ANSI/NFPA 312 An American National Standard June 14, 1984

# NFPA 312 Fire Protection of Vessels During Construction, Repair and Lay-Up 1984

National Fire Protection Association Batterymarch Park, Quincy, MA 02269

## NOTICE

All questions or other communications relating to this document should be sent only to NFPA Headquarters, addressed to the attention of the Committee responsible for the document.

For information on the procedures for requesting Technical Committees to issue Formal Interpretations, proposing Tentative Interim Amendments, proposing amendments for Committee consideration, and appeals on matters relating to the content of the document, write to the Secretary, Standards Council, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

A statement, written or oral, that is not processed in accordance with Section 16 of the Regulations Governing Committee Projects shall not be considered the official position of NFPA or any of its Committees and shall not be considered to be, nor be relied upon as, a Formal Interpretation.

Users of this document should consult applicable Federal, State and local laws and regulations. NFPA does not, by the publication of this document, intend to urge action which is not in compliance with applicable laws and this document may not be construed as doing so.

### 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.

NFPA has no power or authority to police or enforce compliance with the contents of this document and any certification of products stating compliance with requirements of this document is made at the peril of the certifier.

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

**NFPA 312-1984**

## 1984 Edition of NFPA 312

This edition of NFPA 312, *Standard for Fire Protection of Vessels During Construction, Repair and Lay-Up*, was prepared by the Technical Committee on Shipbuilding, Repair and Lay-up, released by the Correlating Committee on Marine Fire Protection, and acted on by the National Fire Protection Association, Inc. at its Annual Meeting held May 21-24, 1984 in New Orleans, Louisiana. It was issued by the Standards Council on June 14, 1984, with an effective date of July 5, 1984, and supersedes all previous editions.

The 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 pages on which they appear. These lines are included as an aid to the user in identifying changes from the previous edition.

## Origin and Development of NFPA 312

The first standard on these subjects was adopted by the NFPA in 1933 on recommendation of its Marine Committee, predecessor of the Marine Section. It was further considered in 1935, 1936, and 1937, and was finally adopted by the Association in 1938 on 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. Their recommendations were adopted by the Association in 1950 (Parts I and II), 1951 (Part III), and revised editions were adopted in 1964, 1968, and 1976.

## Committee on Marine Fire Protection

## Correlating Committee

**Robert Loeser,** *Chairman*
Underwriters Laboratories Inc.

**Charles L. Keller, Secretary**
National Fire Protection Assn.
(Nonvoting)

**Joseph J. Cox,** American Inst. of Merchant Shipping
**Edwin M. Hood,** Shipbuilders Council of America
**Warren E. Jackson,** Travelers Insurance Co.
**R. A. Pedersen,** Washington Surveying & Rating Bureau
**Howard Saffer,** Firem(e)n's Fund American Ins. Co.

## Technical Committee on

## Shipbuilding, Repair and Lay-Up

**John S. Rivers,** *Chairman*
Shipbuilders Council of America
Rep. Shipbuilders Council of America

**David E. Ezzell,** Newport News Shipbuilding & Dry Dock Co.
**Tom Glover,** Bethlehem Steel Corp.
Rep. Shipbuilders Council of America
**Clifford E. Jones,** Todd Shipbuilding Corp.
**Edward S. Karlson,** US Maritime Admin.
**David H. Kay,** US Dept. of the Navy
**Donald J. Kerlin,** US Coast Guard
Rep. USCG
**Gerry S. Livieratos,** M & M Protection Consultants
**Basil A. Needham Jr.,** US Dept. of Labor
Rep. OSHA
**Winston A. Smith,** Norfolk Shipbuilding & Dry Dock Corp.
**Elias J. Swerida,** Wall Fire Dept.
Rep. Fire Marshals Assn. of N. America
**John W. VanBrunt,** Bricktown, NJ
**William A. Webb,** Rolf Jensen & Assoc., Inc.

