NFPA 312

Standard for Fire Protection of Vessels During Construction, Conversion, Repair, and Lay-Up

2006 Edition

NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
An International Codes and Standards Organization

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Standard for

Fire Protection of Vessels During Construction, Conversion, Repair, and Lay-Up

2006 Edition

This edition of NFPA 312, *Standard for Fire Protection of Vessels During Construction, Conversion, Repair, and Lay-Up,* was prepared by the Technical Committee on Shipbuilding, Repair, and Lay-Up and acted on by NFPA at its June Association Technical Meeting held June 6–10, 2005, in Las Vegas, NV. It was issued by the Standards Council on July 29, 2005, with an effective date of August 18, 2005, and supersedes all previous editions.

This edition of NFPA 312 was approved as an American National Standard on August 18, 2005.

Origin and Development of NFPA 312

The first standard on this subject was adopted by NFPA in 1933 on the recommendation of its Marine Committee, predecessor of the Marine Section. The standard was further considered in 1935, 1936, and 1937, and it was finally adopted by the Association in 1938 on the recommendation of the Marine Section Committee on Builders Risk, Repair, and Lay-Up. Editorial changes were made in 1942.

With the reorganization of NFPA marine activities in 1948, responsibility for the standard fell to the Committee on Shipbuilding, Repair, and Lay-Up. Its recommendations were adopted by the Association in 1950 (Parts I and II) and 1951 (Part III), and revised editions were adopted in 1964, 1968, 1976, and 1984.

The 1990 edition of NFPA 312 was a complete revision that incorporated expanded requirements for vessel lay-up and an update of the fire protection requirements for vessels undergoing construction, conversion, and repair.

The 1995 edition consisted of amendments and editorial changes to the 1990 edition.

The 2000 edition consisted of amendments and editorial changes to the 1995 edition.

For the 2006 edition, the entire standard has been revised in accordance with the *Manual of Style for NFPA Technical Committee Documents*. Changes made to OSHA 1915 Subpart P, requirements for fire watch (29 CFR 1915.504), and fixed extinguishing systems (29 CFR 1915.506) have been incorporated into the appropriate sections of the standard.

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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.

Committee Scope: This Committee shall have primary responsibility for documents on safeguarding against the fire and explosion hazards associated with vessels in course of construction, under repair, and during lay-up.

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

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex B. Editorial changes to extracted material consist of revising references to an appropriate division in this document or the inclusion of the document number with the division number when the reference is to the original document. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex B.

Chapter 1 Administration

1.1 Scope.

1.1.1 This standard shall apply to vessels during the course of construction, conversion, repairs, or while laid up.

1.1.2 This standard shall not apply to situations where it is in conflict with or superseded by requirements of any government regulatory agency.

1.2* Purpose. Every reasonable means of preventing fire shall be provided and supplemented by means of detection and protection equipment that permit the prompt discovery, retard the spread, and permit extinguishment of any fire before it has passed the incipient stage.

1.2.1 These fire-fighting methods shall include full coordination and cooperation with municipal fire departments.

1.2.2 Nothing in this document shall be construed as prohibiting the immediate dry-docking of a vessel whose safety is imperiled, as by being in a sinking condition or by being seriously damaged.

1.2.3 In such cases, all necessary precautionary measures shall be taken as soon as practicable.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 10, *Standard for Portable Fire Extinguishers,* 2002 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems,* 2002 edition.

NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work,* 2003 edition.

NFPA 70, *National Electrical Code®,* 2005 edition.

NFPA 306, *Standard for the Control of Gas Hazards on Vessels,* 2003 edition.

NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves,* 2006 edition.

2.3 Other Publication. *Merriam-Webster's Collegiate Dictionary,* 11th edition, Merriam-Webster, Inc., Springfield, MA 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 306, *Standard for the Control of Gas Hazards on Vessels,* 2003 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary,* 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

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

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

3.2.5 Shall. Indicates a mandatory requirement.

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

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3.2.7 Standard. A document, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix or annex, footnote, or fine-print note and are not to be considered a part of the requirements of a standard.

3.3 General Definitions.

3.3.1 Competent Person. A person who is designated in writing by their employer in accordance with 29 CFR 1915.7. [**306,** 2003]

3.3.2 Marine Chemist. The holder of a valid Certificate issued by the National Fire Protection Association in accordance with the "Rules for the Certification and Recertification of Marine Chemists," establishing the person's qualifications to determine whether construction, alteration, repair, or shipbreaking of vessels can be undertaken with safety. Activities of a Marine Chemist are limited to the inspection and certification procedures described in NFPA 306, *Standard for the Control of Gas Hazards on Vessels.*

3.3.3 Responsible Person. A person who, by education or training, has experience in identifying and resolving problems in a specific area.

Chapter 4 Construction, Conversion, and Repair

4.1 Inspection.

4.1.1 General fire safety inspections shall be made by a responsible person representing the shipyard during the entire construction, conversion, or repair period to note and initiate actions to eliminate fire hazards or to implement work procedures to keep these hazards to a minimum.

