

NFPA 408
Standard for
Aircraft Hand
Portable Fire
Extinguishers
1994 Edition



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The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

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NFPA 408
Standard for
Aircraft Hand Portable Fire Extinguishers
1994 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 Annual Meeting held May 16-18, 1994, in San Francisco, CA. It was issued by the Standards Council on July 14, 1994, with an effective date of August 5, 1994, and supersedes all previous editions.

The 1994 edition of this document has been approved by the American National Standards Institute.

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. This edition is a complete revision and was developed by a task group made up of the following individuals:

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This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in the membership may have occurred.

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

Committee Scope: This Committee shall have primary responsibility for documents on aircraft rescue and fire-fighting services and equipment, 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. The Committee shall develop aircraft fire investigation procedures as an aid to accident prevention and the saving of lives in future aircraft accidents involving fire.

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates explanatory material on that paragraph 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 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, *Standard for Portable Fire Extinguishers*, 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 carried and operated by hand containing an extinguishing agent that can be expelled under pressure for the purpose of suppressing or extinguishing fire.

Approved. Acceptable to the authority having jurisdiction.

NOTE: The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installa-

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

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

NOTE: 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.

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 Fire. A fire that involves ordinary solid combustible materials such as wood, cloth, paper, rubber, and many plastics.

Class B Fire.* A fire that involves a flammable or combustible liquid such as oil, fat, alcohol, gasoline, and hydraulic fluid. Some plastics behave like Class A combustibles up to a point, but then they develop many attributes of a Class B fire.

Class C Fire.* A fire that involves energized electrical equipment or wiring.

Class D Fire.* A fire that involves 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, i.e., pilot in command (captain), first officer (co-pilot), second officer (flight engineer), etc.

Flight Deck. The area of an aircraft arranged for use of the flight crew in operating the aircraft. Berths, galleys, and lavatory facilities may be associated with the flight crew compartment but are not included in the term "flight deck."

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

Halogenated Agents. Halogenated agents referenced in this standard are bromotrifluoromethane (Halon 1301), bromochlorodifluoromethane (Halon 1301), 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 shall be permitted to be used to comply with the requirements of this standard.

NOTE: 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.

Halon 1211. The chemical name is bromochlorodifluoromethane, CBrClF_2 . Halon 1211 is a multipurpose, Class ABC-rated agent effective against flammable liquid fires. Due to its relatively high boiling point ($+25^\circ\text{F}/-4^\circ\text{C}$), Halon 1211 discharges as an 85 percent liquid stream offering long agent throw range.

Halon 1301. The chemical name is bromotrifluoromethane, CBrF_3 . Halon 1301 is recognized as an agent having Class ABC capability in total flooding systems; however, Halon 1301 offers limited Class A capability when used in hand portable fire extinguishers.

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

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

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. (In the United States the authority having jurisdiction is the Federal Aviation Administration.)

May. This term is used to state a permissive use or an alternative method to a specified requirement.

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

Rated/Rating. A numerical value assigned to an extinguisher based upon 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.

Chapter 2 Types and Capacities

2-1 General.

2-1.1 Hand portable fire extinguishers should meet or exceed all of the requirements of one of the fire test standards and one of the appropriate performance standards listed below.

2-1.1.1 Extinguishers installed in the United States shall meet the requirements of the following ANSI standards:

- (a) Fire Test Standard: ANSI/UL 711
- (b) Performance Standards
 1. Dry Chemical Types: ANSI/UL 299
 2. Water Types: ANSI/UL 626
 3. Halon Types: ANSI/UL 1093
 4. Film Forming Types: ANSI/UL 8

2-1.1.2 Extinguishers installed in Canada shall meet the requirements of the following Canadian standards:

- (a) Fire Test Standard: CAN/ULC S508-M90
- (b) Performance Standards
 1. Dry Chemical Types: CAN/ULC-S504-M88
 2. Water Types: CAN4-S507-M83
 3. Halon Types: CAN/ULC-S512-M87

2-1.2 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.

2-1.2.1 An organization listing, labeling, and marking 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.

2-1.3* All aircraft hand fire extinguishers shall function properly at temperature ranges from -40°F to 120°F (-40°C to 49°C).

2-1.4* Water extinguishers having a capacity of 1⅔ 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, and 2-1.3 of this chapter.

2-2 Water.

2-2.1 Water-based extinguishers shall have a minimum 1-A rating 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 or 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 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* For occupied spaces on aircraft, Halon 1211 extinguishers shall not be less than 2½ lb (1.2 kg) capacity, and shall not be more than 5 lb (2.3 kg) capacity. These extinguishers shall have a minimum 5-B:C rating, not less than 8-sec effective discharge time, not less than a 10-ft (3-m) liquid range, and may be equipped with a discharge hose.

2-3.4.1.1* 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 2-B:C rating 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 not be less than 13 lb (5.9 kg) capacity, and shall have a minimum 2-A: 40-B:C rating.

