

NFPA®

1925

**Standard on
Marine Fire-Fighting Vessels**

2018



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NFPA® 1925

Standard on

Marine Fire-Fighting Vessels

2018 Edition

This edition of NFPA 1925, *Standard on Marine Fire-Fighting Vessels*, was prepared by the Technical Committee on Marine Fire Fighting Vessels. It was issued by the Standards Council on November 10, 2017, with an effective date of November 30, 2017, and supersedes all previous editions.

This edition of NFPA 1925 was approved as an American National Standard on November 30, 2017.

Origin and Development of NFPA 1925

This standard resulted from a request by the NFPA Fire Service Training Committee stating that there was a need for a document addressing construction, testing, and operation of marine fire-fighting vessels. The Technical Committee on Marine Fire Fighting Vessels was appointed and began work on developing this document in 1991. The committee met many times during the 1990s to draft the first edition of the standard, which was issued by NFPA in the summer of 1998.

The 2004 edition of NFPA 1925 was a complete revision of the document to comply with the NFPA Manual of Style. Many of the changes in the document are editorial in nature and include updating definitions for consistency with the NFPA *Glossary of Terms*. In addition, the Committee eliminated waterline length as a consideration of the designation of class of firefighting vessel to focus on vessel functionality; operational requirements were streamlined to eliminate those provisions not essential as design considerations by marine fire-fighting vessel designers; and some existing requirements were reworded to state equipment usage in performance language so the requirement would be applicable to the activity being conducted by the designated class of marine fire-fighting vessel.

For the 2008 edition, the committee completely revised the standard to redesignate the marine fire-fighting vessel classifications and capabilities from three to five categories to be consistent with the NIMS DHS Table for Emergency Support Function (ESF) #4, shown in Chapter 5. With this change, the standard included vessels that had been designated as being equipped with fire-fighting capabilities according to the NIMS DHS Table for ESF #4. This effort provided a consistent methodology for defining the capabilities for marine fire-fighting vessels that support resource sharing in mutual aid applications.

Also for the 2008 edition, the committee reorganized and updated the information in the document to make it consistent with current industry design and specification practices. The committee updated the equipment specification listings for each class of marine fire-fighting vessel.

For the 2013 edition, the committee completely reorganized Chapter 6, Fire-Fighting System Capabilities, to remove redundant requirements and assist the user with applying the standard. In addition to updating the definition of *fire-fighting vessel*, the committee also added new definitions for *Category A machinery space* and *net positive suction head*. Extinguishing systems, optical warning devices, installation of navigation equipment, and testing of communication and signaling equipment are some of the other requirements that were updated in this edition of the standard.

For the 2018 edition, a number of editorial corrections have been made. Also, Section 10.6 has been edited to remove specific basic medical and first-aid supplies, instead leaving it to the AHJ to determine what the vessel is required to carry based on its intended use and mission.

Dedication

The Marine Fire Fighting Vessels Committee dedicated the 2004 edition of the standard to the late Timothy Stillman, who was a member of the Committee from its start-up in January 1991 until his death in 2001.

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This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.

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 the design, construction, performance, and operation of marine vessels for fire fighting and related emergency operations.

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NFPA 1925

Standard on

Marine Fire-Fighting Vessels

2018 Edition

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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 C. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. 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 C.

Chapter 1 Administration

1.1 Scope.

1.1.1 This standard shall provide minimum requirements for marine fire-fighting vessels.

1.1.2 This standard shall also provide minimum maintenance and testing requirements for marine fire-fighting vessels.

1.2 Purpose.

1.2.1 The purpose of this standard shall be to provide the minimum requirements for the construction of new marine fire-fighting vessels or for the conversion of existing vessels to become marine fire-fighting vessels.

1.2.2 This standard is not intended to serve as a detailed manufacturing or purchase specification, but it shall be permit-

ted to be referenced in purchase specifications as minimum requirements.

1.2.3 This standard is not intended to serve as a staffing document for marine fire-fighting vessels.

1.3 Application. This standard shall apply to both the construction of new vessels and the conversion of existing vessels for fire-fighting purposes.

1.4 Retroactivity. This standard shall not be retroactive unless an existing vessel is undergoing a major conversion to become a marine fire-fighting vessel.

1.5 Equivalency.

1.5.1 Nothing herein shall be construed as reducing relevant government regulations regarding marine fire-fighting vessels.

1.5.2 Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

1.5.3 The technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.5.4 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

1.6 Units.

1.6.1 In this standard, values for measurement are followed by an equivalent in SI units, but only the first stated value shall be considered as the requirement.

1.6.2 Equivalent values in parentheses shall not be considered as the requirement as these values might be approximate.

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*, 2018 edition.

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*, 2016 edition.

NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*, 2018 edition.

NFPA 72®, *National Fire Alarm and Signaling Code*®, 2016 edition.

NFPA 302, *Fire Protection Standard for Pleasure and Commercial Motor Craft*, 2015 edition.

NFPA 303, *Fire Protection Standard for Marinas and Boatyards*, 2016 edition.

NFPA 720, *Standard for the Installation of Carbon Monoxide (CO) Detection and Warning Equipment*, 2015 edition.

