NFPA 408
Standard for Aircraft Hand Portable Fire Extinguishers

1999 Edition

National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101
An International Codes and Standards Organization

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NFPA 408

Standard for

Aircraft Hand Portable Fire Extinguishers

1999 Edition

This edition of NFPA 408, *Standard for Aircraft Hand Portable Fire Extinguishers,* was prepared by the Technical Committee on Aircraft Rescue and Fire Fighting, and acted on by the National Fire Protection Association, Inc., at its May Meeting held May 17–20, 1999, in Baltimore, MD. It was issued by the Standards Council on July 22, 1999, with an effective date of August 13, 1999, and supersedes all previous editions.

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.

This edition of NFPA 408 was approved as an American National Standard on August 13, 1999.

Origin and Development of NFPA 408

Work on this standard started in 1947 after requests were received by the National Fire Protection Association for recommendations on aircraft hand fire extinguishers. During the intervening years, prior to the adoption of the first draft of this text in 1955 by the Association, a number of proposals were prepared and circulated for comment and criticism. In 1956 a revision was adopted incorporating an appendix on air crew training. Revisions were made in 1964, 1965, 1970, and 1973.

The 1984 document was completely revised to recognize state-of-the-art developments in extinguishing agents and to bring the document into form with the NFPA *Manual of Style.*

The 1989 edition was a reconfirmation of the 1984 edition. The 1994 edition was a partial revision. This edition is a reconfirmation of the 1994 edition.

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NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on aircraft rescue and fire-fighting services and equipment, for procedures for handling aircraft fire emergencies, and for specialized vehicles used to perform these functions at airports, with particular emphasis on saving lives and reducing injuries coincident with aircraft fires following impact or aircraft ground fires. This Committee also shall have responsibility for documents on aircraft hand fire extinguishers and accident prevention and the saving of lives in future aircraft accidents involving fire.

Contents

NFPA 408

Standard for

Aircraft Hand Portable Fire Extinguishers

1999 Edition

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

Information on referenced publications can be found in Chapter 6 and Appendix B.

Chapter 1 Administration

1-1 Scope.

1-1.1 This standard specifies requirements for the type, capacity, rating, number, location, installation, and maintenance of aircraft hand portable fire extinguishers to be provided for the use of flight crew members or other occupants of an aircraft for the control of incipient fires in the areas of aircraft that are accessible during flight.

1-1.2 This standard also includes requirements for training flight crew members in the use of these extinguishers.

1-1.3 This standard does not cover fire detection and fixed fire extinguishing systems installed in an aircraft or fire detection and fire extinguishing systems for the protection of ground maintenance operations.

1-1.4 Specific protection for Class D fires and for fires in hazardous materials is beyond the scope of this standard.

1-2 Purpose.

1-2.1 This standard is intended for use by those responsible for selecting, purchasing, installing, approving, and maintaining aircraft hand portable fire extinguishers and for those responsible for training personnel in their use.

1-2.2* The specific requirements established in this standard are intended for the particular environment of an aircraft where fire extinguishment must be the first priority.

1-2.3* Hand portable fire extinguishers, as specified in NFPA 10, *Standard for Portable Fire Extinguishers*, have the general purpose of serving as first aid fire-fighting appliances. Accordingly, the requirements of Chapters 4 and 5 of NFPA 10 are applicable to the aviation environment and are supplemental to the specific requirements of this standard.

1-3* Definitions.

Aircraft Hand Portable Fire Extinguisher. An approved, portable device that is carried and operated by hand and contains an extinguishing agent that can be expelled under pressure for the purpose of suppressing or extinguishing fire.

Approved.* Acceptable to the authority having jurisdiction.

Authority Having Jurisdiction.* The organization, office, or individual responsible for approving equipment, materials, an installation, or a procedure.

Bar. See Galley.

Buffet. See Galley.

Cargo Aircraft. An aircraft that is configured solely to carry cargo and no personnel other than the flight crew and any additional crew required for the care of the cargo.

