



Standard Guide for Shipboard Fire Detection Systems¹

This standard is issued under the fixed designation F1198; 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 guide covers the selection, installation, maintenance, and testing of shipboard fire detection systems other than sprinkler systems.

1.2 This guide is intended for use by all persons planning, designing, installing, or using fire alarm systems onboard vessels. As it includes regulatory requirements, this guide addresses those vessels subject to regulations and ship classification rules. However, the principles stated herein are also suitable for unregulated commercial vessels, pleasure craft, military vessels, and similar vessels that are not required to meet regulations for fire detection and alarm systems.

1.3 *Limitations*—This guide does not constitute regulations or ship classification rules, which must be consulted when applicable.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *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.*

1.6 *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 Code of Federal Regulations:²

Title 46, Part 76.25

Title 46, Part 76.30

Title 46, Part 76.33

Title 46, Part 161.002

2.2 NFPA Publications:³

NFPA 72E Standard on Automatic Fire Detectors

2.3 Safety of Life at Sea (SOLAS) Regulations:⁴

SOLAS II-2/13-1

SOLAS II-2/12

3. Terminology

3.1 Definitions:

3.1.1 *accommodation space, n*—those spaces used for public spaces, corridors, lavatories, cabins, bunkrooms, staterooms, offices, hospitals, cinemas, game and hobby rooms, barber shops, pantries containing no cooking appliances, and similar spaces.

3.1.2 *alarm signalling device, n*—an audible or visual device such as a bell, horn, siren, strobe, flashing, or rotating light used to warn of a fire condition.

3.1.3 *annunciator, n*—an audible and visual signalling panel that indicates and displays the alarm, trouble, and power conditions of the fire detection system.

3.1.4 *approved, adj*—acceptable to the organization, office, or individual responsible for accepting equipment, an installation, or a procedure.

3.1.5 *automated machinery space, n*—a space containing machinery that is automated to allow: (a) periodic unattended operation by the crew; and (b) continuous manual supervision by the crew from a central room (enclosed) or remote location.

3.1.6 *control panel, n*—an electrical panel that monitors and controls all of the equipment associated with the fire detection and alarm system.

3.1.7 *control space, n*—an enclosed space within which is located a ship's radio, main navigating equipment, emergency source of power, or the centralized fire recording or fire control equipment, but not including individual pieces of firefighting equipment or firefighting apparatus that must be located in the cargo area.

¹ This guide is under the jurisdiction of ASTM Committee F25 on Ships and Marine Technology and is the direct responsibility of Subcommittee F25.10 on Electrical.

Current edition approved Dec. 1, 2023. Published December 2023. Originally approved in 1989. Last previous edition approved in 2018 as F1198 – 92 (2018)¹. DOI: 10.1520/F1198-92R23.

² Available from U.S. Government Printing Office, Superintendent of Documents, 732 N. Capitol St., NW, Washington, DC 20401-0001, <http://www.access.gpo.gov>.

³ Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, <http://www.nfpa.org>.

⁴ Available from International Maritime Organization (IMO), 4, Albert Embankment, London, SE1 7SR, United Kingdom, <http://www.imo.org>.

3.1.8 *hazardous (classified location), adj*—locations where fire or explosion hazards may exist due to flammable gases or vapors, flammable or combustible liquids, combustible dust, or ignitable fibers or flyings.

3.1.9 *listings, n*—equipment or materials included in a list published by an organization certified to perform product evaluations. This organization maintains periodic inspections of production of the listed equipment or materials. The listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

3.1.10 *machinery spaces of Category A, n*—those spaces and trunks to such spaces which contain: (a) internal combustion machinery used for main propulsion; or (b) 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 500 hp (375 kW); or (c) any oil-fired boiler or oil fuel unit.

3.1.11 *main vertical zones, n*—those sections, the mean length of which does not, in general, exceed 131 ft (40 m) on any one deck, into which the hull, superstructure, and deck houses are required to be divided by fire-resisting bulkheads.