NFPA 1005, *Standard for Professional Qualifications for Marine Fire Fighting for Land-Based Fire Fighters*, 2014 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety, Health, and Wellness Program*, 2018 edition.

NFPA 1931, *Standard for Manufacturer's Design of Fire Department Ground Ladders*, 2015 edition.

NFPA 1961, *Standard on Fire Hose*, 2013 edition.

NFPA 1963, *Standard for Fire Hose Connections*, 2014 edition.
 NFPA 1964, *Standard for Spray Nozzles*, 2018 edition.
 NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*, 2013 edition.
 NFPA 1983, *Standard on Life Safety Rope and Equipment for Emergency Services*, 2017 edition.
 NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*, 2015 edition.

2.3 Other Publications.

2.3.1 ABS Publications. American Bureau of Shipping, 16855 Northchase Drive, Houston, TX 77060.

ABS Guidance Notes on Fire-Fighting Systems, 2005, updated 2015.

ABS Rules for Conditions of Classification - High Speed Craft, 2014.

ABS Rules for Building and Classing Steel Vessels, 2015.

ABS Rules for Building and Classing Steel Vessels for Service on Rivers and Intracoastal Waterways, 2015.

ABS Rules for Building and Classing Steel Vessels Under 90 Meters (295 ft) in Length, 2015.

2.3.2 ABYC Publications. American Boat and Yacht Council, 613 Third Street, Suite 10, Annapolis, MD 21403.

ABYC A-4, *Fire Fighting Equipment*, July 2008.

ABYC A-24, *Carbon Monoxide Detection Systems*, July 2007.

ABYC A-27, *Alternating Current (AC) Generator Sets*, July 2004.

ABYC A-28, *Galvanic Isolators*, 2014.

ABYC A-31, *Battery Chargers and Inverters*, 2013.

ABYC E-2, *Cathodic Protection*, 2013.

ABYC E-10, *Storage Batteries*, July 2011.

ABYC E-11, *Alternating Current (AC) and Direct Current (DC) Electrical Systems on Boats*, July 2012.

ABYC H-2, *Ventilation of Boats Using Gasoline*, 2013.

ABYC H-3, *Windows, Windshields, Exterior Hatches, Doors, Port Lights and Glazing Materials*, July 2014.

ABYC H-24, *Gasoline Fuel Systems*, July 2012.

ABYC H-25, *Portable Gasoline Fuel Systems*, July 2010, reaffirmed 2013.

ABYC H-26, *Powering of Boats*, July 2011.

ABYC H-32, *Ventilation of Boats Using Diesel Fuel*, 2008, reaffirmed 2013.

ABYC H-33, *Diesel Fuel Systems*, 2009.

ABYC H-40, *Anchoring, Mooring, and Lifting*, July 2014.

ABYC P-1, *Installation of Exhaust Systems for Propulsion and Auxiliary Engines*, 2014.

ABYC P-4, *Marine Inboard Engines and Transmissions*, July 2012.

ABYC P-6, *Propeller Shafting Systems*, July 2010.

ABYC P-14, *Mechanical Propulsion Control Systems*, December 2010.

ABYC P-17, *Steering Systems for Outboard, Inboard, Stern-drive, and Water Jet Drive Boats*, July 2013.

ABYC P-18, *Cable over Pulley Steering Systems for Outboard Engines*, July 2013.

ABYC P-21, *Manual Hydraulic Steering Systems*, July 2012.

ABYC P-22, *Steering Wheels*, July 2013.

ABYC P-23, *Steering and Propulsion Controls for Jet Boats*, July 2012.

ABYC P-24, *Electric/Electronic Propulsion Control Systems*, July 2013.

ABYC S-12, *Outboard Motor Transom and Motor Well Dimensions*, July 2010.

ABYC S-30, *Outboard Engine and Related Equipment Weights*, July 2012.

ABYC Standards and Technical Information Reports for Small Craft, July 2012.

2.3.3 ASME Publications. American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.

ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*, 2013.

2.3.4 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM F683, *Standard Practice for Selection and Application of Thermal Insulation for Piping and Machinery*, 2010.

2.3.5 AWS Publications. American Welding Society, 8669 NW 36 Street, Suite #130, Miami, FL 33166-6672.

AWS B2.1/B2.1M, *Specification for Welding Procedure and Performance Qualification*, 2014.

2.3.6 CGA Publications. Compressed Gas Association, 14501 George Carter Way, Suite 103, Chantilly, VA 20151

CGA G-7.1, *Commodity Specification for Air*, 2011.

2.3.7 IMO Publications. International Maritime Organization, 4, Albert Embankment, London, SE1 7SR, United Kingdom.

IMO A 18, Resolution 749, *Code on Intact Stability for All Types of Ships Covered by IMO Instruments*, 1993 edition.

2.3.8 ISO Publications. International Organization for Standardization, ISO Central Secretariat, BIBC II, Chemin de Blandinnet 8, CP 401, 1214 Vernier, Geneva, Switzerland.

ISO/IEC Guide 65, *General requirements for bodies operating product certification systems*, 2012.

ISO 12217-1, *Small Craft — Stability and Buoyancy Assessment and Categorization — Part 1: Non-Sailing Boats of Hull Length Greater Than or Equal to 6 m*, 2013.

ISO/IEC 17020, *General criteria for the operation of various types of bodies performing inspection*, 2012.