4.1.2 An inspection of a vessel shall be made by a responsible person representing the shipyard to evaluate potential fire hazards as soon as practicable after the vessel enters a repair yard and before any work is started.

4.1.2.1 The inspection shall be conducted jointly by a representative of the owner of the vessel and a responsible person representing the shipyard.

4.1.2.2 The inspection shall note the following:

(1) Housekeeping conditions, including location of dunnage and trash
(2) Type and amount of cargo aboard
(3) Type, amount, and condition of the vessel's fire protection equipment

4.1.3 The types and approximate amounts of fuel oils and other flammable liquids in all cargo, bunker, deep, settler, and double-bottom tanks shall be determined.

4.1.3.1 The determination shall include all associated piping systems.

4.1.3.2 The information shall be provided by the vessel owner's representative.

4.1.4 The information obtained shall be distributed to the departments responsible for the fire safety of vessels while in the yard and to the various departments involved in construction, conversion, and repair.

4.1.5 Minor Repairs.

4.1.5.1 For minor repairs, the inspection shall be permitted to be limited to the actual working area and adjacent compartments.

4.1.5.2 Supplementary information necessary for fire and explosion prevention shall be obtained.

4.2 Rubbish, Waste Materials, Oil Spills, and General Care.

4.2.1 Work areas shall be kept clean.

4.2.2 All accumulations and particularly combustible rubbish, refuse, and waste materials shall be collected and disposed of as they accumulate.

4.2.3* Uncrating of equipment or working materials shall be accomplished before taking the contents aboard ship.

4.2.4 Protective coverings (e.g., tarpaulins) used to protect machinery and equipment shall be either noncombustible or fire-retardant-approved material.

4.3 Smoking.

4.3.1 Smoking shall not be permitted in designated hazardous areas.

4.3.2 "No Smoking" signs shall be prominently posted in all prohibited areas.

4.4 Storage of Explosives, Flammable Material, and Dangerous Cargo.

4.4.1* The storage of explosive, flammable, or combustible materials, excepting ship's fuel and standard ship's stores in specifically designated spaces, shall not be permitted on or in close proximity to vessels in the course of construction, conversion, or repair.

4.4.2 Vessels carrying explosives or other dangerous cargo such as flammable gases, hazardous chemicals, and flammable liquids, excepting ship's fuel and standard ship's stores in specifically designated spaces, shall not be permitted to enter a repair yard until such materials have been removed.

4.4.3 NFPA 306, *Standard for the Control of Gas Hazards on Vessels,* outlines the circumstances under which exceptions to the requirement in 4.4.2 shall be permitted to be exercised with respect to gas hazards.

4.5 Use of Open-Flame or Spark-Emitting Devices and Fire Watch.

4.5.1 The yard management shall be responsible for ensuring that any hot work or other fire- or spark-producing operations proceed with safety.

4.5.2 Fire Watch.

4.5.2.1 A fire watch shall be posted if during hot work the following can occur:

(1) Slag, weld splatter, or sparks can cause a fire.
(2) Fire-resistant guards or curtains are not used to prevent ignition of combustible materials on or near decks, bulkheads, partitions, or overheads.
(3) Combustible material closer than 35 ft (10.7 m) to the hot work in either the horizontal or vertical direction cannot be removed, protected with flameproof covers, or otherwise shielded with metal or fire-resistant guards or curtains, so that the material is not ignited by the hot work.

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(4) On or near insulation, combustible coatings or sandwich-type construction on either side cannot be shielded, cut back or removed, or the space inerted.
(5) Combustible materials adjacent to the opposite sides of bulkheads, decks, overheads, metal partitions, or of sandwich-type construction can be ignited by conduction or radiation.
(6) The hot work is close enough to cause ignition through heat radiation or conduction on the following:
   (a) Insulated pipes, bulkheads, decks, partitions, or overheads
   (b) Combustible materials and/or coatings
(7) The hot work is close enough to unprotected combustible pipe or cable runs to cause ignition.
(8) A person recognized by the authority having jurisdiction such as a Marine Chemist, a Coast Guard–authorized person, or a shipyard competent person requires that a fire watch be posted.

4.5.2.2 Persons acting as the fire watch shall meet the following criteria:

(1) Not be assigned other duties
(2) Have a clear view of and immediate access to all areas included in the fire watch
(3) Are able to communicate with workers exposed to hot work, if necessary
(4) Remain in the hot work area for at least 30 minutes after completion of the hot work, unless the employer or the employer's representative surveys the exposed area and makes a determination that there is no further fire hazard
(5) Are trained to detect fires that occur in areas exposed to the hot work
(6) Attempt to extinguish any incipient-stage fires in the hot work area that are within the capability of available equipment and within the fire watch's training qualifications
(7) Alert employees of any fire beyond the incipient stage
(8) If unable to extinguish fire in the areas exposed to the hot work, activate the alarm to start the evacuation procedure in accordance with the fire prevention plan

4.5.3 When it is necessary to remove combustible insulation to a safe distance from the location where welding or burning is to be done, measures shall be taken to prevent sparks or hot slag from entering exposed insulated spaces.