**Alternates**

**John Bruce Ferguson,** Rolf Jensen & Assoc., Inc.
(Alternate to W. A. Webb)
Rep. Rolf Jensen & Assoc.
**Alan L. Schneider,** US Coast Guard
Rep. USCG
(Alternate to D. J. Kerlin)

*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

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

NFPA 312-1984

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

## Chapter 1 Introduction

Due to the quantity and character of combustible materials used in the construction of many vessels, such vessels in course of construction, conversion, during repair *and while laid up* are readily vulnerable to fire. Long passageways, unenclosed stairways, hatches and hoistways facilitate the rapid spread of fire throughout the vessel. The location of the shipyard is frequently so isolated that dependence for fire fighting is mainly on the private protection provided. Even where major municipal protection is available, the possible delayed response due either to lateness in the discovery of the fire or the absence of means for quick notification, lack of special equipment in many municipal fire departments for combating shipboard fires, or an unfamiliarity with ship construction due to the transitory nature of the risk may cause material damage or complete destruction before effective means of extinguishment can be brought into action. It is, therefore, obvious that every reasonable means of preventing fire shall be provided and supplemented by such means of detection and protection equipment as will permit the prompt discovery, retard the spread and permit extinguishment of any fire before it has passed the incipient stage. This includes full coordination and cooperation with municipal fire departments.

**1-1 Scope.** This standard applies to vessels during the course of construction, conversion, repairs, or while laid up. It does not apply to situations where it is in conflict with or superseded by requirements of any government regulatory agency.

**1-1.1 Emergency Exception.** Nothing in this document shall be construed as prohibiting the immediate drydocking of a vessel whose safety is imperiled as by being in a sinking condition or by having been seriously damaged. In such cases, all necessary precautionary measures shall be taken as soon as practicable.

**1-2 Definitions.**

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

NOTE: 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 or procedures, equipment or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization concerned with product evaluations which is in a position to determine compliance with appropriate standards for the current production of listed items.

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

NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The "authority having jurisdiction" should utilize the system employed by the listing organization to identify a listed product.

**Shall.** Indicates a mandatory requirement.

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

## Chapter 2 Construction and Repair

**2-1 Inspection.**

**2-1.1** Regular inspections shall be made by a responsible person representing the shipyard during the entire construction or repair period to note and initiate action to eliminate fire hazards or to implement work procedures to keep these hazards to a minimum.

**2-1.2** As soon as practicable after a vessel enters a repair yard, but before any work is started, an inspection of the vessel shall be made by a yard representative to evaluate the potential fire hazard. It shall be made jointly with a representative of the owner, if available. Such inspection shall note housekeeping conditions, including location of dunnage and trash; the kind and amount of cargo aboard; and the type, amount and condition of the vessel's fire protection equipment.

**2-1.3** 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. Such determination shall include all associated piping systems and any condition changes thereto.

**2-1.4** The information obtained shall be distributed to the departments responsible for the fire safety of vessels while in the yard, and to the various production departments involved.

**2-1.5*** For minor repairs, the inspection may be limited to the actual working area and adjacent compartments. Supplementary information necessary for fire and explosion prevention shall be obtained.

**2-2* Rubbish, Waste Materials, Oil Spills and General Care.**

2-2.1 Work areas shall be kept clean. All accumulations, and particularly combustible rubbish, refuse and waste materials, shall be collected and safely disposed of as they accumulate.

2-2.2 Uncrating of equipment or working materials shall be accomplished before taking the contents aboard a ship unless they can be damaged in handling, in which case the consignment can be taken aboard to be uncrated. All crating and packing material shall be removed immediately to a remote location ashore.

2-2.3 Temporary coverings such as tarpaulins which may be used to protect machinery, equipment, combustible stores or similar materials shall either be of approved noncombustible material or flameproofing.

**2-3 Smoking.** Smoking shall be prohibited in designated hazardous areas. "No Smoking" signs shall be prominently posted in all prohibited areas.

**2-4* Storage of Explosives, Flammable Material and Dangerous Cargo.**

2-4.1* The storage of explosive, highly flammable or combustible materials, excepting ship's fuel and standard ship's stores stowed in certified spaces, shall not be permitted on nor in close proximity to vessels in course of construction or repair.

2-4.2 Vessels carrying explosives or other dangerous cargo such as flammable gases, hazardous chemicals and flammable liquids, but excepting ships' fuel and storage in certified spaces, shall not be permitted to enter a repair yard until such materials have been removed. NFPA 306, *Control of Gas Hazards on Vessels*, outlines the circumstances under which exceptions to this requirement may be exercised with respect to gas hazards.