▲ **2.3.9 U.S. Government Publications.** U.S. Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

Title 33, Code of Federal Regulations, Parts 1–124, “Navigation Rules,” July 2000.

Title 33, Code of Federal Regulations, Parts 1251–1387, “Federal Water Pollution Control Act,” 2002.

Title 46, Code of Federal Regulations, Parts 24–28 (Subchapter C), “Uninspected Vessels,” Oct. 2001.

Title 46, Code of Federal Regulations, Parts 50–64 (Subchapter F), “Marine Engineering,” Oct. 2001.

Title 46, Code of Federal Regulations, Part 56, “Piping Systems and Appurtenances,” Oct. 2002.

Title 46, Code of Federal Regulations, Part 111, “Electric Systems — General Requirements,” Oct. 2002.

Title 46, Code of Federal Regulations, Part 112, “Emergency Lighting and Power Systems,” Oct. 2002.

Title 46, Code of Federal Regulations, Parts 175–187 (Subchapter T), “Small Passenger Vessels (Under 100 Gross Tons),” 2015.

Title 46, Code of Federal Regulations, Part 197, “Marine Occupational Safety and Health Standards,” Oct. 2015.

Navigation and Vessel Inspection Circular (NVIC) No. 9-97, Change 1, *Guide to Structural Fire Protection*, U.S. Coast Guard, July 2010.

2.3.10 Other Publications.

Merriam-Webster’s Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*, 2016 edition.

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, 2016 edition.

NFPA 58, *Liquefied Petroleum Gas Code*, 2017 edition.

NFPA 70®, *National Electrical Code®*, 2017 edition.

NFPA 302, *Fire Protection Standard for Pleasure and Commercial Motor Craft*, 2015 edition.

NFPA 1405, *Guide for Land-Based Fire Departments That Respond to Marine Vessel Fires*, 2016 edition.

NFPA 1901, *Standard for Automotive Fire Apparatus*, 2016 edition.

NFPA 1906, *Standard for Wildland Fire Apparatus*, 2016 edition.

NFPA 1983, *Standard on Life Safety Rope and Equipment for Emergency Services*, 2017 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.

3.2.7 Standard. An NFPA Standard, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase “standards development process” or “standards development activities,” the term “standards” includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

3.3.1 Acceptance. An agreement between the purchasing authority and the contractor that the terms and conditions of the contract have been met. [1906, 2016]

3.3.2 Acceptance Tests. In marine fire-fighting vessels, tests performed on behalf of the purchaser by the manufacturer’s representative at the time of delivery to determine compliance to the authority having jurisdiction requirements.

3.3.3 Accessible. Capable of being reached for inspection, maintenance, or removal without disturbing the permanent structure.

3.3.3.1 Readily Accessible. Capable of being reached quickly for operation, renewal, or inspections, without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders, and so forth. [70:100]

3.3.4 Accommodation Spaces. Spaces designed for human occupancy as living spaces for persons aboard a vessel.

3.3.5 Anchor. A device designed to engage the bottom of a waterway and, through its resistance to drag, maintain a vessel within a given radius.

3.3.6 Anchor Chocks. See 3.3.16.1.

3.3.7 Anchor Rod. The line connecting an anchor with a vessel.

3.3.8* Anode. A metal that in an electrolyte assumes a more electronegative charge than the one to which it is coupled. (See also 3.3.15, *Cathode*.)

3.3.9 Bilge. The lowest inner part of a ship's hull. [1405, 2016]

3.3.10 Bitt. Any of the deck posts, often found in pairs, around which ropes or cables are wound and held fast.

3.3.11* Bitter End. That end of a rope or cable that is wound around a bitt.

3.3.12 Boarding Ladder. A device used for boarding a vessel from the water, including handles, rails, ladders, steps, or platforms.

3.3.13* Bridge. The vessel's command and control area, usually enclosed, containing the principal helm, navigation systems, communications systems, and monitoring equipment for the vessel's operating systems.

3.3.14 Category A Machinery Space. Spaces and trunks to such spaces that contain either internal combustion machinery used for main propulsion, internal combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of not less than 375 kW, or any oil-fired boiler, oil fuel unit, or oil-fired equipment other than boilers, such as inert gas generators, incinerators, and so forth.

3.3.15* Cathode. A metal that in an electrolyte assumes a more electropositive charge than the one to which it is coupled. (See also 3.3.8, *Anode*.)

3.3.16 Chocks. Usually found on the rail or deck of a vessel, fittings having jaws that serve as fair leads for anchor rode and other lines.

3.3.16.1 Anchor Chocks. Fittings on a deck of a vessel used to stow an anchor when it is not in use.

3.3.17 Class A or Class B Foams. See 3.3.31, Foam.

3.3.18 Cleat. Fitting attached to the vessel used to secure an anchor rode or other line to the vessel.

3.3.19 Close-Off Pressure. The maximum pressure the pump is capable of developing at zero discharge flow.

3.3.20 Convenient Reach. In marine fire-fighting vessels, the ability to operate controls without excessive movement from a fixed position such as a seat or safety harness.

3.3.21 Crew. Anyone associated with the onboard operation of the vessel.

3.3.22 dBA. Decibel, "A" scale.