2-3.4.3 The total Halon 1211 agent available in all extinguishers in any single compartment, if discharged simultaneously, shall not be capable of producing a concentration 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 (CO₂) extinguishers shall not be used.

2-4.2 For cargo compartments of COMBI aircraft and cargo aircraft, CO₂ 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 not be less than 10-lb (4.5-kg) capacity, and shall have a minimum 2-A: 40-B:C rating.

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.

2-7.1 Hand portable fire extinguishers carrying non-halogenated-type agents 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 a galley opening and on the same floor level, 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 shall be 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.

3-2.1.1 The flight deck of cargo aircraft shall be provided with one Halon 1211 extinguisher.

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 2-3.4.1.1, 2-3.4.3, 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)
Greater than 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	1	Halon 1301 or Halon 1211	Flight Deck
Wide-body	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	1	Halon 1301 or Halon 1211	Flight Deck
Narrow-body	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	

3-2.2 Cargo Compartment.

3-2.2.1 Where fixed extinguishing systems provide protection for the entire cargo compartment(s), or where cargo compartment(s) are 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 min 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 a galley opening and on the same floor level, an additional extinguisher shall not be required for the galley.

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

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

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 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.

4-3.1 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 experienced in the extinguishment of fire using hand portable fire extinguishers.

5-1.3 Training shall include:

- (a) Classroom instruction;
- (b) Practical use of hand portable fire extinguishers;
- (c) Extinguishment of a hot fire;
- (d) Movement in a smoke-filled environment;

(e) 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:

- (a) Chemistry of fire and fire extinguishment;
- (b) Severity potential of aircraft fires;
- (c) Types of combustibles available in aircraft;
- (d) Identification and choice of proper extinguisher;
- (e) Consequences of misapplication of extinguishers;
- (f) Relative effectiveness of extinguishers;
- (g) Inspection requirements; and
- (h) 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 breathing equipment (PBE) when using an extinguisher in a cosmetic 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 be used only to combat unwanted fires. Suitable substitutes may be used for training. This shall be agreed on with the authority having jurisdiction.

5-3.3.4 Any alternative agent used shall have to 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:

- (a) Explanation of fire risks with COMBI operations;
- (b) Chemistry of fire;
- (c) Theory of extinguishing agents;

- (d) Aircraft layout;
- (e) Cargo loading requirements;
- (f) Hazardous cargo consignments;
- (g) Scale of COMBI fire fighting equipment (*see Table 3-1.1*);
- (h) Designated fire fighter duties
 - Preflight audit
 - In-flight inspection
 - Fire control techniques
 - Post fire information feedback;
- (i) Practical demonstration and use of portable controlled fire extinguishers;
- (j) Practical exercises involving simulated fire situations.

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

- (a) An enclosed environment in which the trainee can experience the effects of fire and heat.
- (b) Demonstrate the effectiveness of fire extinguishers when correctly applied to an actual fire.
- (c) A facility to demonstrate an electrical fire shall be provided.
- (d) One exercise shall include dressing in the protective clothing and personnel breathing equipment provided on-board 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 on-board aircraft fire incidents. This is particularly important when crews are assigned to more than one aircraft type.

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 and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

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*, 1994 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 edition.

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

ANSI/UL 626, *Standard for 2½ Gallon Stored Pressure Water-Type Fire Extinguishers*, 1993 edition.

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

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

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

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

CAN/ULC-S504-M88, *Standard for Dry Chemical and Dry Powder Fire Extinguishers*.

CAN4-S507-M83, *Standard for 2 Imperial Gallon Stored Pressure Water Type Fire Extinguishers*.

CAN/ULC-S508-M90, *Rating and Testing of Fire Extinguishers*.

CAN/ULC-S512-M87, *Standard for Dry Chemical Home Type Fire Extinguishers*.

CAN/ULC-8512-M87, *Standard for Halogenated Agent Fire Extinguishers*.

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

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

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 may 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, etc;
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 U.K. 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 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-2-1.3 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-2-1.4 In the United States, the authority having jurisdiction is the Federal Aviation Administration. In Europe it is the Joint Aviation Authority. In Canada it is Transport Canada.

A-2-3.1 Exposure to decomposed halogenated agents may produce varied central nervous system effects depending upon exposure concentration and time. Halogenated agents also will decompose into more toxic products when subjected to flame or 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. Halon 1211 extinguishers have their greatest effectiveness on Class B and C fires. Extinguishers with 9 lb (4 kg) or greater capacity also are rated for Class A fires. Extinguishers with capacity 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 may be found in NFPA 12B, *Standard on Halon 1211 Fire Extinguishing Systems*.

A-2-3.4.1 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-2-3.4.1.1 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 in 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/her performance can be assessed by instructional staff.

Appendix B Referenced Publications

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

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

NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*, 1992 edition.

NFPA 12B, *Standard on Halon 1211 Fire Extinguishing Systems*, 1990 edition.

B-1.2 British Standards Institution Publications. British Standards Institution, 2 Park Street, London W1A 2BS, United Kingdom.

