ANSI/NFPA 303 An American National Standard December 8, 1983

NFPA 303 Marinas and Boatyards 1984

National Fire Protection Association Batterymarch Park, Quincy, MA 02269

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Policy Adopted by NFPA Board of Directors on December 3, 1982

The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

Statement on NFPA Procedures

This material has been developed under the published procedures of the National Fire Protection Association, which are designed to assure the appointment of technically competent Committees having balanced representation. While these procedures assure the highest degree of care, neither the National Fire Protection Association, its members, nor those participating in its activities accepts any liability resulting from compliance or noncompliance with the provisions given herein, for any restrictions imposed on materials or processes, or for the completeness of the text.

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Fire Protection Standard for Marinas and Boatyards

NFPA 303-1984

1984 Edition of NFPA 303

This edition of NFPA 303, *Fire Prevention Standard for Marinas and Boatyards*, was prepared by the Technical Committee on Marinas and Boatyards, released by the Correlating Committee on Marine Fire Protection, and acted on by the National Fire Protection Association, Inc. at its Fall Meeting held November 14-17, 1983 in Orlando, Florida. It was issued by the Standards Council on December 8, 1983 with an effective date of December 28, 1983, and supersedes all previous editions.

This 1984 edition of this standard has been approved by the American National Standards Institute.

Changes other than editorial are indicated by a vertical rule in the margin of the page 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, 1969, and 1975.

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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.

NOTE: Membership on a Committee shall not in and of itself constitute an endorsement of the Association or any document developed by the Committee on which the member serves.

Contents

Fire Protection Standard for Marinas and Boatyards

NFPA 303-1984

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

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 or fueling of small craft. Where additional facilities are operated in conjunction therewith, reference to other applicable standards shall 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 the handling of 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. These containers shall be located in open areas where ignition of the contents will not pose a hazard to the surroundings.

1-4.3 All wood shavings, sawdust, light wood waste and other readily ignitible 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. 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. 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. 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.

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 NFPA 13, *Standard for the Installation of Sprinkler Systems*. 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 NFPA 14, *Standpipe and Hose Systems*.

(i) A systematic and regular check of all parts of a standpipe 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 shall be connected to the public water supply, if available, and this connection shall 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 shall be supplied by an approved fire pump of not less than 500-gpm (.0315 m^3/s) 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.

(i) In laying out a fire line system, the piping shall be run to serve all buildings, piers, repair docks, outside boat storage areas, and areas used to store combustibles such as lumber. Hydrants shall be so located as to keep hose lines as short as practicable, preferably not over 250 ft (76.2 m). The guiding requirement shall 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 shall be located in relation to buildings so as to be accessible and usable under any anticipated conditions of fire.

(ii) Underground piping shall 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 shall be accessible and useful under any fire conditions within the premises. Underground piping shall be not less than 6 in. (.15 m) in diameter and hydrants should conform to the National Standard.

(iii) Approved 1½-in. (.038-m) hose in 75-ft (22.9-m) lengths shall be provided and properly housed in hose houses equipped with play pipes, ordinary nozzles and fog nozzles, hydrant wrenches and spanners. Such equipment shall be located at strategic points, for instance, where piers exceed 250 ft (76.2 m), each shall be provided with a 2-in. (.05-m) water line extending the length of the pier and be equipped with 1½-in. (.038-m) hose connections at 75-ft (22.9-m) intervals. At shore ends these water lines shall be equipped with 2½-in. (.064-m) hose adapters to permit connection to a fire hydrant outlet of the same size. The pier water lines shall be normally dry where freezing temperatures occur.

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 NFPA 10, *Standard for Installation of Portable Fire Extinguishers.*

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 a 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 shall be located at a convenient place within or at the entrance to the premises. If permissible in the particular locality, the public alarm box shall 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 Where the premises are not under public fire protection and/or no central station signaling service is available, the telephone shall 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.

2-2.5.6 A regular watch service is highly desirable. The watch person shall warrant and receive the implicit confidence of management and of the owners of boats using the facilities. Characteristics to be considered in the 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.

2-2.5.7 It is important that the watch person's route be carefully laid out to include every important and potentially hazardous area within the premises with such locations incorporated in a recognized watch person'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 watch person'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.

2-2.5.8 The watch person'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 shall 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 shall 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 management 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.