3.3.23 Deck Rail. See 3.3.52, Life Rail, Deck Rail, or Lifeline.

3.3.24 Dynamic Suction Lift. The sum of the vertical lift and the friction and entrance loss caused by the flow through the suction strainers, sea chest, and piping, expressed in feet (meters).

3.3.25* Eductor. A device that uses the Venturi principle to siphon a liquid in a water stream.

3.3.26* Electrolyte. A liquid in which an electric current is easily conducted.

3.3.27 EMS. Emergency medical services.

3.3.28 Fire Hazard Area.

3.3.28.1* Major Fire Hazard Area. Any compartment, space, or duct where the proximity of combustible materials, flammable liquids, and potential sources of ignition can promote a fire.

3.3.28.2 Minor Fire Hazard Area. Includes accommodation, service, and public spaces where the proximity of combustible materials, flammable liquids, and potential sources of ignitions doesn't promote a fire.

3.3.29 Fire Monitor. See 3.3.58, Monitor.

3.3.30 Fire-Fighting Vessel. Any vessel whose primary mission is fire-fighting and pumping operations, including emergency operations.

3.3.31* Foam. A stable aggregation of bubbles of lower density than oil or water. [11, 2016]

3.3.32 Freeboard. The vertical distance between the sheer and the waterline.

3.3.33 Gallon U.S. Standard. 1 U.S. gal = 0.833 Imperial gal = 231 in.³ = 3.785 L. [58, 2017]

3.3.34 Galvanic Corrosion. The corrosion that occurs at the anode of a galvanic couple caused by the flow of ions between dissimilar metals in an electrolyte and electron flow within the dissimilar metals.

3.3.35 Galvanic Isolator. A device installed in series with the ac grounding (green, or green with yellow stripe) conductor of the shore power cable to block, in effect, the low voltage dc galvanic current flow, yet permit the passage of ac current normally associated with the ac grounding (green, or green with yellow stripe) conductor. [302, 2015]

3.3.36 Galvanically Compatible. Metals that are close to each other in the galvanic series.

3.3.37 GM. Abbreviation of metacentric height. (See also 3.3.57, *Metacentric Height*.)

3.3.38 gpm. Gallons per minute.

3.3.39 Grab Rail. See 3.3.44, Handhold Device or Grab Rail.

3.3.40 Ground. The electrical potential of the earth's surface. The boat's ground is established by a conducting connection (intentional or accidental) with the earth, including any conductive part of the wetted surface of a hull. [302, 2015]

3.3.41 Ground Tackle. A general term for the anchor, anchor rodes, and fittings used for securing a vessel to anchor.

3.3.42 Grounded Conductor. In marine fire-fighting vessels, a current-carrying conductor connected to the side of the electrical source that is intentionally maintained at ground potential.

3.3.43 Grounding Conductor. In marine fire-fighting vessels, a normally non-current-carrying conductor provided to connect the exposed metallic enclosures of electrical equipment to ground for the purpose of minimizing shock hazard to personnel.

3.3.44* Handhold Device or Grab Rail. Any fitting, assembly, or device, other than a lifeline or deck rail, that is intended for grasping with the hand.

3.3.45 Hawse Pipe. A cylindrical or elliptical pipe or casting in a vessel's hull through which the anchor rode runs and within which the anchor shank can be housed.

3.3.46* Helm. The position from which direction and water speed of the vessel are controlled.

3.3.47 Hull Potential Monitor. A dc meter that measures the potential of a metallic hull or metallic hull fittings as compared to a reference electrode.

3.3.48* Impressed Current System. A cathodic protection system that uses an external power source to induce a dc electric current through an electrode (anode) that suppresses galvanic corrosion of the craft's hull.

3.3.49 Inclining Experiment. See 3.3.73, Stability Test (Inclining Experiment).

3.3.50 Inflatable Boat (IB). Any boat that achieves and maintains its intended shape and buoyancy through the medium of inflation.

3.3.50.1 Rigid Hull Inflatable Boat (RHIB). Solid-shaped hull mated with a flexible multicompartiment buoyancy tube(s) at the gunwale.

3.3.51* Jet Drive. A propulsion unit that generates thrust in reaction to a water stream.

3.3.52 Life Rail, Deck Rail, or Lifeline. A single rail or the entire assembly of stanchions, lines, or rails, including hardware, gates, and so forth, surrounding weather decks and designed to prevent falls overboard.

3.3.53 Limber Holes. Holes in hull framing members to permit draining of liquids.

3.3.54 Line. Rope, when in use. [1983, 2017]

3.3.55 Major Conversion. A change in service of the vessel from some other use to use as a marine fire-fighting vessel.

3.3.56 Manufacturer. The person or persons, company, firm, corporation, partnership, or other organization responsible for turning raw materials or components into a finished product. [1901, 2016]

3.3.57 Metacentric Height. A geometric point used to determine stability when related to the center of gravity and center of buoyancy.

3.3.58 Monitor. A fixed master stream device, manually or remotely controlled, or both, capable of discharging large volumes of water or foam.

3.3.59 Monitor Panel. A device that is located at a position remote from the system being monitored (usually at the bridge) and that indicates the condition of the system being monitored.