4.5.3.1 Doorways, hatch and tank openings, portholes, and so forth, shall be protected where there is a danger of sparks or hot slag dropping or ricocheting into such openings and igniting combustible materials.

4.5.3.2 Hot work shall not be done on vessels where there is a danger of sparks or hot slag falling into oil slicks on the waters beneath or adjacent to the hot work.

4.5.4 Where hot work processes cannot be safeguarded for making necessary repairs, such repairs shall be accomplished by safer means, such as by drilling, sawing, bolting, or other appropriate methods.

4.5.5 The riveting of furnaces shall not be permitted in confined spaces or in close proximity to combustible materials.

4.5.6 Before any hot work involving riveting, welding, burning, heating, or other fire- or spark-producing operations is started in or on any fuel spaces, including fuel tanks of motor-driven lifeboats, or other areas that contain or have contained flammable or combustible liquids or vapors, including freshly painted areas, certification shall be obtained in accordance with NFPA 306, *Standard for the Control of Gas Hazards on Vessels.*

4.5.7 Welding, Cutting, and Heating Apparatus.

4.5.7.1 Welding, cutting, and heating apparatus shall be stored so as to prevent tampering by unauthorized persons.

4.5.7.2 Oxygen, acetylene, and other flammable gas lines shall be disconnected at the source of supply at the end of each working shift, and the discharge end of the hose shall be removed from below decks or enclosed spaces.

4.5.7.3 During meal periods or other extended non-work periods, lines shall be disconnected at the source of supply.

4.5.7.4 Only oxygen, acetylene, and other flammable gas hoses in good repair shall be used.

4.5.7.5 Where gases are supplied from portable cylinders, the portable cylinders shall not be placed below the main deck, in confined spaces, or under overhanging decks.

4.5.7.6 Portable outlet headers from piped systems shall comply with the provisions of NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work.*

4.5.8 Electric Welding Cables.

4.5.8.1 Electric welding cables shall be inspected frequently, and cables with damaged insulation shall be reinsulated or replaced.

4.5.8.2 Cables shall be triced-up off steel decks, bulkheads, or wherever possible to reduce the possibility of short-circuiting or grounding.

4.5.8.3 Where cables run in areas of personnel or vehicular traffic, protection shall be provided to prevent crushing of the cables.

4.5.8.4 When not in use, electrodes shall be removed from holders and the holders placed so that they do not cause arcing or electrical short circuits.

4.5.9 Vessels in dry dock shall be grounded and bonded.

4.5.10 Heating.

4.5.10.1 Heating for the personal comfort of employees or for other reasons shall be done by means of steam, hot water, or electricity, using the vessel's heating facilities as far as practicable.

4.5.10.2 Salamanders.

4.5.10.2.1 Where salamanders must be used, they shall be mounted on 4 in. (102 mm) legs.

4.5.10.2.2 Salamanders shall be permitted only where someone is constantly in attendance and where adequate ventilation is provided.

4.5.10.2.3 Salamanders shall be located a safe distance from combustible materials and arranged so as to avoid any danger of upset.

4.5.10.2.4 Use of wood kindling fuel shall not be permitted.

4.5.10.2.5 Under no conditions shall compressed air or oxygen be discharged into salamanders to increase the rate of burning.

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4.6 Electrical Installations.

4.6.1 Lighting.

4.6.1.1 The vessel's permanent lighting system shall be used when conditions permit.

4.6.1.2 Electric current to the vessel's lighting system shall be cut off when no work is being done, unless lights are required for inspection and safety purposes, in which case the vessel's lighting system shall remain active.

4.6.1.3 Temporary, portable electric lights shall be used in accordance with NFPA 70, *National Electrical Code*.

4.6.2 Temporary Electrical Installations.

4.6.2.1 Protection and Inspection. Temporary electrical wiring and equipment shall be protected from physical damage and shall be frequently inspected.

4.6.2.1.1 Defects in wiring, fixtures, or equipment of a type likely to create hazardous conditions shall be promptly remedied.

4.6.2.1.2 Circuits serving portable equipment shall be grounded and provided with overcurrent protection and shall be disconnected when not in use.

4.6.2.1.3 When temporary wiring and equipment is needed in hazardous locations, such wiring and equipment shall conform to the provisions of Articles 500 through 503 of NFPA 70, *National Electrical Code*.

4.6.2.2 Installation and Maintenance. Temporary electrical wiring shall be installed and maintained in a safe manner and shall be provided with overcurrent protection.

4.6.2.2.1 Installations in accordance with the provisions of Article 590 of NFPA 70, *National Electrical Code*, shall constitute compliance with the requirement in 4.6.2.2.