**2-5* Use of Open Flame or Spark Emitting Devices.**

2-5.1* It shall be the responsibility of yard management to determine that any hot work or other fire or spark producing operations may proceed with safety.

2-5.2 The opposite sides of the bulkheads or decks on which hot work is to be done shall be checked to be certain that there are no combustible materials, painted surfaces, wiring runways, etc., in contact with or in close proximity to such bulkheads or decks, which may be damaged by heat or fire. Where there is any danger of starting fires in the way of hot work, despite the fact that ordinary precautions are employed, a fire watch shall be provided to stand by during such operations with suitable portable fire fighting equipment ready to extinguish any incipient fire that may occur. The employees acting as fire watchmen shall be instructed as to the fire hazards anticipated and how to use the fire extinguishing equipment provided.

2-5.2.1 When it is necessary to remove combustible insulation for a safe distance from the location where welding or burning is to be done, special care shall be taken to prevent sparks or hot slag from entering exposed insulated spaces. Doorways, hatch and tank openings, portholes, etc., shall be protected where there is a danger of sparks or hot slag dropping or ricocheting into such openings and igniting combustible materials. 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.

2-5.2.2* Where hot work processes cannot be properly safeguarded in making necessary repairs, such repairs shall be accomplished by safer means, such as by drilling, sawing, bolting or other appropriate means.

2-5.3 Riveting furnaces shall not be permitted in confined spaces or in close proximity to combustible materials.

2-5.4* Before any hot work involving riveting, welding, burning, heating or other fire or spark producing operations are started in or on any fuel spaces or other areas which contain or have contained flammable or combustible liquids or vapors, certification shall be obtained in accordance with NFPA 306, *Standard for the Control of Gas Hazards on Vessels*.

2-5.5 Equipment such as blow torches, cutting and welding apparatus shall be so stored as to prevent tampering by unauthorized persons. 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 removed from below decks or enclosed spaces. During meal periods or other extended nonwork periods, lines shall be disconnected at the source of supply.

2-5.5.1 Only oxygen, acetylene and other flammable gas hose in good repair shall be used. Where gases are supplied from portable cylinders, the latter shall not be placed below the main deck, in confined spaces or under overhanding decks. Portable outlet headers from piped systems shall comply with the provisions of NFPA 51B, *Fire Prevention in Use of Cutting and Welding Processes*.

2-5.6 Electric welding cables shall be inspected frequently and cables with damaged insulation shall be reinsulated or replaced. Cables shall be triced up off steel decks, bulkheads, etc., wherever possible to reduce the possibility of short-circuiting or grounding. Where cables must be run in areas of personnel or vehicular traffic, suitable protection shall be provided to prevent crushing of the cables. When not in use, electrodes shall be removed from holders and the holders so placed that they will not cause arcing or electrical short circuits.

2-5.7 Vessels in drydock shall be suitably grounded.

2-5.8* 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. Where salamanders must be used, they shall be mounted on 4 in. (.102 m) legs, and shall be permitted only where someone is constantly in attendance. They shall be located a safe distance from combustible materials and so arranged as to avoid any danger of upset. Use of wood kindling fuel shall not be permitted. Under no conditions shall compressed air or oxygen be discharged into salamanders to increase the rate of burning.

2-5.9* Temporary, appropriately worded danger markings or warning signs shall be posted throughout vessels in course of construction or under repair wherever required.

**2-6* Temporary Electrical Installations.**

2-6.1 Electrical wiring and equipment of a temporary nature shall be substantially installed in such manner as to be safe from physical damage and be frequently inspected. Defects in wiring, fixtures, or equipment of a type liable to create dangerous conditions shall be promptly remedied. Portable equipment shall be grounded and provided with overcurrent protection and shall be disconnected when not in use.

2-6.1.1 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*.

2-6.2 Except where lights are required for inspection and safety purposes, electric current to the vessel's lighting system shall be cut off when no work is being done. All electric lines shall be kept triced up off the decks wherever possible.

2-6.3 The vessel's permanent lighting system shall be used when conditions permit.

2-6.4 Where temporary portable electric lights must be used, they shall be in accordance with NFPA 70, *National Electrical Code*.