Cargo/Baggage Compartment. An enclosed compartment within, or attached to, an aircraft fuselage and separate from the passenger and flight crew areas; it almost always is accessible only from the exterior of the fuselage.

Class A Fires. Fires in ordinary combustible materials, such as wood, cloth, paper, rubber, and many plastics.

Class B Fires. Fires in flammable liquids, oils, greases, tars, oil-based paints, lacquers, and flammable gases.

Class C Fires. Fires that involve energized electrical equipment or wiring.

Class D Fires. Fires in combustible metals, such as magnesium, titanium, zirconium, sodium, lithium, and potassium.

Cockpit. See Flight Deck.

COMBI. An aircraft designed to transport both passengers and cargo on the same level within the fuselage.

Extinguisher(s). See Aircraft Hand Portable Fire Extinguisher.

Flight Crew. Those members of the aircraft crew whose responsibilities include the operation and management of the aircraft flight controls, engine(s), and systems, that is, pilot in command (captain), first officer (co-pilot), second officer (flight engineer), and so forth.

Flight Deck.* The area of the aircraft arranged for use of the pilot and flight crew in operating the aircraft.

Galley. An area of an aircraft that is used for storing, refrigerating, heating, and dispensing food and beverages and that typically includes storage areas for plastic trays, plastic dinnerware utensils, and paper napkins.

Halogenated Agents.* Halogenated agents referenced in this standard are bromotrifluoromethane (Halon 1301), bromochlorodifluoromethane (Halon 1211), and mixtures of Halon 1211 and Halon 1301 (Halon 1211/1301). Approved, listed, and labeled extinguishers containing clean evaporating type HCFC or HFC halogenated replacement agents also can be permitted to be used to comply with the requirements of this standard.

Halon 1211.* A halogenated agent whose chemical name is bromochlorodifluoromethane, $CBrClF_2$, and that is a multipurpose, Class ABC-rated agent effective against flammable liquid fires.

Halon 1301.* A halogenated agent whose chemical name is bromotrifluoromethane, $CBrF_3$, and that is recognized as an agent having Class ABC capability in total flooding systems.

Hand Fire Extinguisher(s). See Aircraft Hand Portable Fire Extinguisher.

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.

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.

Maximum Certificated Occupant Capacity.* The maximum number of persons that can be carried as certified for each specific aircraft model by the authority having jurisdiction.

Passenger Aircraft. An aircraft designed for the primary function of carrying passengers.

Rated/Rating. A numerical value assigned to an extinguisher based on its fire extinguishing capability in accordance with ANSI/UL 711, *Standard for Rating and Fire Testing of Fire Extinguishers.*

Shall. Indicates a mandatory requirement.

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

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

Chapter 2 Types and Capacities

2-1 General.

2-1.1 Hand portable fire extinguishers shall meet or exceed all of the requirements of one of the fire test standards and one of the appropriate performance standards listed in the following subsections.

2-1.2 Hand portable fire extinguishers used to comply with this standard shall be listed and labeled and meet or exceed all the requirements of one of the fire test standards and one of the appropriate performance standards shown below:

(1) Fire Test Standards: ANSI/UL 711, *Standard for Rating and Fire Testing of Fire Extinguishers* and CAN/ULC-S508, *Standard for Rating and Fire Testing of Fire Extinguishers and Class D Extinguishing Media*

(2) Performance Standards

a. Carbon Dioxide Types: ANSI/UL 154, *Standard for Carbon Dioxide Fire Extinguishers,* and CAN/ULC-S503, *Standard for Carbon Dioxide Hand and Wheeled Fire Extinguishers*

b. Dry Chemical Types: ANSI/UL 299, *Standard for Dry Chemical Fire Extinguishers,* and CAN/ULC-S504, *Standard for Dry Chemical and Dry Powder Hand and Wheeled Fire Extinguishers*

c. Water Types: ANSI/UL 626, *Standard for $2^1/_2$ Gallon Stored Pressure Water-Type Fire Extinguishers,* and CAN/ULC-S507, *Standard for 9 Litre Stored Pressure Water Type Fire Extinguishers*

d. Halon Types: ANSI/UL 1093, *Standard for Halogenated Agent Fire Extinguishers,* and CAN/ULC-S512, *Standard for Halogenated Agent Hand and Wheeled Fire Extinguishers*

e. Film-Forming Foam Types: ANSI/UL 8, *Standard for Foam Fire Extinguishers*

2-1.3 Listing and Labeling Organization.