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 shall be encouraged to become acquainted with every part of the plant. Their knowledge of the grounds, buildings, and berthing facilities shall 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 shall be a duty impressed upon all personnel and especially upon watch personnel. 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 to fire fighting forces and apparatus in an emergency.

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 700-16, *National Electrical Code®*, and protected from the weather shall be installed at the outboard end and the shore end of each pier.

3-2 Dry Storage of Boats.

3-2.1 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.

3-2.2 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 watch person's regular rounds.

3-2.3 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.

3-2.4 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.

3-2.5 No flammable liquids or materials shall be kept in boat storage areas.

3-2.6 Fixed or portable ladders of sufficient length to reach every stored boat shall be so located as to be readily available for use.

3-2.7 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.

3-2.8 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.

3-2.9* Where boats are stored at a single level in any building, ready access shall be provided to every boat for personnel and fire fighting equipment.

3-2.10 Boats stored on inside multilevel racks shall be provided the same access described in 3-2.8.

3-2.11 When boats are seasonally stored on inside multilevel racks as described in 3-2.7, a fire alarm and watch person service shall be provided in accordance with 2-2.5 unless having automatic sprinklers in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

3-2.12 When boats are stored in the multilevel 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.

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.

4-1.3 Boat operators using a marina or boatyard for mooring, repair, servicing, or storage shall be provided with a list of safe operating procedures containing such information as:

(a) The use of hibachis or any type of portable charcoal or wood-fired cooking equipment shall be prohibited.

(b) Procedures for disposal of trash.

(c) Non-smoking areas.

(d) Location of fire extinguishers.

(e) Procedures for turning in fire alarm.

4-2 Heating.

4-2.1 Heating equipment shall be installed in accordance with local ordinances and the following standards as appropriate:

NFPA 31, *Installation of Oil Burning Equipment*

NFPA 54, *National Fuel Gas Code*

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

NFPA 211, *Chimneys, Fireplaces and Vents.*

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 in. (.91 m) shall be maintained from any combustible material unless such material is effectively protected in accordance with NFPA 211, *Chimneys, Fireplaces and Vents.*

(b) Combustible flooring under stoves shall be protected in accordance with NFPA 211, *Chimneys, Fireplaces, and Vents.*

(c) Chimney connectors shall be substantially supported and have a clearance of at least 18 in. (.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. (.31 m) larger in diameter than the protector or in accordance with Chapter 5 of NFPA 211,

Chimneys, Fireplaces and Vents. 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.

4-3.2 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.

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

4-3.6 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 30, *Flammable and Combustible Liquids Code*, shall be observed.

4-3.7 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 the 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.

4-3.8 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 gal (2.08 m^3) aggregate capacity. Pumps not a part of the dispensing unit shall be located adjacent to the tanks.

4-3.9 Fuel pipelines shall be installed in accordance with the provisions of NFPA 30, *Flammable and Combustible Liquids Code*.

4-3.10 Dispensing units for transferring fuels from storage tanks shall be in accordance with provisions of NFPA 30, *Flammable and Combustible Liquids Code*. 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. The use of any device to override this safety feature is prohibited.

4-3.11 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 NFPA 30, *Flammable and Combustible Liquids Code*. Fueling operations involving systems using portable tanks shall be in accordance with provisions set forth for outboard boats in NFPA 302, *Fire Protection Standard for Pleasure and Commercial Motor Craft*.

4-3.12 Hand carriage of gasoline within the plant area shall be restricted to containers designed for carrying and storage of fuel. Open buckets, cans or glass jars shall not be used.

4-3.13 Only soaps, detergents and approved solvents shall be used on the premises or on board boats. Gasoline or Class I flammable liquids shall not 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, sand-

ing, 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 "explosionproof" 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 NFPA 33, *Standard for Spray Application Using Flammable and Combustible Materials*. 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 shall be 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 NFPA 306, *Standard for the Control of Gas Hazards on Vessels*, and a certificate obtained from a certificated Marine Chemist.

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

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.

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.

(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 noncombustible 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 neces-

sary in the separating firewall, it shall comply with the requirements of NFPA 80, *Fire Doors and Windows*.

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.

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 explosionproof.

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

4-11.3* Checks for leaks in liquefied petroleum gas systems shall never be made with flame.