4.6.2.2.2 Temporary wiring and lamps shall not be placed in direct contact with combustible materials.

4.6.2.2.3 Makeshift hangers, such as nails, which could damage wiring insulations, shall not be used.

4.6.2.2.4 Where temporary wiring cables are run in areas of personnel or vehicular traffic, they shall be triced-up to prevent physical damage.

4.6.2.2.5 Protective guards shall be installed on all lights that have the possibility of sustaining physical damage.

4.7 Application of Paints and Other Flammable Compounds.

4.7.1 No welding, burning, or other open-flame or spark-producing machines or operations, such as chipping, grinding, and so forth, shall be permitted in close proximity to the application of flammable paints or other flammable compounds.

4.7.2 Ventilation shall be provided to maintain the atmosphere at no more than 10 percent of the lower explosive limit or below the lower limit of toxicity for that particular material, as determined by a certified Marine Chemist.

4.7.3 In all instances, precautions and application instructions of the manufacturer shall be obtained and observed.

4.7.4 Monitoring of these areas shall be carried out by a designated competent person.

4.8 Protection of Doors and Other Openings.

4.8.1 As work advances, so far as practicable, all door openings shall be provided with permanent doors.

4.8.2 In order to minimize the spread of fire, all doors and personnel accesses shall be kept completely closed, except as required by the work.

4.8.3 All openings other than doors and personnel accesses, such as vent ducts, shall be kept closed except as required by the work.

4.8.4 Where doors are kept locked to prevent theft or unauthorized entry, the keys shall be made available to the watch service and fire brigade or shall be located at a designated place aboard where they can be obtained without delay in emergencies by such personnel.

4.9 Staging, Gangways, Access, and Miscellaneous Structures.

4.9.1 Staging other than metal or fire-retardant-treated wood shall be removed as soon as its purpose has been served.

4.9.2 Small buildings on or under shipways shall be restricted to those absolutely necessary and shall be of noncombustible construction.

4.9.3 Gangways, ladders, or other access facilities shall provide unobstructed, safe, and efficient access to the vessel(s) at all times for fire-fighting purposes.

4.9.4 Gangways, ladders, or other access facilities shall be constructed of noncombustible materials.

4.10 Watch Service.

4.10.1 During the outfitting of new vessels or in the case of vessels berthed for construction, conversion, or repair operations, a watch service shall be on duty at all times when work is not in progress.

4.10.2 Watch service shall be familiar with the location of all fire alarms and with the procedures for turning in alarms.

4.10.3* Where central stations are not feasible or are not deemed necessary, a log of inspections and two-way hourly communications shall be maintained.

4.10.4 A watch service shall also be provided on the shipways during earlier stages of construction if a fire hazard exists due to completion of another vessel, combustibility of ways, stocks, and staging, and any significant obstruction or congestion caused by the proximity of adjacent structures.

4.10.5 Before going on duty, the watch service shall be informed of locations where riveting, welding, burning, or other hot work has been performed.

4.10.6 In the event of fire, the watch service for the area in which the fire occurs shall perform the following functions:

(1) Call the fire department
(2) Turn in the alarm to the fire department
(3) Open the gate
(4) Direct the responding fire service to the location of the fire

4.11 Fire Alarm Service.

4.11.1 A means of alerting all persons aboard the vessel shall be provided and clearly identified.

4.11.2 Instructions on what to do in case of fire shall be posted at points of vessel access.

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4.11.3* Telephones.

4.11.3.1 Where central station supervised fire alarm service is not provided, telephones shall be available at convenient locations on or near vessels.

4.11.3.2 Telephones shall be connected to a central office or directly to the public fire department where a knowledgeable person is constantly on duty.

4.11.4 Provisions shall be made for the establishment, marking, and maintenance of fire lanes.

4.11.5 Ways, hulls, and berths shall be prominently identified.

4.11.6 Yard layout diagrams shall be provided for public fire departments whenever the yard is primarily dependent upon those facilities for fire protection.

4.12 Fire Protection Equipment.

4.12.1* Water Pressure. Water for fire-extinguishing purposes shall be available to all parts of the vessel at a pressure acceptable to the authority having jurisdiction.

4.12.2 Fire Hose.

4.12.2.1 One-and-one-half inch (38.1 mm) diameter and 2½ in. (63.5 mm) diameter fire hoses of a length acceptable to the authority having jurisdiction connected to shore hydrants for hose connections shall lead to points on vessels convenient for use in an emergency.

4.12.2.2 Spare hose and nozzles shall be readily available.

4.12.3 Pipe Risers.

4.12.3.1 Temporary pipe risers with hose connections supplied from shore shall be installed at the shipways, and a supply of hose shall be available at such connections on the various decks of vessels under construction.

4.12.3.2 Temporary pipe risers with hose connections supplied from shore shall be installed in the ratio of one for each 200 ft (62 m) of vessel length.

4.12.4 Temporary Fire Hoses at Berths or Dry Docks.

4.12.4.1* While vessels are at berths or in dry dock, temporary fire hoses supplied by shore connections shall be placed aboard the vessels, connected and ready for use, in the ratio of at least one hose for each 200 ft (62 m) of vessel length.