3.3.60 Moorings. Methods of securing a vessel within a given area.

▲ 3.3.61 National Standard Hose Thread (NH). A standard thread that has dimensions for inside and outside fire hose connection screw threads as defined by NFPA 1963.

3.3.62 Net Positive Suction Head (NPSH) (h_{sn}). The total suction head in meters (feet) of liquid absolute, determined at the suction nozzle, and referred to datum, less the vapor pressure of the liquid in meters (feet) absolute. [20, 2016]

3.3.63* Net Pump Pressure. The sum of the discharge pressure and the suction lift converted to psi or kPa when pumping at draft, or the difference between the discharge pressure and the intake pressure when pumping from a hydrant or other source of water under positive pressure. [1901, 2016]

3.3.64 Personal Flotation Device (PFD). A displacement device worn to keep the wearer afloat in water.

3.3.65 psi. Pounds per square inch. [1901, 2016]

3.3.66 Pump Operator's Position. The location from which the pump operator operates the pump. [1901, 2016]

3.3.67 Rigid Hull Inflatable Boat (RHIB). See 3.3.50.1.

3.3.68 rpm. Revolutions per minute.

3.3.69 Sacrificial Anode System. Galvanic corrosion protection that employs zinc, aluminum, or magnesium anodes connected to the vessel's hull that dissolve away over time.

3.3.70 Salvage. The restoration of a distressed vessel to normal condition, usually the removal of water from inside the hull.

3.3.71 Seaworthy. A vessel's capability to perform its mission in adverse sea or weather conditions.

3.3.72 Sheer. Upper edge of hull exterior at the intersection with the deck.

3.3.73 Stability Test (Inclining Experiment). A test to determine the vessel displacement (light ship survey) and the position of the center of gravity both vertical and longitudinal.

3.3.74 Stem. The most forward portion of the hull.

3.3.75 Thimble. A grooved metal reinforcement fitted snugly into an eye splice of rope to reduce chafing and to spread the tensional loads.

3.3.76 Thruster. Controllable device used to assist in maneuvering and positioning the vessel.

3.3.77 Tonnage. A measurement of enclosed volume of a vessel inside of structural frames (1 ton = 100 ft³).

3.3.78* Ventilation. The changing of air within a compartment by natural or mechanical means. [302, 2015]

3.3.79 Weather Deck. Any deck that is exposed to the weather and normally accessible to personnel and that permits walking or moving around outboard of the superstructure.

3.3.80 Windlass. A mechanical device utilized in the recovery of anchor and chain by vessels following anchoring operations.

Chapter 4 Design Considerations

4.1 General. The vessel shall comply with all relevant governmental regulations governing the design, operation, and navigation of vessels.

4.2 Vessel Performance.

4.2.1 General.

4.2.1.1 The overall performance of a marine fire-fighting vessel shall be permitted to be determined after a careful evaluation of all perceived operational requirements.

4.2.1.2 Elements of performance requiring definition shall include, but are not limited to, speed, range, capacity, endurance, and seakeeping capability, as well as the capability of the fire-fighting system(s).

4.2.1.3 The performance criteria shall be permitted to be defined after the completion of a Determination of Needs Study as described in 4.2.2, or equivalent assessment as determined by the AHJ.

4.2.2 Determination of Needs Study. See also Annex B.

4.2.2.1 Prior to the construction of a new marine fire-fighting vessel or the major conversion of a vessel for fire-fighting purposes, a study shall be undertaken to clearly identify the mission and capability requirements of the vessel.

4.2.2.2 Some of the issues that the study shall be permitted to cover are as follows:

- (1) General specifications as follows:
 - (a) Geographical size of the area to be protected by the vessel
 - (b) Nature of the waterfront facilities and vessels to be protected
 - (c) Maximum desirable response times
 - (d) Maximum wake permissible
 - (e) Nature of the marine environment in which the vessel will operate, including mutual aid operations
 - (f) Anticipated future growth in the service area and the service needs from the marine fire-fighting vessel
 - (g) Projected or anticipated years of service
- (2) Crew — The expected number of personnel in the vessel's crew
- (3) Fire-fighting mission requirements as follows:
 - (a) Requirements for supplying shoreside water systems
 - (b) Number of pier fires in the jurisdiction to which marine fire-fighting vessels have responded or would have responded
 - (c) Number of vessel fires in the jurisdiction to which marine fire-fighting vessels have responded or would have responded
 - (d) Number of land fires in the jurisdiction to which marine fire-fighting vessels have responded or would have responded
 - (e) Maximum expected duration of a mission
 - (f) Pumping capacity used or required during previous major fires
 - (g) Maximum pumping capacity to be reasonably expected of a marine fire-fighting vessel
 - (h)* Minimum pumping capacity for expected handline use

- (i) Hose and equipment used or required at previous fires by marine fire-fighting vessels
 - (j) Requirements to remain on station during previous fires in the jurisdiction
 - (k) Self protection such as, but not limited to, heat protection, spray, and CBRN
- (4) Rescue and emergency medical services (EMS) requirements as follows:
 - (a) Number of rescue incidents in the jurisdiction in which marine fire-fighting vessels have been involved
 - (b) Type of rescue missions that the marine fire-fighting vessel could become involved with during service life
- (5) Fire prevention requirements as follows:
 - (a) Building inspection requirements
 - (b) Subpier inspection requirements
 - (c) Hazardous cargo inspection requirements
 - (d) Prefire inspection requirements
- (6) Effect of standards and requirements as follows:
 - (a) NFPA standards
 - (b) U.S. Coast Guard (USCG) requirements
 - (c) American Boat and Yacht Council (ABYC) standards
 - (d) Local insurance considerations

4.2.3 Mission of the Vessel.

4.2.3.1 The mission of the vessel shall be defined as a result of the Determination of Needs Study as determined in accordance with 4.2.2.