3.1.12 *manually activated fire alarm box, n*—a box containing an electrical switch which, when manually operated, sends an alarm signal to the control panel (referred to as “Manually Operated Call Points” by SOLAS).

3.1.13 *roll on/roll off cargo space, n*—a space not normally subdivided in any way and extending to either a substantial length or the entire length of the ship in which cargo, including packaged cargo, in or on rail or road cars, vehicles (including road or rail tankers), trailers, containers, pallets, or demountable tanks (in or on similar stowage units or other receptacles), can be loaded and unloaded normally in a horizontal direction.

3.1.14 *self restoring, v*—the ability of a device to reset itself automatically after being activated.

3.1.15 *service space, n*—spaces used for galleys, pantries containing cooking appliances, locker rooms, mail rooms, specie rooms, store rooms, workshops other than those forming part of the machinery spaces, and similar spaces, as well as trunks to such spaces.

3.1.16 *special category space, n*—an enclosed space above or below the bulkhead deck intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion, into and from which such vehicles can be driven and to which passengers have access.

3.1.17 *supervised, v*—describes an electronic method of monitoring the electrical continuity of the circuits and devices of a fire detection and alarm system. This is normally accomplished by constantly passing a small current through the circuits and devices.

4. Significance and Use

4.1 The purpose of a shipboard fire detection system is to provide warning so as to reduce the life safety threat from fire and to minimize the fire threat to the operation of the ship. Given that few ships are identical either in size or layout, it

follows that the fire detection system will have to be custom designed accordingly. A well-designed system provides a reasonable substitute to having crew members on constant fire watch in every protected space where a fire might occur.

4.2 The basic function of the fire detection system is to automatically and reliably indicate a fire condition as quickly as is practical and to alert responsible individuals of a fire's existence and location. This system design and application guide addresses the individual steps in the layout of the system and provides an overview of the information needed to design a system.

4.3 The U.S. Coast Guard and the International Convention for the Safety of Life at Sea (SOLAS) regulations have been stated as requirements within this guide. Additional guidelines to assure complete and effective systems or to incorporate good industry practices are stated as recommendations.

DESIGN AND APPLICATION

5. System Types

5.1 Fire detection and alarm systems used on vessels are typically of the following types:

5.1.1 *Electrical Automatic Fire Detection and Alarm Systems*—These systems consist of a control panel, various types of fire detectors, manually actuated fire alarm boxes, audible and visual alarms, and appropriate power supplies. The control panel monitors the fire detection and alarm circuits and generates appropriate signals when an automatic fire detector or manual fire alarm box is activated.

5.1.2 *Manual Fire Alarm Systems*—A similar system without automatic fire detectors is referred to as a manual fire alarm system but is otherwise identical. Operation is initiated by individuals who activate a manually actuated fire alarm box that incorporates an electrical switch. This guide is primarily concerned with electrically operated automatic and manual fire detection and alarm systems.

5.1.3 *Pneumatic Fire Detection Systems*—These systems consist of a closed length of pneumatic tubing attached to a control unit. Air chambers called heat actuated devices (HADs) are often attached to the tubing in the protected area to increase the volume and thus the sensitivity of the system. As temperature builds up in a fire, the air in the tubing expands, moving a diaphragm in the control unit. A small calibrated vent compensates for normal changes in ambient temperature. The diaphragm activates a release mechanism or a set of contacts. Because pneumatic fire detection systems are self-contained (that is, independent of outside sources of power), they are often used to activate small automatic fire extinguishing systems such as are installed in paint lockers and emergency generator enclosures. U.S. Coast Guard Requirements for pneumatic fire detection systems may be found in Title 46, Code of Federal Regulations, Part 76.30.

5.1.4 *Sample Extraction Smoke Detection Systems*—These systems consist of a piping system connected to a control unit with a suction blower. These systems continually draw samples from the protected spaces to the control unit where a light source and photocell monitor the sample for smoke. Sample extraction smoke detection systems are often used in cargo