4.12.4.2 Where this arrangement is deemed unnecessary due to the size and type of vessel involved, fire hoses shall be provided at the berthing spaces or dry docks.

4.12.5 Fire hose connections or hydrants shall be provided with adapters to permit the connection of shore fire department hose.

4.12.6 On vessels under repair, the vessel's fire system piping, where the system is intact and capable of being used, shall be connected to water supplies from the yard by means of temporary shore-to-ship connections.

4.12.7 Portable Extinguishing Appliances.

4.12.7.1 Approved portable fire-fighting and extinguishing appliances, such as hand extinguishers, in suitable numbers for Class A, Class B, and Class C fires, shall be provided at convenient locations throughout vessels.

4.12.7.2 Portable extinguishers shall be provided and used in accordance with NFPA 10, *Standard for Portable Fire Extinguishers.*

4.12.8 Alternate means shall be available for extinguishing Class A, Class B, and Class C fires that cannot be controlled by the limited capacity of portable hand extinguishers.

4.13* Fire Brigade.

4.13.1 Designated employees shall form the nucleus of a fire brigade and shall be thoroughly drilled in the use of extinguishing equipment provided, including the following:

(1) Laying of fire hoses
(2) Handling of hose streams and special extinguishing equipment
(3) Use of self-contained breathing apparatus

4.13.2 Drills shall be held at least once a month.

4.13.3 Where a shipyard fire department with paid members is maintained or where a public fire department is utilized, the requirements of 4.13.1 and 4.13.2 shall not apply.

4.14 Vessel Stability During Fire Fighting.

4.14.1 After an outbreak of fire, at the first indication of lack of stability, the discharge of fire streams shall be reduced to the minimum necessary to prevent the spread of fire.

4.14.2 Effective means shall be taken to prevent capsizing of the vessel as soon as the extent of list indicates the possibility of diminished stability.

4.14.3 On vessels under repair, the vessel's pumping facilities or a shore substitute shall be in condition and ready to free the bilges of water.

4.14.4 Scuppers leading from all decks below the main deck to the bilge shall be maintained in unobstructed condition except where construction necessitates temporary closure.

4.14.5 Provisions shall be made where practicable for the withdrawal of any vessel in the event that fire makes withdrawal necessary.

4.15 Testing of Fire Protection Equipment.

4.15.1 Water-based fire protection systems shall be tested in accordance with NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.*

4.15.2* Fixed Extinguishing Systems. The following requirements shall be met before any work is done in a space equipped with fixed extinguishing systems:

(1) The systems shall be either physically isolated or have other positive means to prevent the systems' discharge.
(2) Protective measures shall be taken to ensure that all doors, hatches, scuttles, and other exit openings remain working and accessible for escape in the event the systems are activated.
(3) If the systems' activation could result in a positive pressure in the protected spaces, all inward opening doors, hatches, scuttles, and other potential barriers to safe exit shall be removed, locked open, braced, or otherwise secured so that they remain open and accessible for escape.

4.15.3 Additional Requirement for Manual Systems. Before any work is done in a space equipped with fixed extinguishing systems that are only activated manually, all pull stations and other activation stations, whether remote or local, shall be secured either under lock and key or by posting an attendant, so the manual activators cannot be accessed by unauthorized persons.

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4.15.4 Testing a Fixed Extinguishing System. The system shall be physically isolated and all persons not directly involved in testing it shall be evacuated from the protected spaces and affected areas on board any vessel or vessel sections before testing any fixed extinguishing system.

4.15.5 Conducting Maintenance on a Fixed Extinguishing System. Before conducting maintenance on a fixed extinguishing system the system shall be physically isolated.

4.15.6 Fixed Extinguishing System Safety Training.

4.15.6.1 Personnel shall be trained to recognize the system's discharge, evacuation alarms, and appropriate escape routes.

4.15.6.2 Personnel shall be trained to recognize hazards associated with the extinguishing systems and agents, including the dangers of disturbing system components and equipment such as piping, cables, linkages, detection devices, activation devices, and alarm devices.

Chapter 5 Lay-Up

5.1 Application.

5.1.1* This chapter shall apply to all vessels that are declared as laid up by the owner or operator, and that are without a full crew, but with equipment either in operable condition or requiring a minimum of work for restoration to service.

5.1.2 This chapter shall not apply to vessels in a long-term inactive status (mothballed) that require extensive work to return to active service.

5.1.3 All repairs, reconstruction, conversion, and alteration performed during lay-up shall satisfy the requirements of Chapter 4.

5.2* Governmental Authorities. Lay-up locations and procedures shall satisfy the current requirements of the authority having jurisdiction (e.g., Coast Guard Captain of the Port requirements).

