



Standard Test Method for Shipboard Fixed Foam Firefighting Systems¹

This standard is issued under the fixed designation F1994; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers shipboard, fixed (installed) foam/sprinkling firefighting systems.

1.2 Satisfactory completion of these tests indicates functional performance of the fixed foam firefighting system and may be used to demonstrate the system installation's compliance with the design characteristics of the system.

1.3 Tests made in conformity with this test method are intended to demonstrate the installation and operation of an installed, fixed foam firefighting system. As it includes regulatory requirements, this standard addresses those vessels subject to regulations and ship classification rules. However, the methods stated herein are suitable for unregulated commercial vessels, pleasure craft, military vessels, and similar vessels that are not required to meet regulations for firefighting systems.

1.4 Limitations:

1.4.1 International requirements, national regulations, and ship classification rules must be consulted. The following regulatory requirements and classification society rules were considered in the preparation of this test method:

1.4.1.1 International Convention for the Safety of Life at Sea (SOLAS), 1974 SOLAS Convention, 1978 SOLAS Protocol, and the 1981 and 1983 SOLAS Amendments, II-2/8, "Fixed low-expansion foam extinguishing systems in machinery spaces,"

1.4.1.2 U.S. Government regulations included in 46 CFR 76, 46 CFR 95, and 46 CFR 108 as those regulations are written and enforced by the United States Coast Guard, and

1.4.1.3 The American Bureau of Shipping (ABS) *Rules for Building and Classing Steel Vessels*. However, the owner will designate the specific classification society which is to be used to classify a particular vessel.

1.4.2 The requirements, regulations, and rules for a specific design must be selected by the owner based on the planned operating profile for the vessel.

1.4.3 This test method reflects international requirements, U.S. Government regulations, and ABS rules in effect at the time it was prepared, and may not include requirements adopted subsequent to the effective date of this test method.

1.4.4 This test method does not include requirements for the selection, design, installation, and maintenance of foam firefighting systems. It applies to installed systems whose designs meet all applicable international requirements, national regulations, and ship classification rules.

1.5 The values stated in inch-pound units are to be regarded as standard. No other units of measurement are included in this standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 The following documents apply to this test method only to the extent referenced herein. However, they may be further invoked by the ship owner as part of the design requirements for the vessel.

2.2 ASTM Standards:²

A795/A795M Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use

F998 Specification for Centrifugal Pump, Shipboard Use

F1030 Practice for Selection of Valve Operators

F1155 Practice for Selection and Application of Piping System Materials

F1198 Guide for Shipboard Fire Detection Systems

¹ This test method is under the jurisdiction of ASTM Committee F25 on Ships and Marine Technology and is the direct responsibility of Subcommittee F25.07 on General Requirements.

Current edition approved May 1, 2023. Published June 2023. Originally approved in 1999. Last previous edition approved in 2019 as F1994 – 99 (2019)^ε. DOI: 10.1520/F1994-99R23.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- F1333** Specification for Construction of Fire and Foam Station Cabinets
- F1370** Specification for Pressure-Reducing Valves for Water Systems, Shipboard
- F1508** Specification for Angle Style, Pressure Relief Valves for Steam, Gas, and Liquid Services
- F1510** Specification for Rotary Positive Displacement Pumps, Ships Use
- F1547** Guide Listing Relevant Standards and Publications for Commercial Shipbuilding (Withdrawn 2015)³
- 2.3 *Code of Federal Regulations (CFR)*:⁴
- Title 46, Part 76** Fire Protection Equipment, Subpart 76.17, Foam Extinguishing Systems, Details
- Title 46, Part 76, Subpart 76.23** Manual Sprinkling System, Details
- Title 46, Part 95** Fire Protection Equipment, Subpart 95.17, Foam Extinguishing Systems, Details
- Title 46, Part 108** Design and Equipment, Subpart D, Fire Extinguishing Systems, §108.459–§108.477
- 2.4 *ABS Rules for Building and Classing Steel Vessels*:⁵
- Part 4, Section 6** Pumps and Piping Systems
- Part 4, Section 9** Fire Extinguishing Systems
- Part 4, Section 11** Shipboard Automatic and Remote-control Systems
- 5/4B.11** Fire Protection and Fire Extinction
- 2.5 *IACS Documents*:⁶
- Comparable rules also are published by other members of the International Association of Classification Societies
- 2.6 *IMO SOLAS Regulations*:⁷
- SOLAS II-2 Construction – Fire Protection, Fire Detection and Fire Extinction**
- 2.7 *ASME Standard*:⁸
- ASME B16.34** Valves – Flanged, Threaded, and Welding End
- 2.8 *NFPA Publications*:⁹
- NFPA 11** Standard for Low Expansion Foam
- 2.9 *SNAME Bulletins*:¹⁰
- Technical & Research Bulletin 3-39** Guide for Shop and Installation Tests
- Technical & Research Bulletin 3-47** Guide for Sea Trials

