Locations That May Be Flooded (NFPA 30, 1973, Appendix B)* shall be observed.

4-3.8 Fuel storage tanks and pumps, other than those integral with approved dispensing units, supplying gasoline, Class I, or Class II flammable liquids at marine service stations, shall be located only on shore, or with express permission of the authority having jurisdiction, on a pier of solid-fill type. Approved dispensing units with or without integral pumps may be located on shore, piers of solid-fill type, or open piers, wharves or floating piers.

4-3.9 Tanks and pumps supplying diesel Class III flammable liquids at marine service stations may be located on shore, on piers of solid-fill type or on open piers, wharves or floating piers. Class III flammable liquid tanks which are located elsewhere than on shore or on piers of the solid-fill type shall be limited to 550 gallons aggregate capacity. Pumps not a part of the dispensing unit shall be located adjacent to the tanks.

4-3.10 Fuel pipelines shall be installed in accordance with the provisions of the *Flammable and Combustible Liquids Code, NFPA 30, 1973*.

4-3.11 Dispensing units for transferring fuels from storage tanks shall be in accordance with provisions of the *Flammable and Combustible Liquids Code, NFPA 30, 1973*. Every fuel delivery nozzle shall be equipped with a self-closing control valve, which will shut off the flow of fuel when the operator's hand is removed from the nozzle. The use of any automatic nozzle with a latch-open device is prohibited. 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 5-6.3 of this standard.

4-3.12 Gasoline and other flammable liquids stored in drums or cans shall be kept separated from other plant facilities, and stored and dispensed in accordance with applicable requirements of the *Flammable and Combustible Liquids Code, NFPA 30, 1973*. Fueling operations involving systems using portable tanks shall be in accordance with provisions set forth for outboard boats in *Fire Protection Standard for Motor Craft, NFPA 302, 1972*.

4-3.13 Hand carriage of gasoline within the plant area shall be restricted to approved safety containers of sound metal construction having a tight closure with screwed or spring cover and fitted with a spout or so designed that the contents can be poured without spilling. Open buckets, cans or glass jars shall not be used.

4-3.14 Gasoline shall not be used as a cleaner on the premises or on board boats. Only soaps, detergents and approved solvents shall be used.

4-4 Storage and Handling of Paints and Spirits. 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.

4-5 Paint Removal and Painting.

4-5.1 Removal of paint or other finishes by means of a blowtorch or 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.

4-5.2 Only trained yard personnel shall be permitted to perform paint removal by means of a blowtorch.

4-5.3 All fuel tank vents shall be effectively plugged before burning operations are begun and the plugs removed upon completion of the burning operations.

4-5.4 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.

4-5.5 The operation of open flame or spark producing equipment shall not be permitted where painting, sanding, scraping, or wire brushing is being performed in confined areas such as boat interiors.

4-5.6 Portable electric lamps used in areas where flammable vapors may be encountered, such as in paint removal and painting locations, shall be of the "explosion proof" type and shall be equipped with guards.

4-5.7 Only such quantities of paint and thinner as required for one day's operations shall be permitted in the work area.

4-5.8 Where spray finishing is performed indoors repeatedly at a fixed location, it shall be conducted in accordance with the *Standard for Spray Application Using Flammable and Combustible Materials, NFPA 33, 1973*. Where such spray finishing is performed but 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.

4-6 Lumber Storage.

4-6.1 Main stocks of lumber shall be stored in a segregated area for this specific purpose whether outdoors or in a separate shed.

4-6.2 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.

4-7 Welding, Brazing, Soldering and Cutting.

4-7.1 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.

4-7.2 Only experienced personnel shall be permitted to perform welding, brazing, soldering, and cutting work.

4-7.3 When welding or cutting in or on a boat, the following precautions shall be taken:

(a) All combustible materials in proximity to hazardous repair work shall, if possible, be moved to a safe location aboard or ashore. Protect combustible materials which cannot be moved with noncombustible material or properly flameproofed tarpaulins.

(b) The area must be absolutely free of combustible vapor, and flammable liquids.

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

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

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

4-7.4 Neither welding nor cutting shall be attempted on a fuel tank unless one of the following requirements has been met:

(a) The tank has been freed of flammable vapor or inerted in accordance with *Standard for the Control of Gas Hazards on Vessels To Be Repaired, NFPA 306, 1972*, and a certificate obtained from a certificated Marine Chemist.¹

¹The holder of a valid certificate issued by the NFPA establishing his qualifications to determine whether repairs and alterations may be undertaken with safety from hazards with flammable vapor-air mixtures.

(b) The tank has been cleaned or otherwise safeguarded in accordance with *Standard Procedures for Cleaning or Safeguarding Small Tanks and Containers*, NFPA 327, 1970.

4-7.5 All welding and cutting equipment shall be maintained in the best condition. Oxy-acetylene 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 be kept in a well-ventilated locker. Electric welding equipment shall conform to the provisions of the *National Electrical Code*.