2-1.3.1 Identification of the listing and labeling organization, with ratings and classifications, including the performance standard that the extinguisher meets or exceeds, shall be clearly marked on each extinguisher.

2-1.3.2 An organization that lists, labels, and marks extinguishers used to comply with the requirements of this standard shall utilize a third-party certification program for hand portable fire extinguishers that meets or exceeds the requirements of ANSI/UL 1803, *Standard for Factory Follow-Up on Third Party Certified Portable Fire Extinguishers.*

Exception No. 1: Extinguishers manufactured prior to January 1, 1989.

Exception No. 2: Certification organizations accredited by the Standards Council of Canada.

2-1.4* All aircraft hand portable fire extinguishers shall function properly at temperature ranges from −40°F to 120°F (−40°C to 49°C).

2-1.5* Water extinguishers having a capacity of $1^3/_8$ qt (2 L), and having special approval of the authority having jurisdiction, shall not be required to be labeled and shall comply with 2-1.1, 2-1.2, 2-1.3, and 2-1.4 of this chapter.

2-2 Water.

2-2.1 Water-based extinguishers shall have a minimum rating of 1-A and shall be equipped with either a spray or straight stream nozzle.

2-2.2 Water-based extinguishers shall not be used on Class B, Class C, or Class D fires.

2-2.3 Cargo compartments shall have a water-based extinguisher(s) with a minimum rating of 2-A.

2-3 Halogenated Agents.

2-3.1* Only halogenated agents specified in this standard shall be used in hand portable fire extinguishers in aircraft.

2-3.2 Halon 1211 purchased for recharging extinguishers shall meet the requirements of Military Specification MIL-B-38741.

2-3.3 Halon 1301 purchased for recharging extinguishers shall meet the requirements of Military Specification MIL-M-12218C.

2-3.4* Halon 1211 Extinguishers.

2-3.4.1 Occupied Spaces.

2-3.4.1.1* For occupied spaces on aircraft, Halon 1211 extinguishers shall be not less than $2^1/_2$-lb (1.2-kg) capacity nor more than 5-lb (2.3-kg) capacity. These extinguishers shall have a minimum rating of 5-B:C, shall have not less than an 8-second effective discharge time, shall have not less than a 10-ft (3-m) liquid range, and shall be permitted to be equipped with a discharge hose.

2-3.4.1.2* For occupied spaces on small aircraft only, with a maximum certificated occupant capacity of one to four persons including the pilot, a Halon 1211 extinguisher with a minimum rating of 2-B:C shall be permitted to be used as an option to the Halon 1301 extinguishers specified in Table 3-1.1.

2-3.4.2 For accessible cargo compartments of COMBI aircraft and cargo aircraft, Halon 1211 extinguishers shall be not less than 13-lb (5.9-kg) capacity, and shall have a minimum rating of 2-A: 40-B:C.

2-3.4.3 The total Halon 1211 agent available in all extinguishers in any single compartment, if discharged simultaneously, shall be capable of producing a concentration not greater than 2 percent by volume at 120°F (49°C) in the compartment.

2-4 Carbon Dioxide.

2-4.1 For occupied spaces on aircraft, carbon dioxide (CO_2) extinguishers shall not be used.

2-4.2 For cargo compartments of COMBI aircraft and cargo aircraft, CO_2 extinguishers shall not be used.

2-5 Dry Chemical.

2-5.1* For occupied spaces on aircraft, dry chemical extinguishers shall not be used.