2-6.5 Temporary electrical wiring shall be installed and maintained in a safe manner and shall be provided with overcurrent protection; installations in accordance with the provisions of Article 305 of NFPA 70, *National Electrical Code*, shall constitute compliance with this requirement. Such wiring and lamps shall not be placed in direct contact with combustible materials. Makeshift hangers, such as nails, which might damage wiring insulations shall not be used. Protective guards shall be installed on all lights subjected to physical damage.

**2-7* Application of Paints and Other Flammable Compounds.**

2-7.1* No welding, burning or other open flames or spark-producing machines or operations such as chipping, grinding, etc., shall be permitted in close proximity to the application of flammable paints or other flammable compounds. Adequate ventilation shall be provided to maintain the atmosphere at not more than 10 percent of the lower explosive limit or below the lower limit of toxicity for that particular material, as determined by a Certificated Marine Chemist. In all instances, precautions and application instructions of the manufacturer shall be obtained and observed. Monitoring of these areas shall be carried out by a designated competent person.

**2-8 Protection to Door Openings.**

2-8.1 As work advances, so far as practicable, all door openings shall be provided with their permanent doors.

2-8.2* In order to minimize the spread of fire, all doors and personnel accesses shall be kept closed except as required by the work. All other openings, such as vent ducts, shall be kept closed wherever practicable.

2-8.3 Where doors are kept locked to prevent theft or unautorized entry, the keys shall be made available to the guard and fire brigade, or shall be located at a designated place aboard where they can be obtained without delay in emergencies by such personnel.

**2-9 Staging and Miscellaneous Structures.**

2-9.1* Staging other than metal or fire retardant treated wood shall be removed as soon as its purpose has been served.

2-9.2 All fire retardant treated wood shall be periodically tested to assure its flame-proof quality.

2-9.3 Small buildings on or under shipways shall be restricted to those absolutely necessary and shall be of noncombustible construction.

**2-10 Watch Service.**

2-10.1* During the outfitting of new vessels, or in the case of vessels berthed for conversion or repair operations, a competent guard shall be on duty at all times when the vessel is unattended.

2-10.2 Where central station systems are not feasible or are not deemed necessary, an approved portable clock system shall be provided on the vessel during the outfitting, repair or conversion period.

2-10.3 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.

2-10.4 Before going on duty, guards shall be informed of locations where riveting, welding, burning or other hot work has been carried on in the vicinity of combustible material during the previous work period. They shall also be advised of the locations of freshly painted areas, tanks containing oil or other hazardous conditions. All such locations shall be inspected during the progress of work and as soon as practicable after work has been stopped. The regular watch force shall be assisted by other competent persons when necessary in order to complete the inspection within a reasonable period. The guards shall be required to give further special attention to these locations during their rounds so as to ensure against the spread of any previously undetected fires.

2-10.5* Guards shall be familiar with the location of all items of fire equipment on vessels, inspect them during their daily tours of inspection, and have a knowledge of their use.

**2-11 Fire Alarm Service.**

2-11.1 A suitable means of alerting all persons aboard the vessel shall be provided and clearly identified. In-

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

2-11.2 Where central station or fire alarm supervised guard service is not provided, telephones shall be available at convenient locations on or near vessels and connected to a central office where someone is constantly on duty.

2-11.3 Provisions shall be made for the establishment, marking and maintenance of proper fire lanes at ways and berths.

2-11.4 Ways, hulls, and berths shall be prominently identified. Yard layout diagrams shall be provided for public fire fighting whenever the yard is primarily dependent upon those facilities for fire protection.

**2-12 Fire Protection Equipment.**

2-12.1* Water with adequate pressure for fire extinguishing purposes shall be available to all parts of vessels in course of construction, conversion, and under repair. One-and-one-half-inch ($3.81 \times 10^{-2}$ m) and 2½-in. ($6.35 \times 10^{-2}$ m) lines of adequate length connected to shore hydrants for hose connections shall lead to points on vessels convenient for use in an emergency. Adequate supplies of spare hose and nozzles shall be readily available. Due regard shall be given to the capacity of existing shore hydrants to assure that an adequate water supply is available.

2-12.2 Temporary pipe risers with hose connections supplied by shore lines 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. These risers shall be installed in the ratio of one for each 200 ft of length of the vessel.