4-7.6 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.

NOTE: For additional information, see NFPA pamphlets "Preventing Cutting and Welding Fires" and "Sparks Astray."

4-8 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 inaccessible surfaces shall be inclined as steeply as possible (at least 45 degrees from the horizontal) so as to prevent accumulations of sawdust and shavings, 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 saws and 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. (*See Installation of Portable Fire Extinguishers*, NFPA 10, 1974.)

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

4-9 Machine Shop.

4-9.1 The machine shop shall be housed in a separate non-combustible or fire-resistive building or effectively segregated by means of a firewall when it shares a building with other facilities. If a means of egress is necessary in the separating firewall, it shall comply with the requirements of *Fire Doors and Windows, NFPA 80, 1974*.

4-9.2 Machines and motors shall be kept clean and in good repair at all times.

4-9.3 All flammable liquids required shall be kept to a minimum and handled only in approved safety cans.

4-9.4 Gravity feed from fuel tanks to test stands shall not be permitted.

4-9.5 An adequate supply of approved portable fire extinguishers of suitable type shall be installed and maintained in an approved manner. (*See Installation of Portable Fire Extinguishers, NFPA 10, 1974.*)

4-10 Battery Service and Storage.

4-10.1 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 exterior atmosphere and
- (b) prevent ignition of such gas which may not be completely vented.

4-10.2 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.

4-10.3 The battery room shall be ventilated in the following manner: Provide air inlets at, or below, the level of the battery racks with adequate exhausts at ceiling. Install a vent stack equipped with natural draft exhaust head to aid in providing an upward draft.

4-10.4 The room and the electrical equipment located within the described space shall conform to the applicable requirements

of the *National Electrical Code*, for Class I, Division 1, Group B, Hazardous Areas.

4-10.5 To minimize the hazard, switches for control of services and illumination may be located on the exterior of the room or enclosure, and in such location need not be rated explosion proof.

4-10.6 Battery chargers used shall have separate control switches in addition to a master switch to control all units.

4-10.7 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).

4-10.8 Racks for storing and charging use shall be substantial, suitably insulated, reasonably open and permit the setting of batteries so that no pockets, in which gases might accumulate, can be formed, and shall conform to the requirements of Section 480-6, *National Electrical Code*.

4-10.9 Insulated tools and battery clips equipped with rubber cuffs shall be used to avoid short circuits.

4-10.10 All battery servicing work shall be conducted by experienced personnel only. The following specific precautions shall be followed:

- (a) Prohibit smoking 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.
- (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.

4-10.11 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.

4-11 Servicing Liquefied Petroleum Gas Systems.

4-11.1 Utmost care shall be exercised at all times in the servicing of liquefied petroleum gas systems and equipment.

4-11.2 Changing of cylinders shall be performed in accordance with *Fire Protection Standard for Motor Craft, NFPA 302, 1972*.

4-11.3 Checks for leaks in liquefied petroleum gas systems must never be made with flame. Use of liquid detergent or soapy water solution is recommended.

NOTE: For further information, see *Standard on Liquefied Petroleum Gases, Storage and Handling, NFPA 58, 1974*.

Chapter 5 Electrical Wiring and Equipment

5-1 Hazards arising from the presence of electrical systems and electrical equipment in the marina and boatyard requiring special precautions are:

(a) Wet or continuously damp areas, exposed to rain, wind-driven spray and atmospheric moisture.

(b) Areas subject to flooding by abnormally high water.

(c) Areas in which flammable liquids or gases are stored, dispensed or used.

(d) The use of electrical equipment and facilities by persons not under the control of the management, many of whom are unfamiliar with the hazards which can be created by such use, and the means of avoiding them.

5-2 The *National Electrical Code, NFPA 70*, 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 the *National Electrical Code* to the specific hazards and combinations of hazards found in marinas, boatyards, boat basins and establishments of similar type.

5-3 General. All electrical wiring, conduit, enclosures and equipment, and the provision of circuit protective devices, shall conform to the applicable requirements of the *National Electrical Code* and to the applicable requirements of this standard.

5-4. Classification of Locations within Marinas and Boat-yards. All areas of marinas, boatyards, boat basins and similar establishments shall be properly related to one of the location classifications as herein described for the purpose of determining suitable arrangements of electrical wiring, and electrical equipment. The classification of all areas shall be related to a datum-level which shall be calculated for each establishment according to the following formula:

(a) In areas subject to tidal fluctuation the datum-level shall be established at a point two feet above the highest tide level recorded by the U.S. Coast Guard in the area. (*See Exception below.*)

(b) In areas inland and not subject to tidal fluctuation, the datum-level shall be established at a point two feet above the highest water level recorded by local sources at that area, or if

no reliable record is available, the datum-level shall be established at a point six feet above normal high water level. (*See Exception below.*)

Exception: In both tidal and nontidal areas, floating piers and landing stages which are installed to permit rise and fall responsive to water level, without lateral movement, and which are so equipped that they may rise to the datum-level established for the area in 5-4(a) and 5-4(b), such floating piers and landing stages will have a datum-level at the deck surface of the pier landing stage of two feet above the water.