2-5.2 For cargo compartments of COMBI aircraft and cargo aircraft, dry chemical extinguishers shall be not less than 10-lb (4.5-kg) capacity and shall have a minimum rating of 2-A: 40-B:C.

2-6 Dry Powder.

2-6.1* For occupied spaces on aircraft, dry powder extinguishers for Class D fires shall not be used.

2-6.2 For accessible cargo compartments of COMBI aircraft and cargo aircraft, dry powder extinguishers for Class D fires may be provided in addition to required extinguishers specified in 3-2.2 of this standard.

2-7 Other Agents. Hand portable fire extinguishers carrying non-halogenated-type agents that were developed to replace halon shall be listed and labeled.

Chapter 3 Distribution of Extinguishers

3-1 Passenger Aircraft.

3-1.1 Aircraft hand portable fire extinguishers shall be placed in occupied spaces on aircraft as specified in Table 3-1.1.

3-1.2 Where an extinguisher other than a water extinguisher is located within 5 ft (1.5 m) of, and on the same floor level as, a galley opening, an additional extinguisher shall not be required for the galley.

3-1.3 Where distances between extinguishers, as measured by normal aisle travel, exceed 60 ft (18 m), extinguishers in addition to those required by Table 3-1.1 shall be provided so that no travel distance to an extinguisher exceeds 30 ft (9 m).

3-1.4 Where aircraft passenger compartments, galleys, or lounge areas are on a separate level, such compartments or areas shall have extinguishers in accordance with Table 3-1.1.

3-1.5 Extinguishers in passenger compartments shall be readily accessible, mounted for quick removal, and installed on bulkheads wherever possible. Where installation is necessary in overhead storage spaces, extinguishers shall be located so that carry-on luggage cannot interfere with extinguisher accessibility, and extinguisher locations shall be clearly marked and shall be visible to occupants of the compartment.

3-1.6 Personal breathing equipment (PBE) approved and maintained as specified by the authority having jurisdiction shall be provided. The PBE shall be provided within 3 ft (0.9 m) laterally of all hand portable fire extinguishers.

3-2 Cargo Aircraft.

3-2.1 Occupied Spaces on Aircraft. The flight deck of cargo aircraft shall be provided with one Halon 1211 extinguisher.

3-2.2 Cargo Compartment.

3-2.2.1 Where fixed extinguishing systems provide protection for the entire cargo compartment(s), or where the cargo compartment(s) is not accessible during flight, hand portable fire extinguishers shall not be required for the cargo compartment(s).

3-2.2.2* Where fixed extinguishing systems do not provide protection for the entire cargo compartment(s), a minimum of one hand portable fire extinguisher having a minimum capacity of 10 lb (4.5 kg) and a minimum rating of 2-A: 40-B:C shall be provided and shall be equipped with a discharge hose or wand with a minimum length of 12 in. (304 mm).

3-2.2.3 The hand portable fire extinguisher specified in 3-2.2.2 shall be located and accessible inside the cargo compartment at the interior access entry. Any additional hand portable fire extinguishers provided for cargo compartment use shall also be located in the cargo compartment.

3-2.2.4 A self-contained breathing apparatus (SCBA), approved and maintained as specified by the authority having jurisdiction, with a minimum rated service life of 15 minutes and equipped with a full facepiece shall be provided. The SCBA shall be accessible in a clearly marked location outside the cargo compartment positioned adjacent to the access entry point.

3-3 COMBI Aircraft.

3-3.1 Aircraft hand fire extinguishers shall be placed in the flight deck passenger cabin and cargo compartment on aircraft as specified in Table 3-1.1.

3-3.2 Where an extinguisher other than a water extinguisher is located within 5 ft (1.5 m) of, and on the same floor level as, a galley opening, an additional extinguisher shall not be required for the galley.

3-3.3 The minimum number of hand portable fire extinguishers necessary for the cargo compartment is as specified in Table 3-1.1.

3-3.4 Hand portable fire extinguishers shall be placed adjacent to the entrance door of the passenger deck (cargo compartment) and adjacent to the rear exit door of the aircraft.