2-12.3 While vessels are at berths or in drydock, temporary hose lines supplied by shore connections shall be placed aboard the vessels connected and ready for use, in the ratio of at least one hose line for each 200 ft (62 m) of length of vessel. Where this may be deemed unnecessary due to the size and type of vessel involved, hose lines shall be provided at the berthing spaces or drydocks.

2-12.4 Hose line connections or hydrants shall be provided with adapters to permit the connection of shore fire department hose.

2-12.5* On vessels under repair, the vessel's fire system piping shall be connected to water supplies from the yard by means of temporary shore to ship connections.

2-12.6* Hose lines or approved portable fire fighting and extinguishing appliances such as hand extinguishers, in suitable numbers for Class A, B, and C fires, shall be provided at convenient locations throughout vessels.

2-12.7 Alternate means shall be available for extinguishing Class A, Class B and Class C fires, which cannot be controlled by the limited capacity of portable hand extinguishers.

**2-13 Fire Brigade.** Designated employees shall form the nucleus of a fire brigade, and shall be thoroughly drilled in the use of extinguishing equipment provided, including the laying of hose lines, the handling of hose streams and special extinguishing equipment, and the use of self-contained breathing apparatus. Drills shall be held at least one a month. For further details, refer to NFPA 27, *Private Fire Brigades*.

*Exception: This does not apply where a shipyard fire department with paid members is maintained.*

**2-14 Vessel Stability During Fire Fighting.**

2-14.1* 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. Effective means to prevent capsizing of the vessel shall be taken as soon as the extent of the flooding indicates there may be danger of lack of stability.

2-14.2 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 whenever it tends to accumulate. Scuppers leading from all decks below the main deck to the bilge shall be maintained free.

2-14.3 Provision shall be made for the withdrawal of any vessel in the event that fire makes withdrawal necessary.

## Chapter 3 Lay-Up

**3-1 Application.** This standard applies to vessels temporarily in an idle status, without a full crew, but with equipment either in operable condition or requiring a minimum of work to restore it to service.

3-1.1 Lay-up locations and procedures shall conform with the current U.S. Coast Guard Captain of the Port requirements.

**3-2 Lay-Up Berth.** Where the lay-up berth is contiguous to a wharf, pier, or other land-connected structure, it shall be free from exposure to potential fire and explosion hazards, provide ready access for fire fighting equipment, and be within convenient proximity of adequate fire fighting facilities and water supply.

3-2.1 The lay-up berth shall have sufficient depth of water at all stages of the tide to permit removal of the vessel in the event of fire.

3-2.2* The wharf or pier shall be in good repair and provided with adequate means for the safe mooring of a vessel.

3-2.3 Ample-sized fenders or camels shall be provided alongside at areas of possible or actual contact with other vessels or land structures.

3-2.4 Vessels shall be moored singly at the lay-up berth unless all necessary arrangements have been made to pro-

vide full access for shore-based fire fighting and salvage equipment to the outboard vessel.

**3-2.5** A fire alarm box, telephone, voice radio or other reliable means of communication shall be readily accessible to each vessel.

**3-2.6** Mooring of vessels, whether singly or in groups, shall be effected in such manner as to facilitate their quick removal in the event of fire. Tow wires shall be secured at the bow and stern of each vessel and paid out through suitable hawse pipes or chocks so that the free end of the wire is readily accessible to tug boats for towing purposes.

**3-2.7** Where vessels are to be laid up some distance from shore facilities, e.g., at anchor, the site shall be chosen with due regard to the availability of adequate fire fighting forces and equipment.

### 3-3 Ground Tackle.

**3-3.1** Vessels in lay-up shall have both anchors available for emergency if they are not already in use.

**3-3.2** Vessels laid up at an anchorage shall maintain a readily accessible means of parting or slipping the chain.

### 3-4 General Care and Cleanliness.

**3-4.1*** Vessels laid up shall be kept thoroughly clean throughout. Any accumulations, particularly combustible rubbish, refuse, and waste material shall be collected and disposed of promptly.

**3-4.2** Protective coverings, such as tarpaulins, which may be used to protect machinery and equipment, shall be either of noncombustible or fire retardant approved material.

**3-4.3** Smoking shall be prohibited aboard laid-up vessels except at locations specifically designated and approved as smoking areas.

**3-4.4** Vessels shall be certified gas free 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 regulatory authorities.