5.3* Lay-Up Locations. The following factors shall be considered in choosing a lay-up site:

(1) Sufficient water depth at all tidal stages year-round
(2) Presence of a fire alarm box, telephone, or other reliable means of communication
(3) Freedom from high humidity and very low temperature extremes, which could affect the fire main system
(4)*Arrangement of vessel moorings, singly or in groups, to facilitate vessel movement in case of fire or other emergency
(5) Availability of fenders or camels of ample size positioned alongside at areas of possible or actual contact with other vessels or land structures
(6)*Availability of towing craft and waterborne or land-based fire-fighting assistance, or both
(7) Availability of anchors not already in use for emergency deployment
(8) Arrangement of the vessel's equipment so that personnel can part or slip the anchor chain

5.4 Lay-Up Berths at Dock.

5.4.1 Where the lay-up berth is adjacent to a wharf, pier, or other land-connected structure, it shall be free from exposure to potential fire and explosion hazards and provide ready access for fire-fighting equipment.

5.4.2 Piers shall satisfy the requirements of NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*.

5.4.3 Vessels shall be moored singly at the lay-up berth unless shore-based fire-fighting and salvage equipment is accessible to the outboard nested vessels.

5.5 Vessel Preparation.

5.5.1* Sea Valves. Sea suction for fire mains intended for immediate use shall not be covered and shall be kept clear from fouling.

5.5.2* Escape Preparation. Tow wires (fire warps) shall be secured at the bow and stern of each vessel and laid out through suitable hawse pipes or chocks so that the free end of the wire is accessible to tug boats for towing purposes.

5.6 Power Source.

5.6.1 A source of power shall be available from land, from another vessel, or on the vessel that is sized for lighting, flooding alarms, fire fighting, fire detection systems, and bilge pumping through the ship.

5.6.1.1 The power source shall be maintained and immediately available.

5.6.1.2 The power source shall not be a battery.

5.6.2 Where the service or emergency source of power is a portable generator located on the weather deck, selection and placement shall take into account fire safety considerations of the fuel system, exhaust system, fire-fighting systems, weather protection, electrical installation, and electrical protection devices.

5.7 Planning and Station Bills.

5.7.1 There shall be standard and emergency communication plans between vessel and shore.

5.7.2 There shall be contingency plans for fire fighting, including coordination with local public fire departments, heavy weather, use of tug boats, movement of the vessel, and emergency evacuation of personnel.

5.7.3 A fire station bill shall be conspicuously posted for all personnel on the vessel, and safety observers for each work party shall be identified.

5.7.4 Personnel shall be trained to perform their safety and emergency duties.

5.7.5 Fire control plans showing general arrangements, fire-fighting equipment, including clear indication of which fire extinguishing systems are operational, fire detection systems, ventilation systems, fire-resistant boundaries, and means of escape shall be available in a prominently marked weathertight enclosure at the point of embarkation.

5.8 General Care and Cleanliness.

5.8.1 Cleaning.

5.8.1.1 Vessels that are laid up shall be kept thoroughly clean.

5.8.1.2 Any accumulations, particularly combustible rubbish, refuse, and waste material, shall be collected and disposed of promptly.

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5.8.2 Grease Traps.

5.8.2.1 Galley exhaust grease traps shall be cleaned prior to lay-up.

5.8.2.2 If in use by watch personnel, the traps shall be inspected at least monthly and cleaned as necessary.

5.8.3 Smoking shall not be permitted aboard laid-up vessels except at locations specifically designated and approved as smoking areas.

5.8.4 Protective coverings (e.g., tarpaulins) used to protect machinery and equipment shall be either noncombustible or fire-retardant-approved material.

5.8.5 All liquid and gaseous cargoes shall be off-loaded from the vessel, and all vessels shall be certified in accordance with NFPA 306, *Standard for the Control of Gas Hazards on Vessels*, immediately prior to being laid up, and weekly thereafter, until conditions are stabilized, subject to requirements of the authority having jurisdiction.

5.8.6 Machinery space bilges shall be clear of all debris, oil, and other flammable materials.

5.9 Closure of Ventilation and Other Openings.

5.9.1 All spaces, except those that are sealed, shall be ventilated and accessible for ready inspection.

5.9.2 All cargo and ship's service tanks, double bottom, deep, peak, settling, day, and all other miscellaneous tanks used for the vessel's fuel oil and lubricants shall have their manhole cover plates closed and secured and all exterior traces of oil or lubricants removed.

5.9.3 All vents serving tanks used for the vessel's fuel and lubricants, and all vents serving adjacent cofferdams, shall be fitted with flame screens or flame arresters, as appropriate, and left open.

5.9.4 Except where required for distribution of humidified air, all closures, including fire dampers, but not automatic fire dampers, in ventilation systems shall be closed.

5.9.5 All automatic fire dampers shall be maintained in operating condition.

5.9.6 All ports, doors, and other openings in the vessel's shell or deckhouses and all hatches shall be kept closed, covered, or sealed.

5.9.7 All interior doors shall be kept closed.

5.9.8 Hatches used for ventilation and access to holds shall be permitted to be open.

5.10* Storage of Explosive and Flammable Materials.