Table 3-1.1 Distribution of Extinguishers in Occupied Spaces on Aircraft

Maximum Certificated Occupant Capacity	Number of Extinguishers	Type of Extinguisher	Location
1–4 (including pilot)	1	Halon 1301 Halon 1211 optional (See 2-3.4.1.2, 2-3.4.3)	Within reach of seated pilot
5–30	1	Halon 1301 or Halon 1211	Within reach of seated pilot
	1	Halon 1211	Cabin
31–60	1	Halon 1301 or Halon 1211	Flight deck
	2	One water and one Halon 1211	Cabin
	1	Halon 1211	Each galley (see 3-1.2)
61–120	1	Halon 1301 or Halon 1211	Flight deck
	3	One water and two Halon 1211	Cabin
	1	Halon 1211	Each galley (see 3-1.2)
121–200	1	Halon 1301 or Halon 1211	Flight deck
	4	Two water and two Halon 1211	Cabin
	1	Halon 1211	Each galley (see 3-1.2)
201–275	1	Halon 1301 or Halon 1211	Flight deck
	5	Two water and three Halon 1211	Cabin
	1	Halon 1211	Each galley (see 3-1.2)
276–400	1	Halon 1301 or Halon 1211	Flight deck
	8	Four water and four Halon 1211	Cabin
	1	Halon 1211	Each galley (see 3-1.2)
> 400	1	Halon 1301 or Halon 1211	Flight deck
	10	Five water and five Halon 1211	Cabin
	1	Halon 1211	Each galley (see 3-1.2)
COMBI aircraft wide-body	1	Halon 1301 or Halon 1211	Flight deck
	5	Two water and three Halon 1211	Cabin
	1	Halon 1211	Each galley (see 3-1.2)
	4	Halon 1211	Cargo (PAX level)
	2	Water	
COMBI aircraft narrow-body	1	Halon 1301 or Halon 1211	Flight deck
	4	Two water and two Halon 1211	Cabin
	1	Halon 1211	Each galley (see 3-1.2)
	2	Halon 1211	Cargo (PAX level)
	2	Water	

Chapter 4 Inspection, Maintenance, and Hydrostatic Testing

4-1 Preflight Inspection.

4-1.1 Flight crew member(s) shall make a preflight inspection of all extinguishers.

4-1.2 The inspection shall determine that all required extinguishers are provided, ready for use, in the proper location, and properly secured. Where provided, extinguisher pressure gauges shall indicate acceptable pressure, and seals and seal wires shall not be broken.

4-2 Maintenance.

4-2.1 Extinguishers shall be maintained in accordance with Chapter 4 of NFPA 10, *Standard for Portable Fire Extinguishers*, and records shall be kept in accordance with these requirements.

4-2.2 Recharging procedures shall follow the requirements of Chapter 4 of NFPA 10, *Standard for Portable Fire Extinguishers*.

4-2.3 Extinguishers that are out of service for maintenance or recharge shall be replaced with extinguishers having the same agent, rating, and operating procedure.

4-3 Hydrostatic Testing. Extinguisher shells and appurtenant devices such as nozzles, hoses, and pressure cartridges shall be hydrostatically tested in accordance with Chapter 5 of NFPA 10, *Standard for Portable Fire Extinguishers*.

Chapter 5 Flight Crew Training

5-1 General.

5-1.1 Initially, before assignment, and at least annually thereafter, flight crew members shall receive theoretical and practical training in the basics of fire extinguishment. Instruction on location and use of hand portable fire extinguishers on the aircraft for which flight crew members will be qualified shall be provided.

5-1.2 Training shall be conducted by instructors who are knowledgeable of the aircraft environment and experienced in the extinguishment of fire using hand portable fire extinguishers.

5-1.3 Training shall include the following:

(1) Classroom instruction
(2) Practical use of hand portable fire extinguishers
(3) Extinguishment of a hot fire
(4) Movement in a smoke-filled environment
(5) Wearing of personal breathing equipment, within a replica of an aircraft cabin environment. Halon shall not be discharged during training, as per 5-3.3.3.