4.2.3.2 Where the vessel is used for the sole purpose of fire fighting, it shall meet all the stated objectives of this standard.

4.2.3.3 Where the vessel is assigned additional duties, it shall meet all the objectives of this standard, as well as those for each of the designated special operations.

4.2.4 Vessel Requirements Specification.

4.2.4.1 Based upon the outcome of the Determination of Needs Study, the details of the vessel shall be specified.

4.2.4.2 The services of an experienced professional shall be considered to prepare this document and properly define the vessel.

4.3 Command and Control Spaces.

4.3.1 Helm Control Station.

4.3.1.1 All vessels shall have a field of vision from the helm suitable for safe navigation in all operating conditions.

4.3.1.2 Polarized or tinted windows that would interfere with safe navigation shall be prohibited.

4.3.1.3 Machinery, alarm, and monitoring equipment shall be provided at the primary helm or master control station and be adequate for the safe and proper operation of the vessel.

4.3.2 Machinery Control Stations. Vessels that are not equipped with remote controls for machinery shall have an engine room communication system in accordance with 46 CFR 184, "Vessel Control and Miscellaneous Systems and Equipment."

4.3.3 Fire-Fighting Control Centers.

4.3.3.1 Fire-fighting control centers shall provide control of the fire pump and associated remote control equipment.

4.3.3.2 Fire-fighting control centers shall be located in close proximity to the navigation control center.

4.3.3.3 The control center shall provide maximum visual observation of fire-fighting operations.

4.3.3.4 When the control center is to be used as an incident command center, adequate communications for the incident commander shall be provided.

4.3.3.5 Fire-fighting control stations on Type I through Type IV vessels shall be insulated from heat and protected from spray in accordance with the Determination of Needs Study.

4.4 Construction.

4.4.1 General. Placement of equipment shall allow for its removal from the vessel with minimal disruption of permanently installed structural members, or equipment shall be situated to allow for maintenance and repair.

4.4.2 Materials.

4.4.2.1 All parts of the vessel shall be constructed of materials appropriate for the environment in which the vessel will operate.

4.4.2.2 All construction materials for the vessel and the systems shall be selected to minimize the effects of corrosion.

4.4.3 Fuel Tanks.

4.4.3.1 Diesel fuel systems shall comply with *ABS Rules for Building and Classing Steel Vessels*, for Types I and II and ABYC H-33, *Diesel Fuel Systems*, for Types III, IV, and V.

4.4.3.2 Gasoline fuel systems shall comply with ABYC H-24, *Gasoline Fuel Systems*.

4.4.3.3 Portable fuel tanks shall comply with ABYC H-25, *Portable Gasoline Fuel Systems*.

4.4.3.4 The use of liquid hydrocarbon alternative fuels shall be permitted in accordance with accepted industry practices.

4.4.4 Void Spaces.

4.4.4.1 Access and lightening holes shall be arranged clear of concentrated loads or areas of high stresses.

4.4.4.2 Air and limber holes shall be arranged to eliminate air pockets and to avoid any accumulation of water or other liquids.

4.4.5 Open Decks.

4.4.5.1 Openings in weather decks shall comply with *ABS Rules for Conditions of Classification - High Speed Craft* or ABYC H-3, *Windows, Windshields, Exterior Hatches, Doors, Port Lights and Glazing Materials*.

4.4.5.2 All vessels shall be equipped with freeing ports or drains to provide rapid drainage of water, including fire flow, from the weather deck under all operating conditions.

4.4.6 Machinery Spaces.

4.4.6.1 Within practical limits, machinery spaces shall be designed so that all equipment that requires inspection, adjustment, or maintenance is readily accessible.

4.4.6.2 Within practical limits, all equipment shall be arranged so that it is not damaged by bilge water.

4.4.6.3 Compartments in which flammable gases, acid fumes, and oil vapors can accumulate shall be ventilated to reduce the possibility of explosion.

4.4.6.4 Openings and ventilators shall be arranged to minimize risk of water ingress onto equipment.

4.5 Human Factors Engineering.

Δ 4.5.1 The vessel shall comply with the requirements in NFPA 302; *ABYC Standards and Technical Information Reports for Small Craft*; *ABS Rules for Building and Classing Steel Vessels Under 90 Meters (295 ft) in Length*; 46 CFR 24–28, Subchapter C, “Uninspected Vessels,” or 46 CFR 175–187, Subchapter T, “Small Passenger Vessels (Under 100 Gross Tons),” as appropriate.

4.5.2 Instructions for operation of vessel safety equipment shall be the equipment manufacturers' instructions and shall be adequately posted.

4.5.3 Escape plans, operating instructions, diagrams, safety checklists, and other pertinent data shall be available to those onboard.