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 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 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 Boatyards. 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 2 ft (.606 m) above the highest tide level recorded 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 2 ft (.606 m) 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 6 ft (1.83 m) 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 Section 5-4(a) and Section 5-4(b), such floating piers and landing stages will have a datum-level at the deck surface of the pier landing stage of 2 ft (.606 m) 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 (Classified) Location. For the purpose of this section shall be as defined in Article 500, *National Electrical Code*. A Hazardous (Classified) Location may also be a Standard, Damp or Wet Location and will be subject to detailed requirements applicable to these 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 a 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 700-12, *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 aux-

iliary 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 700-12, *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 receptables. 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.

5-7 Standard Locations. The entire electrical system installed in a Standard Location shall comply with the requirements of the *National Electrical Code*.

5-8 Damp Locations. The entire electrical system installed in a Damp Location shall be composed of materials approved for the purpose (as defined in Article 100, *National Electrical Code*).

5-9 Wet Locations. The entire electrical system in a Wet Location shall be composed of materials suitable for compliance with the definition of "wet locations" as given in Article 100, *National Electrical Code*.

5-10 Hazardous (Classified) Locations.

5-10.1 The entire electrical system installed in a Hazardous (Classified) Location shall comply with the requirements as given in Article 500, *National Electrical Code*, and, in addition, when required by the conditions, to the requirements of this standard related to Damp and Wet Locations.

5-10.2 Wiring and electrical equipment installed on piers, wharves, docks or similar locations shall specifically conform to the requirements of Article 555, *National Electrical Code*, when located in proximity to gasoline dispensing equipment.

5-11 Wiring Methods and Materials (Damp and Wet Locations).

5-11.1 The wiring method shall be rigid metal conduit or rigid nonmetallic conduit.

Exception No. 1: Where flexibility is required the wiring method shall be other approved types.

Exception No 2: As permitted by Article 225, National Electrical Code, for outside branch circuits and feeders.

5-11.2 It is recommended that all electrical wiring be installed underground 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 Sections 230-30, 230-31, 230-48 and 230-49, *National Electrical Code*.

5-11.3 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 which may 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 which may 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:

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

(ii) 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 placed in suitable locations.

5-11.4 Wiring installed over and under navigable water shall be subject to approval by the authority having jurisdiction.

5-11.5 Where flexibility is necessary in accord with Exception No. 1 (*see 5-11.1*), as on piers composed of floating sections, the feeder conductors if installed in a Wet Location shall be of Type W or Type G cable, or other approved type which is rated at not less than 75°C, 600 volts, of the required ampacity and including 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 corrosive-resistant construction with permanently installed terminal blocks, on each pier section to which the feeder and feeder extensions are to be connected. Boxes shall have gasketed covers of the same material as the box. The cable entrances to pier junction boxes shall be capable of preventing the entrance of water or splash when the cable is in place. Metal junction boxes and their covers, and metal screws and parts which are exposed externally to the boxes shall be of corrosive resisting materials, or protected by material resistant to corrosion.

5-12 Circuit Breakers, Switches and Panels (Damp and Wet Locations).

5-12.1 Overcurrent protection as required by the *National Electrical Code* shall be provided by the use of circuit breakers, to avoid the difficulty of fuse replacement in gasket enclosures.

Exception: Fuses, rated at not in excess of five amperes, may be located in a panel enclosure for protection of a circuit to a single lighting fixture which is installed as part of a panel assembly on a pier.

5-12.2 Circuit breakers installed in gasketed enclosures which are located where exposed to the direct rays of the sun shall be of the fully magnetic type, with no thermal elements.

5-12.3 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.

5-12.4 Circuit breakers, switches and panels shall not be installed in Wet Locations.

5-12.5 Devices which contain one or more circuit breakers and one or more receptacles intended for use as power outlets for boats shall be considered to be panels for the purposes of this standard.

5-12.6 Circuit breakers, switches and panels permanently installed on piers shall be located to provide a height of not less than 30 in. (.76 m) nor more than 40 in. (1.01 m) for the bottom of the enclosure above the deck below.

5-12.7 All electrical enclosures installed on piers above deck level shall be securely and substantially supported by structural members, independent of any conduit connected 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.

5-12.8 Mooring bitts shall be located so that mooring lines cannot place a load on supports for electrical enclosures.

5-13 Feeders and Branch Circuits on Piers.