5-2* Classroom/Fire Scenario Instruction.

5-2.1 Classroom instruction shall be given to flight crews concerning all types of extinguishers discussed in this standard. Classroom instruction shall include the following topics as a minimum:

(1) Chemistry of fire and fire extinguishment
(2) Severity potential of aircraft fires
(3) Types of combustibles available in aircraft
(4) Identification and choice of proper extinguisher
(5) Consequences of misapplication of extinguishers
(6) Relative effectiveness of extinguishers
(7) Inspection requirements
(8) Health and operational safety concerns

5-2.2 Practical Smoke Training. On aircraft types in which it is provided, training shall be given on the use of appropriate personal breathing equipment (PBE) when using an extinguisher in a simulated smoke-filled environment.

5-3 Manipulative Skills Training.

5-3.1 Training shall be administered to flight crews sufficient to have each crew member demonstrate operation and use of hand portable extinguishers.

5-3.2 Training shall be representative of an interior aircraft fire, using the relevant type of hand portable fire extinguishers carried on the aircraft.

5-3.3* Each flight crew member shall demonstrate the knowledge and skill required to select the appropriate hand portable fire extinguisher for various fire scenarios and to properly apply the agent.

5-3.3.1 The overall training plan shall include representative aircraft fires of Class A, B, C, and combined Class A and B fires.

5-3.3.2 Fire scenarios shall include galley, lavatory or closed compartment, flight deck, open cabins, and flammable liquid fires.

5-3.3.3 Extinguishers containing halon shall not be discharged during routine manipulative skills training. Halon agent shall be conserved and can be used only to combat unwanted fires. Suitable substitutes can be used for training. Such substitutes shall be agreed on with the authority having jurisdiction.

5-3.3.4 Any alternative agent that is used shall be approved by the authority having jurisdiction, listed, and correctly labeled.

5-4* COMBI Aircraft.

5-4.1 The following items shall form the basis of the required course of instruction for flight crew involving COMBI aircraft operations:

(1) Explanation of fire risks with COMBI operations
(2) Chemistry of fire
(3) Theory of extinguishing agents
(4) Aircraft layout
(5) Cargo loading requirements
(6) Hazardous cargo consignments
(7) Scale of COMBI fire-fighting equipment *(see Table 3-1.1)*
(8) Designated fire fighter duties
    a. Preflight audit
    b. In-flight inspection
    c. Fire control techniques
    d. Post-fire information feedback
(9) Practical demonstration and use of hand portable fire extinguishers
(10) Practical exercises involving simulated fire situations

5-4.2 The facility used for training flight crews shall be representative of actual fire conditions and include the following:

(1) An enclosed environment in which the trainee can experience the effects of fire and heat
(2) A demonstration of the effectiveness of fire extinguishers when correctly applied to an actual fire
(3) A facility in which to demonstrate an electrical fire
(4) An exercise that includes dressing in the protective clothing and personnel breathing equipment provided onboard the aircraft and entering a simulated smoke-filled environment carrying a hand portable fire extinguisher as carried on the aircraft

5-5 Recurrent Training and Testing.

5-5.1* Recurrent training shall include discussions on recent onboard aircraft fire incidents.

5-5.2 Recurrent training shall be provided at intervals not exceeding 3 years.

Chapter 6 Referenced Publications

6-1 The following documents or portions thereof are referenced within this standard as mandatory requirements and shall be considered part of the requirements of this standard. The edition indicated for each referenced mandatory document is the current edition as of the date of the NFPA issuance of this standard. Some of these mandatory documents might also be referenced in this standard for specific informational purposes and, therefore, are also listed in Appendix B.

6-1.1 NFPA Publication. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 10, *Standard for Portable Fire Extinguishers*, 1998 edition.

6-1.2 Other Publications.

6-1.2.1 UL Publications. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.

ANSI/UL 8, *Standard for Foam Fire Extinguishers*, 1993.