N 4.6 Third-Party Certification of Test Results. Where this standard requires the results of tests to be certified by an independent third-party certification organization, that organization shall meet the requirements of this section.

N 4.6.1 All certification shall be performed by a certification organization that is accredited for inspection and testing systems on fire apparatus in accordance with ISO/IEC 17020, *General criteria for the operation of various types of bodies performing inspection*, or ISO/IEC Guide 65, *General requirements for bodies operating product certification systems*.

N 4.6.2 The certification organization shall not be owned or controlled by manufacturers or vendors of the product that is being tested.

N 4.6.3 The certification organization shall be primarily engaged in certification work and shall not have a monetary interest in the product's ultimate profitability.

N 4.6.4 The certification organization shall witness all tests and shall refuse to certify any test results for a system if all components of that system requiring testing do not pass the testing required by this standard.

N 4.6.5 There shall be no conditional, temporary, or partial certification of test results.

N 4.6.6 Appropriate forms or data sheets shall be provided and used during the testing.

N 4.6.7 Programs shall be in place for training, proficiency testing, and performance verification of any staff involved with certification.

N 4.6.8 The certification organization's operating procedures shall provide a mechanism for the manufacturer to appeal decisions. The procedures shall include provisions for the presentation of information from representatives of both sides of a controversy to a designated appeals panel.

Chapter 5 Classifications

5.1* Classifications. Marine fire-fighting vessels shall be classified and equipped in accordance with Table 5.1 for classification of emergency response vessel resources.

5.2 Requirements for Vessel Classification.

Δ 5.2.1 Marine fire-fighting vessels designated as Type I shall meet the following minimum requirements:

- (1) Minimum number of pumps: 2
- (2) Minimum water pumping capacity: 20,000 gpm (80,000 L/min) @ 150 psi (10 bar)
- (3) Foam production in accordance with Chapter 9 of NFPA 11
- (4) Minimum number of generators: 2
- (5) On-station fuel capacity: 48 hours
- (6) Minimum number of monitors: 4
- (7) Minimum number of discharge outlets: 24; 6 [1½ in. (38 mm)]; 10 [2½ in. (65 mm) or larger]; 4 [≥3½ in. (89 mm)]; 4 [5 in. (127 mm)]

Δ 5.2.2 Marine fire-fighting vessels designated as Type II shall meet the following minimum requirements:

- (1) Minimum number of pumps: 2
- (2) Minimum pumping capacity: 10,000 gpm (40,000 L/min) @ 150 psi (10 bar)
- (3) Foam production in accordance with Chapter 9 of NFPA 11
- (4) Minimum number of generators: 2
- (5) On-station fuel capacity: 24 hours
- (6) Minimum number of monitors: 4
- (7) Minimum number of discharge outlets: 8; 3 [≥3½ in. (89 mm)]; 5 [5 in. (127 mm)]

Δ 5.2.3 Marine fire-fighting vessels and special purpose fire-fighting vessels designated as Type III shall meet the following minimum requirements:

- (1) Minimum number of pumps: 2
- (2) Minimum pumping capacity: 4500 gpm (18,000 L/min) @ 150 psi (10 bar)

- (3) Foam production in accordance with Chapter 9 of NFPA 11
- (4) Minimum number of generators: 1 with direct power source
- (5) On-station fuel capacity: 8 hours
- (6) Minimum number of monitors: 4
- (7) Minimum number of discharge outlets: 4; 2 [≥3½ in. (89 mm)]; 2 [5 in. (127 mm)]

Δ 5.2.4 Marine fire-fighting vessels and special purpose fire-fighting vessels designated as Type IV shall meet the following minimum requirements:

- (1) Minimum number of pumps: 1
- (2) Minimum pumping capacity: 1500 gpm (6000 L/min) @ 150 psi (10 bar)
- (3) Foam production in accordance with Chapter 9 of NFPA 11
- (4) On-station fuel capacity: 6 hours
- (5) Minimum number of monitors: 2
- (6) Minimum number of discharge outlets: 2 [≥3½ in. (89 mm)]

5.2.5 Marine fire-fighting vessels and special purpose fire-fighting vessels designated as Type V shall meet the following minimum requirements:

- (1) Minimum number of pumps: 1
- (2) Minimum pumping capacity: 500 gpm (2000 L/min) @ 150 psi (10 bar)
- (3) On-station fuel capacity: 4 hours
- (4) Minimum number of monitors: 1

Chapter 6 Fire-Fighting System Capabilities

6.1 General.

6.1.1 The selection of pumps and design of distribution piping shall be done in consideration of the Determination of Needs Study per 4.2.2 and the following:

- (1) Number, sizes, and types of distribution devices expected to be used singularly or simultaneously
- (2) Pressure required at the inlets of the discharge devices
- (3) Required full-range fire flow

6.1.1.1 Where the fire pumps and distribution piping are used to supply thrusters for station keeping, the fire pump capacity and distribution pipe size shall be increased to permit station keeping without decreasing fire flow capacity.