5-13.1 The load for each ungrounded feeder and service conductor supplying receptacles for the connection of power to boats shall be calculated as follows:

For 1 to 4 receptacles — 100 percent of the sum of the rating of the receptacles

For 5 to 8 receptacles — 90 percent of the sum of the rating of the receptacles

For 9 to 13 receptacles — 80 percent of the sum of the rating of the receptacles

For 14 or more receptacles — 70 percent of the sum of the rating of the receptacles.

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 215-2, *National Electrical Code*.

5-13.2 Feeder circuits extending from the main service equipment, which 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, 115/230, 120/240 or 120/208 3 ϕ Y volts, 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.

5-13.3 Where feeder circuits extend on a pier to serve a group of shore power receptacles, the connecting wiring leading to individual devices which contain one or more such receptacles shall be considered feeder taps, coming under Exception No. 2, Section 240-21, *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 recep-

tacle, 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 deck of piers and landing stages and below the enclosure which 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.

5-14 Receptacles (Damp Locations).

5-14.1 Receptacles shall not be installed in Wet Locations or Hazardous (Classified) Locations.

5-14.2 Receptacles that provide shore power for boats shall be rated not less than 20 amperes and shall be single and of the locking and grounding type conforming to ANSI C73, *Dimensions of Attachment Plugs and Receptacles.*

5-14.3 Each single receptacle that supplies shore power for boats shall be supplied from an outlet or panelboard by an individual branch circuit of the voltage class and rating corresponding to the rating of the receptacle.

5-14.4 Fifteen- and 20-ampere outdoor receptacles, other than those supplying shore power to boats, shall be protected as required by Section 555-3, *National Electrical Code.*

5-14.5 All receptacles shall be installed in enclosures and shall be equipped with an approved means of preventing the entrance of water by rain or splash to the receptacle contacts when the receptacle is not in use.

5-14.6 A special sign, stating the maximum voltage and current (in amperes) available from the shore service connection outlets, shall be permanently located at the shore end of each pier on which electrical outlets for shore service connections are provided, and on a wall visible to all within the office where arrangements are made for berthing facilities. Each such sign shall contain the following additional message in large letters:

"CAUTION: CONNECTION SHALL NOT BE MADE TO ANY SHORE POWER OUTLET WITHOUT PERMISSION OF THE MANAGEMENT."

5-15 Lighting Fixtures.

5-15.1 Lighting fixtures shall conform to the requirements of the *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.

5-15.2 Lighting fixtures which are located where the light rays are transmitted offshore shall be suitably shielded to comply with the safety regulations of the U. S. Coast Guard.

5-15.3 Switches for control of individual lighting fixtures located where exposed to the weather or splash shall be of a type approved for that location.

5-16 Hazardous (Classified) Locations.

5-16.1 Only qualified persons, as defined in Article 100, *National Electrical Code*, shall be permitted to use, handle, install or repair electrical systems or facilities within any area classed as "Hazardous."

5-16.2 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.

5-16.3 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.

5-16.4 When electrical equipment is installed in a location which is classified as both Hazardous and Damp, the construction shall include approved methods of meeting the requirements of both locations.

5-17 Tests.

5-17.1 On completion of the electrical system it 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, *National Electrical Code.*

5-17.2 On all receptacles that are intended to provide shore power to boats, a polarity test shall be made and immediate correction of improper polarity performed in the presence of the inspector. Standard polarity connections are as detailed in Section 200-10, *National Electrical Code.*

5-18 Marine Hoists, Railways, Cranes and Monorails.

5-18.1 Motors and controls for marine hoists and railways shall be located above the possibility of flooding by abnormally high water. Wiring and equipment located in an area described herein as a Damp Location shall conform to the requirements of this standard for such locations.

5-18.2 Where cranes or monorails are installed inside buildings for hoisting or transporting vessels or heavy equipment, the power shall be supplied by a system of enclosed trolley busway of the required ampere rating, located parallel to the crane track or monorail and above the level of possible flooding by abnormally high water. Open wire conductors or cable reels for supplying power to any hoist or motor operated on a crane or monorail shall not be used. The trolley busway system shall be of metal enclosed type, with the enclosure properly grounded as described elsewhere herein and protected by overcurrent devices as required by the *National Electrical Code* (Section 610, Part E). The insulating members of the trolley busway system, including those in the trolleys,