ANSI/UL 154, *Standard for Carbon Dioxide Fire Extinguishers*, 1995.

ANSI/UL 299, *Standard for Dry Chemical Fire Extinguishers*, 1993.

ANSI/UL 626, *Standard for $2^1/_2$ Gallon Stored Pressure Water-Type Fire Extinguishers*, 1993.

ANSI/UL 711, *Standard for Rating and Fire Testing of Fire Extinguishers*, 1990.

ANSI/UL 1093, *Standard for Halogenated Agent Fire Extinguishers*, 1993.

ANSI/UL 1803, *Standard for Factory Follow-up on Third Party Certified Portable Fire Extinguishers*, 1988.

6-1.2.2 ULC Publications. Underwriters Laboratories of Canada, 7 Crouse Road, Scarborough, ONT M1R 3A9.

CAN/ULC-S503, *Standard for Carbon Dioxide Hand and Wheeled Fire Extinguishers*, 1993.

CAN/ULC-S504, *Standard for Dry Chemical and Dry Powder Hand and Wheeled Fire Extinguishers,* 1996.

CAN4-S507, *Standard for 9 Litre Stored Pressure Water Type Fire Extinguishers,* 1996.

CAN/ULC-S508, *Standard for Rating and Fire Testing of Fire Extinguishers and Class D Extinguishing Media,* 1996.

CANULC-8512, *Standard for Halogenated Agent Hand and Wheeled Fire Extinguishers,* 1993.

6-1.2.3 U.S. Government Publications. Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

Military Specification for Halon 1211, *MIL-B-38741.*

Military Specification for Halon 1301, *MIL-M-12218C.*

Appendix A Explanatory Material

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

A-1-2.2 In an aircraft fire, the integrity of the aircraft must be preserved and the flight crew must retain their physiological ability to fly the airplane (e.g., vision and consciousness). The overall threat to life must be held at the lowest possible level.

A-1-2.3 Additional information on the effectiveness and suitability of various aircraft hand portable fire extinguishers can be found in DOT/FAA/CT-82/42, "Study of Hand-Held Fire Extinguishers Aboard Civil Aviation Aircraft," 1982.

A-1-3 European fire class designations are as follows:

(1) Class A — Wood, paper, cloth, and so forth
(2) Class B — Flammable liquids
(3) Class C — Flammable gases
(4) Class D — Metal fires
(5) Class E — Electrical fires

NOTE: European fire extinguisher ratings are not comparable with U.S. or Canadian ratings. In the United Kingdom, the applicable standards are British Standard 5306 — Part 3, *Selection, Installation, and Maintenance of Portable Fire Extinguishers*, and British Standard 5423, *Rating Extinguishers by Fire Tests.*

The classification of fire extinguishers consists of one or more capital letters that indicate the classes of fire on which an extinguisher has been found to be effective. The letters (A and B only) are preceded by a rating number that indicates the relative extinguishing effectiveness.

A-1-3 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A-1-3 Authority Having Jurisdiction. The phrase "authority having jurisdiction" is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A-1-3 Flight Deck. Berths, galleys, and lavatory facilities can be associated with the flight crew compartment but are not included in the term *flight deck*.

A-1-3 Halogenated Agents. Halon 1211 and Halon 1301 are included in the Montreal Protocol on Substances that Deplete the Ozone Layer signed September 16, 1987. The 1992 amendments to the protocol call for a cessation of production of Halon 1211 and Halon 1301 worldwide.

A-1-3 Halon 1211. Due to its relatively high boiling point (+25°F/−4°C), Halon 1211 discharges as an 85 percent liquid stream, offering long agent throw range.

A-1-3 Halon 1301. Halon 1301 offers limited Class A capability when used in hand portable fire extinguishers.

A-1-3 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A-1-3 Maximum Certificated Occupant Capacity. In the United States the authority having jurisdiction is the Federal Aviation Administration.