5.10.1 Explosives, flammable gases, hazardous chemicals, and flammable liquids, other than ship's fuel, shall not be retained aboard vessels if lay-up exceeds 30 days.

5.10.2 Fuel tanks and systems of auxiliary motor craft shall be maintained full and stabilized.

5.10.3 When fuel is transferred, unless the fueling system is hard piped, the tank, hose, and machinery shall be bonded.

5.11 Temporary Heating Arrangements.

5.11.1 Open-flame heaters shall be prohibited.

5.11.2 Temporary heating sources shall be disconnected when the vessel is unattended.

5.11.3 When heat tracing cable is used in a hazardous area, a ground-fault circuit interrupter shall be used in conjunction with the overcurrent device.

5.12 Temporary Electrical Wiring.

5.12.1 Electrical wiring for temporary use shall comply with the requirements of 4.6.2.

5.12.2 Portable electrical equipment shall be the double insulated type or shall be provided with a grounding conductor in the supply cable.

5.12.3 Portable electrical equipment shall be disconnected when not in use.

5.13 Watch Service.

5.13.1 Watch service shall be maintained whenever the automatic fire detection and alarm system is not functioning.

5.13.2 Watch service shall be established to monitor the vessel's condition and to detect unauthorized access.

5.13.3 Watch service shall be familiar with the location of all fire alarms and procedures for turning in alarms.

5.14 Fire Detection and Fire Alarms.

5.14.1 There shall be a means of alerting all persons aboard the vessel.

5.14.2 Instructions on what to do in case of fire shall be posted at point-of-vessel access.

5.14.3* Vessels shall maintain the capability of two-way voice radio or telephone emergency communication.

5.14.4 If fire detection and fire alarm equipment is installed in lieu of the requirements of Section 5.13, it shall be capable of notifying appropriate personnel aboard and ashore.

5.15 Access. Gangways, ladders, or other access facilities shall be constructed of noncombustible materials and shall provide safe and efficient access to the vessel or vessels for fire-fighting purposes at all times.

5.16 Vessel Stability. The applicable requirements of Section 4.14 shall be satisfied in the event of fire.

5.17 Fire Protection Equipment. Any onboard equipment that is necessary for protection of the vessel shall be maintained in operating condition.

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.2 Many vessels undergoing construction, conversion, or repairs, and vessels laid up in a shipyard or elsewhere are readily vulnerable to fire, due to the quantity and character of combustible materials used in building. Long passageways, unenclosed stairways, hatches, and hoistways facilitate the rapid spread of fire throughout the vessel. Often the location of the vessel is isolated so that private protection is the main source of fire-fighting services. Even where major municipal protection is available, material damage or complete destruction before effective means of extinguishment are brought into action often results from the following:

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(1) Possible delayed response, due either to late discovery of the fire or to the absence of means for quick notification
(2) Lack of special equipment in many municipal fire departments for combating shipboard fires
(3) An unfamiliarity with ship construction due to the transitory nature of the risk

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.2.4 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.4.2.3 If a risk of damage from handling is possible, the consignee can decide that the consignment should be taken aboard the vessel to be uncrated with all crating and packing material to be removed immediately from the vessel.

A.4.4.1 *Explosive materials* include explosives, blasting agents, and detonators that are authorized for transportation by the Department of Transportation or the Department of Defense as explosive materials. A *flammable material* is a combustible that is capable of easily being ignited and rapidly consumed by fire. Flammables may include solids, liquids, or gases exhibiting these qualities. The terms *flammable* and *inflammable* have the same meaning. A *combustible material* is a material that will burn regardless of its autoignition temperature. A flammable liquid has a closed cup flashpoint below 37.8°C (100°F) and a maximum vapor pressure of 2068 Hg (40 psia) at 37.8°C (100°F). A combustible liquid has a closed cup flashpoint at or above 37.8°C (100°F).

A.4.10.3 Two-way hourly communications between the watch service and another knowledgeable person helps to ensure the watch service's safety and the security of the vessel.

A.4.11.3 The use of cellular phones or the most time-effective way of notifying fire authorities is recommended.

A.4.12.1 The minimum nozzle residual pressure should be 60 psi (4.14×10^5 Pa) at 100 gpm (6.3×10^{-3} m^3/sec). The minimum total flow should be 500 gpm (3.15×10^{-2} m^3/sec) for ships approximately 300 ft (93 m) in length, having small interior compartments, such as those on small passenger vessels. The minimum total flow for larger ships that are 2000 ft^2 (186 m^2) in area, or having smaller compartments, should be 1000 gpm (6.3×10^{-2} m^3/sec). Ships, such as cargo ships, having compartments larger than 2000 ft^2 (186 m^2) should have at least 1500 gpm (9.45×10^{-2} m^3/sec) available. Ships having large cargo holds can require higher capacities.

A.4.12.4.1 The fire hoses should be a nominal 1½ in. (38.1 mm) or 2½ in. (63.5 mm) in size, or a combination of both sizes, and of sufficient length so that any part of the vessel can be reached by at least one line.