5-4.1 Standard Location: The interior area of any building or structure constructed with standard doors and windows to normally seal the interior from weather, and with no usable portion of the building extending below the datum-level. The portion of any building which is usable and is located below the datum-level shall be considered a Wet Location.

5-4.2 Damp Location: All exterior areas, including open sheds, covered passageways, the area above the decks of piers and landing stages which are located at, or above the datum-level.

5-4.3 Wet Location: All interior and exterior areas which are located below the datum-level, including underground areas in which electrical wiring may be installed.

5-4.4 Hazardous Location: For the purpose of this section shall be as defined in Article 500, *National Electrical Code*. A Hazardous Location may also be a Standard, Damp or Wet Location and will be subject to detailed requirements applicable to both locations.

5-5 Power Supply.

5-5.1 Incoming power supply from a public utility system shall be designed and installed in relation to the calculated demand load.

5-5.2 Primary service feeders shall be supported on poles or structures reserved for that purpose.

5-5.3 In multiphase power supply facilities particular care shall be taken to arrange for equally balanced phase loads to the extent possible.

5-5.4 Primary power, when introduced in excess of 250 volts, shall be transformed to reduce the private system to not in excess of 250 volts.

5-5.5 Transformers shall be installed, when located within

the private property area, in compliance with the requirements of Article 450, *National Electrical Code*, with the additional requirement that transformers shall not be located in a Wet Location as herein described, and if located in a Damp Location shall be of type approved for use in such locations.

5-5.6 Main service equipment, including service disconnecting equipment, meters and associated equipment, and the main switchboard or panel, if not installed in a Standard Location, shall be installed in a Damp Location and be protected from the weather in an approved manner, and shall be protected against access by unauthorized persons. Main service equipment shall not be installed in Wet Locations. In other respects the main service installation shall be in compliance with the requirements of Article 230, *National Electrical Code*.

5-5.7 When 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, *National Electrical Code*, and shall also be arranged as follows:

(a) The engine and generator shall be housed in a well-ventilated fire-resistive enclosure not located in a Wet Location and which shall contain only the auxiliary power unit and the necessary controls for the engine. Interior areas of the enclosure shall be lighted by a fixture connected to the normal power supply. An approved battery-powered emergency lighting fixture conforming to the requirements of Section 700-6, *National Electrical Code*, shall be permanently installed in the enclosure, arranged to illuminate the engine control equipment. The fuel supply tank or tanks for the auxiliary power equipment shall be located outside of the structure and shall fully comply with the requirements of this standard related to the storage and handling of flammable liquid fuels.

(b) The requirements for automatic starting of the emergency generator as included in Section 700-6, *National Electrical Code*, may be waived if the starting battery for the prime mover is maintained on a reliable trickle-charge and is tested by actually starting the prime mover at monthly intervals, as required by Section 700-4, *National Electrical Code*.

5-5.8 The transfer switch for use in connecting an auxiliary emergency generator to the selected load circuits shall be a manually operated double throw switch, with wiring arranged to disconnect the selected circuits from the normal power source before the auxiliary source is connected to these circuits, and shall be of proper rating to make and break the full load current for all the

selected circuits. The transfer switch shall be mounted on the exterior of the structure containing the auxiliary power generating equipment, within a cast metal enclosure having a gasketed cover and an external operating handle arranged to be locked in either position. Wiring connections to the transfer switch shall be made through full weight rigid metal conduit threaded into the enclosure, which shall be adequately grounded. The transfer switch installation shall otherwise comply with the requirements of the *National Electrical Code* (Section 373-2).

5-6 Grounding.

5-6.1 Effective 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, including outlets provided for the connection of shore power to vessels afloat, are of utmost importance in marinas, boatyards, boat basins and similar establishments. This is due to the exposure of electrical systems and equipment to water, damp or wet earth and to other grounded or partially grounded conductive parts, and the consequent danger to life and possibility of high sparking adjacent to combustible materials.

5-6.2 The means and methods of providing an effective ground to the noncurrent-carrying metal parts of the electrical system, and for equipment and portable appliances connected thereto, shall comply with the requirements of the *National Electrical Code* (Article 250).

5-6.3 In addition to any grounding provided by the conduit system there shall be installed a common grounding conductor of not less than No. 12 AWG, arranged in accordance with the requirements of the *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 which 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 the *National Electrical Code*, Section 555-7.

5-6.4 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.

5-6.5 Metal poles, lighting standards and other metal supports which carry or enclose electrical wiring shall be effectively grounded.