3. Terminology

3.1 Refer to **Annex A1** for terminology used in this test method related to fixed foam firefighting system installations and their testing. Actual terminology used for fixed foam firefighting systems may vary depending upon the desires of the owner or system designer, or both.

4. Significance and Use

4.1 This test method is applicable to fixed foam firefighting systems, including foam generation equipment, foam distribution system piping and valves, sprinkler arrangement and operation, hose reel unit operation, and system controls, as those components are included in the system for a particular application.

4.1.1 Foam systems for machinery spaces are tested using those portions of this test method which apply to the installed components. Suitable adaptation of this test method is made for use with systems which do not include all hardware components described herein.

4.1.2 Deck foam systems are tested in accordance with the manufacturer's design criteria.

4.2 This test method demonstrates: satisfactory installation of an entire fixed foam/sprinkling system and its associated controls; and effective operation of portions of the foam distribution system and foam maker sprinkling nozzles for selected zones.

4.2.1 This test method verifies application rates and areas of coverage for each type of discharge device of the fixed foam firefighting system.

4.2.2 The satisfactory operation of the system in the selected zones is a measure of overall system capacity and anticipated operation for emergency use. The test, however, may not be representative of all emergency operating conditions that may vary with changes in the number of zones that are activated simultaneously, the material condition of the distribution and sprinkling components as they are maintained over time, and restoration of the system following its use for testing or actual emergencies.

4.3 Test procedures shall be prepared for the conduct of tests of foam firefighting systems in specific vessels. Those procedures shall be tailored to the system design for the system as installed and operated in each vessel.

4.3.1 Tests accomplished in accordance with approved test procedures may be sufficient to demonstrate that the vessel meets the regulatory and classification requirements for the vessel.

4.3.2 Approval of test procedures by a classification society may be necessary.

4.3.3 Test procedures must state operating parameters and values (for example, flow rate, pressure, time to activate) which define pass/fail criteria for each test.

4.4 Certification of the vessel or classification of the vessel or both by the regulatory bodies may require that tests be witnessed by a marine inspector or surveyor or both who represents both regulatory bodies.

4.5 Interpretation of Results:

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from U.S. Government Printing Office, Superintendent of Documents, 732 N. Capitol St., NW, Washington, DC 20401-0001, <http://www.access.gpo.gov>.

⁵ Available from American Bureau of Shipping (ABS), ABS Plaza, 16855 Northchase Dr., Houston, TX 77060, <http://www.eagle.org>.

⁶ Other IACS members and locations at which their publications are available are identified by Guide **F1547** at Section 4. Publication lists of some IACS members can be found in Guide **F1547**, Section 5.

⁷ *International Convention for the Safety of Life at Sea (SOLAS)* is available from International Maritime Organization (IMO), 4, Albert Embankment, London SE1 7SR, United Kingdom, <http://www.imo.org>.

⁸ Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

⁹ Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, <http://www.nfpa.org>.

¹⁰ Available from Society of Naval Architects and Marine Engineers, 601 Pavonia Ave., Jersey City, NJ 07306.