A.4.13 For further details on industrial fire brigades, consult NFPA 600, *Standard on Industrial Fire Brigades*. For further information on public fire departments that respond to marine fires, consult NFPA 1405, *Guide for Land-Based Fire Fighters Who Respond to Marine Vessel Fires*.

A.4.15.2 There is a risk of exposure to a hazardous atmosphere when fixed extinguishing systems are activated aboard a vessel or vessel section. [Examples of these fixed extinguishing systems include carbon dioxide (CO_2) and halogenated agent suppression systems.]

A.5.1.1 This chapter is primarily intended for large self-propelled vessels, although it is applicable to all other vessels to varying degrees. Where a vessel cannot satisfy a requirement, either because of its design (barges typically do not have fire mains) or because the vessel is not required to have equipment or systems on board (not all vessels are required to have an International Shore Connection), it need not satisfy that requirement.

A.5.2 The vessel's Flag State Administration and the authority having jurisdiction over the lay-up location can require the vessel to continue to satisfy all applicable regulations.

A.5.3 In addition to the fire-related considerations for selecting a site for lay-up, the following general safety guidelines should also be considered:

(1) Protection from open seas and surge
(2) Good holding ground for anchors clear of wrecks, cables, or other obstacles
(3) Clear of known cyclone or tidal wave danger
(4) Clear of open roadstead anchorages or shipping channels
(5) Clear of high velocity or turbulent tidal or river currents
(6) Clear of floating hazards or significant amounts of moving ice
(7) Clear of hazardous shore facilities
(8) Clear of industrial waste discharges

A.5.3(4) The following guidelines should be considered when mooring vessels:

(1) The number, size, arrangement, and condition of the mooring lines should be sufficient to hold the vessel secure, based on the vessel's freeboard and draft.
(2) The extreme climatic, tidal, and current conditions in the area.

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For vessels at anchorage, the size and scope of anchor chain and number and size of anchors should be based on the freeboard, depth of water, type of bottom, and extreme climatic, tidal, and current conditions in the area.

A.5.3(6) The fire risk, proximity to port facilities, and location (relative to the pier or waterway) should be considered when determining the reasonable distance and time for availability of assistance.

A.5.5.1 In the event a vessel is in lay-up in ports or places subject to ice conditions, an alternative means to provide water supply to the vessel's fire mains should be considered.

A.5.5.2 NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*, contains specifications for fire warps.

A.5.10 The terms *flammable* and *inflammable* have the same meaning. The term *flammable liquids* in this instance includes all flammable liquids having a flash point below 100°F (37.8°C), closed cup, and having a vapor pressure not exceeding 40 psi (2068.6 mm Hg) absolute at 100°F (37.8°C).

A.5.14.3 Portable radios or cellular telephones satisfy the requirement in 5.14.3.

Annex B Informational References

B.1 Referenced Publications. The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

B.1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves*, 2006 edition.

NFPA 600, *Standard on Industrial Fire Brigades*, 2005 edition.

NFPA 1405, *Guide for Land-Based Fire Fighters Who Respond to Marine Vessel Fires*, 2001 edition.

B.1.2 Other Publications.

B.1.2.1 U.S. Government Publication. U.S. Government Printing Office, Washington, DC 20402.

Title 29, Code of Federal Regulations, Part 1915, "Shipyard Industry."

B.2 Informational References. The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

B.2.1 ABS Publication. American Bureau of Shipping, ABS Plaza, 16855 Northchase Drive, Houston, TX 77060.

Rules for Survey After Construction, Part 7, Appendix, Section 3, Guide for Lay-Up and for Reactivation of Laid-up Ships, 2004.

B.2.2 U.S. Government Publications. U.S. Government Printing Office, Washington, DC 20402.

Title 33, Code of Federal Regulations, "Navigation and Navigable Waters."

Title 46, Code of Federal Regulations, "Shipping."

Title 49, Code of Federal Regulations, "Transportation."

B.3 References for Extracts in Informational Sections. (Reserved)

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Call goes out for proposals to amend existing document or for recommendations on new document.

▼

Committee meets to act on proposals, to develop its own proposals, and to prepare its report.

▼

Committee votes on proposals by letter ballot. If two-thirds approve, report goes forward. Lacking two-thirds approval, report returns to committee.

▼

Report — *Report on Proposals* (ROP) — is published for public review and comment.

▼

Committee meets to act on each public comment received.

▼

Committee votes on comments by letter ballot. If two-thirds approve, supplementary report goes forward. Lacking two-thirds approval, supplementary report returns to committee.

▼

Supplementary report — *Report on Comments* (ROC) — is published for public review.

▼

NFPA membership meets (Annual or Fall Meeting) and acts on committee report (ROP or ROC).

▼

Committee votes on any amendments to report approved at NFPA Annual or Fall Meeting.

▼

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▼

Standards Council decides, based on all evidence, whether or not to issue standard or to take other action, including upholding any appeals.

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