British Standard 5306 - Part 3 - *Selection, Installation, and Maintenance of Portable Fire Extinguishers*.

British Standard 5423 - *Rating Extinguishers by Fire Tests*.

B-1.3 Other Publications.

"Study of Hand-Held Fire Extinguishers Aboard Civil Aviation Aircraft;" Krasner, L. M., Final Report, June, 1982; Factory Mutual Research Corporation, 1151 Boston-Providence Turnpike, Norwood, MA 02062; Report Number DOT/FAA/CT-82/42.

"Test and Evaluation of Halon 1211 Hand-Portable Fire Extinguishers for Use in Habitable and Cargo Compartments of USAF Aircraft;" Walker, J. and Vickers, R. N., Final Report November 1981, Engineering Services Laboratory, Air Force Engineering and Services Center, Tyndall Air Force Base; Report Number ESL-TR-81-22.

Index

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The NFPA Codes and Standards Development Process

Since 1896, one of the primary purposes of the NFPA has been to develop and update the standards covering all areas of fire safety.

Calls for Proposals

The code adoption process takes place twice each year and begins with a call for proposals from the public to amend existing codes and standards or to develop the content of new fire safety documents.

Report on Proposals

Upon receipt of public proposals, the technical committee members meet to review, consider, and act on the proposals. The public proposals – together with the committee action on each proposal and committee-generated proposals – are published in the NFPA's Report on Proposals (ROP). The ROP is then subject to public review and comment.

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These public comments are considered and acted upon by the appropriate technical committees. All public comments – together with the committee action on each comment – are published as the Committee's supplementary report in the NFPA's Report on Comments (ROC).

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Association Action

The Association meeting may, subject to review and issuance by the NFPA Standards Council, (a) adopt a report as published, (b) adopt a report as amended, contingent upon subsequent approval by the committee, (c) return a report to committee for further study, and (d) return a portion of a report to committee.

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"Members" are defined by Article 3.2 of the Bylaws as individuals, firms, corporations, trade or professional associations, institutes, fire departments, fire brigades, and other public or private agencies desiring to advance the purposes of the Association. Each member shall have one vote in the affairs of the Association. Under Article 4.5 of the Bylaws, the vote of such a member shall be cast by that member individually or by an employee designated in writing by the member of record who has registered for the meeting. Such a designated person shall not be eligible to represent more than one voting privilege on each issue, nor cast more than one vote on each issue.

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Sequence of Events Leading to Publication of an NFPA Committee Document

Call for proposals to amend existing document or for recommendations on new document.



Committee meets to act on proposals, to develop its own proposals, and to prepare its report.



Committee votes on proposals by letter ballot. If two-thirds approve, report goes forward.
Lacking two-thirds approval, report returns to committee.



Report is published for public review and comment. (Report on Proposals - ROP)



Committee meets to act on each public comment received.



Committee votes on comments by letter ballot. If two-thirds approve, supplementary report goes forward. Lacking two-thirds approval, supplementary report returns to committee.



Supplementary report is published for public review. (Report on Comments - ROC).



NFPA membership meets (Annual or Fall Meeting) and acts on committee report (ROP and ROC).



Committee votes on any amendments to report approved at NFPA Annual or Fall Meeting.



Complaints to Standards Council on Association action must be filed
within 20 days of the NFPA Annual or Fall Meeting.



Standards Council decides, based on all evidence, whether or not to issue standard
or to take other action, including hearing any complaints.



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Fax No. 617-770-3500

Note: All proposals must be received by 5:00 p.m. EST/EDST on the published proposal-closing date.

If you need further information on the standards-making process, please contact the
Standards Administration Department at 617-984-7249.

Date 9/18/93 Name John B. Smith Tel. No. 617-555-1212

Company _____

Street Address 9 Seattle St., Seattle, WA 02255

Please Indicate Organization Represented (if any) Fire Marshals Assn. of North America

1. a) NFPA Document Title National Fire Alarm Code NFPA No. & Year NFPA 72, 1993 ed.

b) Section/Paragraph 1-5.8.1 (Exception No.1)

2. Proposal recommends: (Check one) ☐ new text
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3. Proposal (include proposed new or revised wording, or identification of wording to be deleted):

Delete exception.

4. Statement of Problem and Substantiation for Proposal: (Note: State the problem that will be resolved by your recommendation; give the specific reason for your proposal including copies of tests, research papers, fire experience, etc. If more than 200 words, it may be abstracted for publication.)

A properly installed and maintained system should be free of ground faults. The occurrence of one or more ground faults should be required to cause a "trouble" signal because it indicates a condition that could contribute to future malfunction of the system. Ground fault protection has been widely available on these systems for years and its cost is negligible. Requiring it on all systems will promote better installations, maintenance and reliability.

5. ☒ This Proposal is original material. (Note: Original material is considered to be the submitter's own idea based on or as a result of his/her own experience, thought, or research and, to the best of his/her knowledge, is not copied from another source.)

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