Table 5.1 Minimum Capabilities of Vessel Classification

Component	Type I	Type II	Type III	Type IV	Type V
Pumps	2	2	2	1	1
Pumping water capacity (gpm)	20,000	10,000	4500	1500	500
Foam production	Per Chapter 9 of NFPA 11	Per Chapter 9 of NFPA 11	Per Chapter 9 of NFPA 11	Per Chapter 9 of NFPA 11	None
Generators	2	2	1 with direct power source	0	0
On-station fuel capacity (hours)	48	24	8	6	4
Monitors	4	4	4	2	1
Discharge outlets	Per 5.2	Per 5.2	Per 5.2	Per 5.2	N/A

N/A: Not applicable.

Note: Additional fire-fighting equipment requirements for all types of vessels are found in Chapter 10.

Shaded text = Revisions. Δ = Text deletions and figure/table revisions. • = Section deletions. N = New material



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6.1.1.2 Where the distribution piping from the fire pumps also supplies the vessel protection systems, the demand for those vessel protection systems shall be added to the fire pump distribution piping to permit simultaneous use without decreasing the fire flow capability.

6.2 System Design.

6.2.1* Fire-fighting piping systems shall be designed for not less than the maximum potential flow rate, cut-off pressure of the pump(s), or relief valve setting of the pump.

6.2.2 The pump suction velocity shall generally not exceed 6.5 ft/sec (2 m/sec), and discharge piping shall generally not exceed 13 ft/sec (4 m/sec) at the design flow rate for each section of pipe.

6.2.3 Recommended flow rates shall be permitted to be exceeded where other aspects of the design could be compromised by fitting larger or heavier pipes and fittings, provided the impact of the higher rates on erosion in piping and fittings is identified and accepted by the owner/operator, and the higher flow resistance does not impair the performance of the system.

6.2.4 Where a common suction or discharge header is connected to more than one pump, the design flow rate in the header shall reflect the combined capacity of all connected pumps operating simultaneously.

6.2.5 Means shall be provided to prevent the pump from overheating with distribution devices closed, such as an overboard discharge.

6.2.6 Where multiple pumps are installed, the failure of any single pump shall not reduce fire flow by more than 50 percent.

6.2.7 Where piping serves multiple pumps, the failure of any piping shall not reduce fire flow by more than 50 percent.

6.2.8 Pump discharge piping shall include a check valve and isolation valve for each pump in a multiple pump system.

6.2.9 Isolation valves shall be installed where necessary for each device or outlet and where necessary for continued operation of the system in case of piping or component failure.

6.2.10 A shutoff valve shall be provided in the supply to each monitor.

6.2.11 Suction Arrangement.

6.2.11.1* The suction arrangements for each pump shall include at least one dedicated sea chest with screened inlet, a valve at the sea chest outlet, and a valved vent to atmosphere.

6.2.11.2 Where pump suctions are arranged in a manifold (sea main), an isolation valve shall be provided at or near the suction inlet of each pump.

6.2.11.3* The open area of the screen shall be at least two times the cross-sectional area of the suction pipe, and the individual openings shall not be larger than the pump manufacturer's maximum particle size.

6.2.11.4 The intakes to all fire pumps shall be fitted with a means of clearing while the vessel is afloat.

6.2.12 System Pressure Ratings and Control.

6.2.12.1 Fire-fighting pump discharge piping shall be designed for a working pressure not less than the maximum cut-off pressure of the pump(s) fitted, except as noted in 6.2.12.3 and 6.2.12.4.

6.2.12.2 Piping systems shall be designed to avoid water hammer and similar hydraulic shocks within the system during operation by fitting valve operators with controlled opening/closing rates in accordance with 6.3.6.3 and by providing the means to purge air from the piping system at low flow velocities.

6.2.12.3 The use of automatic pressure relief valves in systems shall be permitted where the piping system cannot satisfy 6.2.12.1.

6.2.12.4* Where pressure relief valves are fitted, the discharge(s) shall be to the pump suction or, if discharged outside the marine fire-fighting vessel, the discharge shall be above the waterline and in a position least likely to affect vessel operations or the safety of other vessels or personnel in the vicinity.

6.2.13 Drains.

6.2.13.1 Drains shall be provided to drain all portions of the discharge and distribution piping.

6.2.13.2 A small valved drain line that bypasses each pump check valve shall be provided to permit drainage of the discharge piping.

6.2.14 Flushing. All vessels operating in salt or brackish water shall have a means of flushing the distribution system with fresh water.

6.3 Components and Materials.

6.3.1 General.

6.3.1.1 All components shall have design pressure ratings equal to or greater than the maximum pump pressure or relief valve setting.

6.3.1.2 All piping, fittings, and valves shall be constructed of materials that resist galvanic corrosion.

6.3.1.3 Any components and materials to be used with fire-fighting foams shall be compatible with the type of foam concentrate to be used.

6.3.2 Piping.

6.3.2.1 Where steel pipe is joined by threaded fittings referenced in 6.3.3, the minimum wall thickness shall be in accordance with Schedule 40 for pressures up to 300 psi (20.7 bar).

6.3.2.2 Bending of pipe and tube shall be in accordance with *ABS Rules for Building and Classing Steel Vessels Under 90 Meters (295 ft) in Length*.

6.3.3 Fittings.

6.3.3.1 Threaded fittings shall not be used on pipe larger than 2 in. (50 mm).

6.3.3.2 A one-piece reducing fitting shall be used wherever a change is made in the size of the pipe.