### 3-5 Ventilation — Closure of Openings.

**3-5.1** Holds and bilges shall be ventilated, and accessible for ready inspection.

**3-5.2** All double bottom, deep, peak, and settling tanks used for fuel oil shall have their manhole cover plates closed and secured, and all exterior traces of residual oil removed.

**3-5.3** All fuel tank vents shall be fitted with flame arresters and left open.

**3-5.4** All closures in the ducts of mechanical ventilating systems shall be in the closed position.

**3-5.5** All ports, doors, and other openings in shell or deck houses, and all hatches except those desirable for purposes of ventilation and access to holds, shall be kept closed or covered. All interior doors shall be kept closed.

### 3-6 Storage of Explosive and Flammable Materials.

**3-6.1*** Explosives, flammable gases, hazardous chemicals, and flammable liquids, other than ship's fuel, shall not be retained aboard vessels if the lay-up is intended to exceed 60 days except in accordance with the provisions of 3-7.1.

**3-6.2** Fuel shall be drained from tanks and fuel systems of auxiliary motor craft, and removed from the vessel if lay-up is intended to exceed 60 days.

### 3-7 Temporary Heating Arrangements.

**3-7.1*** Where it is impracticable to provide necessary heat by means other than open flame devices, such equipment shall be of a type acceptable to the authority having jurisdiction and safeguarded to minimize the danger of fire.

**3-7.2** Where oil-burning stoves are used they shall be of a type listed or approved. Fuel storage for such oil stoves shall be in approved safety cans or meeting the requirements of the U.S. Department of Transportation, in drums equipped with hand pump and stored on the open deck.

### 3-8 Temporary Electrical Wiring.

**3-8.1** Electrical wiring for temporary use shall comply with the requirements of 2-6.1.

**3-8.2** All portable electrical equipment shall be grounded and disconnected when not in use.

### 3-9 Fire Protection.

**3-9.1** Watch service for laid-up vessels shall be established to provide necessary surveillance and to protect from unauthorized access.

**3-9.1.1** Watch personnel shall be capable of performing emergency procedures, operating fire protection equipment, and assisting in the removal of the vessel from the lay-up location.

**3-9.1.2** The watch service shall be equipped for and carry out procedures outlined in 2-10.

**3-9.2* Fire Detection Equipment.** Where automatic detection systems are not installed or operable, the requirements of 2-11 shall be observed. Vessels at anchor shall maintain two-way voice radio emergency communication.

**3-9.3 Access.** Gangways, ladders or other facilities providing access to the vessel or vessels for fire fighting purposes shall be available at all times.

**3-9.4 Ship Stability.** In the event of fire, applicable parts of Section 2-14 shall be observed.

## Chapter 4 Mandatory Referenced Publications

**4-1** This chapter lists publications referenced within this document which, in whole or in part, are part of the requirements of this document.

**4-1.1 NFPA Publications.** The following publications are available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

NFPA 51B-1984, *Fire Prevention in Use of Cutting and Welding Processes*

NFPA 70-1984, *National Electrical Code*

NFPA 306-1984, *Control of Gas Hazards on Vessels*

## Appendix A

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

**A-2-1.5** See 29 CFR 1915.13-15 for OSHA regulations dealing with repairs.

**A-2-2** See 29 CFR 1915.91-98 for OSHA regulations dealing with general working conditions.

**A-2-4** See 29 CFR 1915.7-16 for OSHA regulations dealing with requirements for repairs.

**A-2-4.1** Flammable and inflammable have the same meaning. The term "flammable liquids" in this instance includes all flammable and combustible liquids having a flash point below 200°F (93.3°C) closed cup test.

**A-2-5** See 29 CFR 1915.14, 1915.15, 1915.51-57 for OSHA regulations dealing with requirements for hot work.

**A-2-5.1** Special attention is called to the danger of hot work in freshly painted areas, in close proximity to combustible stores or other materials and similar locations. Also see 29 CFR 1915.19-35.

**A-2-5.2.2** See 29 CFR 1915.13 for OSHA regulations dealing with cold work.

**A-2-5.4** Attention is called to the hazards of fuel in the tanks of motor driven life boats.

**A-2-5.8** Attention is called to the need for adequate ventilation in confined spaces where salamanders are used.

**A-2-5.9** Sample wordings of such signs are: Smoking Prohibited; Danger, Fuel Oil; Paint Storage, Positively No Hot Work; Cork Insulation, No Welding or Burning; Carbon Dioxide, Do Not Enter. Also see 29 CFR 1915.16.