A-2-1.4 Aircraft hand portable fire extinguishers must perform in an environment substantially more varied and critical than those approved for use in most land surface applications. Design consideration for extinguisher body, valves, fittings, and associated hardware, including mounting brackets, also should include pressure variations, positive and negative accelerations, vibration, corrosion, and ambient temperature variations.

A-2-1.5 In the United States, the authority having jurisdiction is the Federal Aviation Administration. In Europe it is the Joint Aviation Authority, in Canada, Transport Canada.

A-2-3.1 Exposure to decomposed halogenated agents could produce varied central nervous system effects, depending on exposure concentration and time. Halogenated agents also will decompose into more toxic products when subjected to flame or to hot surfaces at approximately 900°F (482°C). See NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*, and NFPA 12B, *Standard on Halon 1211 Fire Extinguishing Systems*, for detailed information.

A-2-3.4 Halon 1211 extinguishers have their greatest effectiveness on Class B and Class C fires. Extinguishers with 9-lb (4-kg) or greater capacity also are rated for Class A fires. Extinguishers with capacity of less than 9 lb (4 kg), although not rated for use on Class A fires, have been shown to be effective in extinguishing surface Class A fires. Detailed information on Halon 1211 agent characteristics, concentration requirements, health hazards, and extinguishing limitations can be found in NFPA 12B, *Standard on Halon 1211 Fire Extinguishing Systems*.

A-2-3.4.1.1 Halon 1211 extinguishers of less than 9-lb (4-kg) capacity are not always furnished with a discharge hose. However, for access to underseat, overhead, and other difficult-to-reach locations, consideration should be given to using extinguishers with a discharge hose of a minimum length of 12 in. (304 mm). Also, the discharge hose is more likely to result in the extinguisher being properly held in an upright position during use.

A-2-3.4.1.2 For occupied spaces on small aircraft where natural state halon concentrations will be approaching allowable limits, Halon 1301 is the halogenated agent of choice for the following reasons:

(a) Halon 1211 decomposes when exposed to flame, producing toxic products of decomposition. Halon 1211 produces some decomposition products that are not produced by Halon 1301 and is therefore also considered more toxic in the decomposed state.

(b) Health and safety advantages associated with similar volume occupied spaces on larger aircraft (flight decks) do not usually exist for the smaller aircraft. These advantages are a forced ventilation system, availability of oxygen masks, and availability of a second individual capable of flying the aircraft.

A-2-5.1 Dry chemical agent causes visibility problems in occupied spaces and potentially severe contamination of aircraft electrical components.

A-2-6.1 Dry powder agent causes visibility problems in occupied spaces and potentially severe contamination of aircraft electrical components.

A-3-2.2.2 The hose or wand will provide effective reach of the contents of the extinguisher to any part of the cargo.

A-5-2 Discussion of health and safety aspects should include hazards and warnings concerning toxicity of combustion products, as well as the effects of short, intermediate, and long-term exposure to the undecomposed agents. See Appendix A of NFPA 12B, *Standard on Halon 1211 Fire Extinguishing Systems*, as appropriate.

A-5-3.3 It is highly recommended that live fire training on representative aircraft fires be conducted for all flight crew members during both initial and recurrent training sessions. Live fire training provides flight crews with psychological conditioning, fire-fighting techniques, and knowledge of extinguishing agent capabilities and limitations under actual fire situations. The live fires used should be the scenarios required in 5-3.3.2.

A-5-4 On completion of the course, flight deck crews and flight attendants should be confident about the procedures and practical use of equipment while working under conditions of smoke and heat. Numbers of personnel receiving training at any one time should be limited in order to ensure that each individual receives adequate practical experience and that his or her performance can be assessed by instructional staff.

A-5-5.1 These discussions are particularly important when crews are assigned to more than one aircraft type.

Appendix B Referenced Publications

B-1 The following documents or portions thereof are referenced within this standard for informational purposes only and are thus not considered part of the requirements of this standard unless also listed in Chapter 6. The edition indicated here for each reference is the current edition as of the date of the NFPA issuance of this standard.