**A-2-6** See 29 CFR 1915.35,56 and 92 for OSHA regulations dealing with electrical requirements.

**A-2-7** See 29 CFR 1915.36 for OSHA regulations dealing with flammable liquids.

**A-2-7.1** See 29 CFR 1915.7 for OSHA regulations dealing with competent persons.

**A-2-8.2** Care should be taken that the closing of these openings is not obstructed or prevented by hose or pipe lines, electrical connections or other lines. Provisions for disconnecting such lines should not be considered as a satisfactory alternative.

**A-2-9.1** All combustible staging material should be treated with an approved flame retardant compound to resist ignition from sparks and to retard the spread of fire.

**A-2-10.1** It is recommended that there be installed on the vessel an approved guard supervisory system of watch boxes connected to a central office where guard signals will be received.

**A-2-10.5** Careful selection of guards is emphasized. Alertness, quick reaction, hearing and sense of smell, good eyesight, bodily agility and good health are indispensable requirements for a competent guard.

**A-2-12.1** The minimum nozzle residual pressure should be 60 psi ($4.14 \times 10^5$ Pa) at 100 gpm ($6.3 \times 10^{-3}$ m³/s). The minimum total flow should be 500 gpm ($3.15 \times 10^{-2}$ m³/s) for ships approximately 300 ft (93 m) in length, having small interior compartments such as small passenger vessels. The minimum total flow for larger ships having 2000 sq ft (186 m²) in area or smaller compartments should be 1000 gpm ($6.3 \times 10^{-2}$ m³/s). Ships, such as cargo ships, having compartments larger than 2000 sq ft (186 m²) should have at least 1500 gpm ($9.45 \times 10^{-2}$ m³/s) available. Ships having large cargo holds may require higher capacities. These flows are similar to those used by the U.S. Navy for ships undergoing overhaul. The basis of the recommended values are described in a report entitled "Proposed Revised NAVSEA Standard Items Concerning Fire Protection for Ships While in Overhaul," dated 30 June 1977 prepared for Naval Surface Weapons Center, Dahlgren by Rolf Jensen & Associates, Inc. under Contract No. N00178-75-D-0328, Task No. 009. In summary, the approach was to evaluate the hazard rating of the ships using NFPA 13, *Standard for the Installation of Sprinkler Systems*, hazard ratings of light, ordinary and extra hazard. The water supplies for such hazards were selected from Table 2-2.1(b) of NFPA 13, 1976. Based on tests performed by Factory Mutual Research Corporation, as referenced in the Navy report, the water flow required to extinguish compartment fires using hoselines is approximately double that required by automatic sprinklers. Therefore, the rates selected from NFPA 13 were doubled to achieve the recommended hoseline flow rates. The water flow required to extinguish fires aboard ships in overhaul was determined in a few cases and compared favorably to the recommended rate.

**A-2-12.3** The hose lines should be nominal 1½ in. or 2½ in. in size, or a combination of both sizes, and of sufficient length so that any part of the vessel may be reached by at least one line.

**A-2-12.5** Caution should be used in turning on these water supplies at shore connections until it is determined that the vessel's fire system is intact and will not result in flooding any portion of the vessel.

**A-2-12.6** More detailed information on portable fire extinguishers may be found in NFPA 10, *Standard for the Installation of Portable Fire Extinguishers*.

**A-2-14.1** In locations where carbon dioxide gas is readily available in adequate quantities, this medium of extinguishment should be employed when practicable in order that the vessel's stability not be endangered.

**A-3-2.2** Piers and wharves constructed and protected in accordance with NFPA 87, *Standard for the Construction and Protection of Piers and Wharves*, are recommended for vessel lay-up.

**A-3-4.1** All mattresses, blankets, carpets, and similar combustible materials should either be removed from the vessel or stored on board in ventilated compartments.

**A-3-6.1** 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 test.

**A-3-7.1** The use of temporary or portable open flame heating equipment aboard vessels in lay-up is not recommended.

**A-3-9.2** Vessel's automatic fire detection equipment, where installed and operable, should be arranged to operate an appropriate fire alarm signal.