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NFPA 408 Aircraft Hand Fire Extinguishers 1989 Edition

National Fire Protection Association Batterymarch Park, Quincy, MA 02269

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Policy Adopted by NFPA Board of Directors on December 3, 1982

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.

Statement on NFPA Procedures

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NATIONAL FIRE PROTECTION ASSOCIATION

NFPA 408

Standard for

Aircraft Hand Fire Extinguishers

1989 Edition

This edition of NFPA 408, *Standard for Aircraft Hand Fire Extinguishers*, was prepared by the Technical Committee on Aircraft Rescue and Fire Fighting, released by the Correlating Committee on Aviation, and acted on by the National Fire Protection Association, Inc. at its Annual Meeting held May 15-18, 1989 in Washington, DC. It was issued by the Standards Council on July 14, 1989, with an effective date of August 7, 1989, and supersedes all previous editions.

The 1989 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 had been 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.

In 1984 the 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 is a reconfirmation of the 1984 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.

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Aircraft Hand Fire Extinguishers

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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 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 fire extinguishers and 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* 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 Fire Extinguisher. An approved, portable fire extinguisher that meets the requirements of this standard, and which can be used by aircraft occupants to combat accessible, incipient, onboard fires.

Approved.* Acceptable to the "authority having jurisdiction."

Authority Having Jurisdiction.* The "authority having jurisdiction" is the organization, office or individual responsible for "approving" equipment, 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 or Baggage Compartment. An area of a passenger aircraft that is separated by flooring or fixed bulkheads from any passenger compartment, and designed for transport of cargo or baggage. It may have provisions for containers or pallets of cargo.

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 have 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. A combination passenger/cargo aircraft designed for the primary function of carrying both passengers and cargo on the same level.

Extinguisher(s). See Aircraft Hand Fire Extinguisher.

Flight Crew. All members of both the flight deck crew and cabin crew.

Flight Deck. The area of the aircraft arranged for use by pilot/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 storage, refrigeration, heating, and dispensing of food and beverages. Such area typically includes storage of plastic trays, plastic dinnerware utensils, and paper napkins.

Halon. A short derivation of "halogenated hydrocarbon" whose chemical structure is identified as a four-digit number representing, respectively, the number of carbon, fluorine, chlorine, and bromine atoms. Halon fire ex-

tinguishing agents approved for use include Halon 1211 and Halon 1301. Both are liquefied gases and typified as "clean agents," leaving no agent residue after discharge. Halons extinguish fire by chemically interrupting the combustion chain reaction rather than by physically smothering.

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 °F (-4 °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 portable fire extinguishers.

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

Labeled. Equipment or materials to which has been attached a label, symbol or other identifying mark of an organization 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.

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 All aircraft hand fire extinguishers shall be approved and labeled.

2-1.1.1* Water extinguishers having a capacity of 1⅜ qt (2 L), and having special approval of the authority having jurisdiction, shall not be required to be labeled, and shall not be required to comply with 2-1.2 and 2-2.1 of this chapter.

2-1.2 All aircraft hand fire extinguishers shall meet the requirements of ANSI/UL 711, *Standard for Rating and Fire Testing of Fire Extinguishers*.

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

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 meet the requirements of either ANSI/UL 626, *Standard for 2½* Gallon Stored Pressure Water Type Fire Extinguishers, or CAN 4-S507, *Two Imperial Gallon Stored Pressure Water Type Fire Extinguishers*.

2-2.3 Water-based extinguishers shall not be used on Class B or Class C fires.

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 shall meet the requirements of Military Specification MIL-B-38741.

2-3.3 Halon 1301 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-second 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 may be used as an option to the Halon 1301 extinguisher 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.

2-3.5* Halon 1301 Extinguishers.

2-3.5.1 For occupied spaces on aircraft, Halon 1301 extinguishers shall have a minimum 2-B:C rating, and shall have an effective discharge time of not less than 8 seconds.

2-3.5.2 For accessible cargo compartments of COMBI aircraft and cargo aircraft, Halon 1301 extinguishers may be provided in addition to required extinguishers specified in 3-2.2 of this standard.

2-3.5.3 The total Halon 1301 agent available in all extinguishers in any single compartment, if discharged simultaneously, shall not be capable of producing a concentration greater than 5 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 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.

Chapter 3 Distribution of Extinguishers

3-1 Passenger Aircraft.

3-1.1 Aircraft hand fire extinguishers shall be placed in aircraft 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.

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, 2-3.5.3	Within Reach of Seated Pilot
5 30	1	Halon 1301 or Halon 1211	Within Reach of Seated Pilot
	1	One 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	At least one water and At least 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, three Halon 1211	Cabin
	1	Halon 1211	Each Galley (See 3-1.2)
Greater than 275	1	Halon 1301 or Halon 1211	Flight Deck
	6	Two water, four Halon 1211	Cabin
	1	Halon 1211	Each Galley (See 3-1.2)

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 location markings shall be visible to occupants of the compartment.

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 cargo compartment(s) are not accessible during flight, hand 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 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 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 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 at the interior access entry.

3-3 COMBI Aircraft.

3-3.1 Aircraft Occupied Spaces. Aircraft occupied spaces of COMBI aircraft shall be provided with extinguishers as specified in Section 3-1 of this standard.

3-3.2 Cargo Compartments. Cargo compartments of COMBI aircraft shall be provided with hand fire extinguishers as specified in 3-2.2 of this standard.

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 gages 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 by 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 training in the basics of fire extinguishment, and the location and use of extinguishers on the aircraft on which they will be qualified.

5-1.2 This training shall provide classroom instruction and manipulative skills training.

5-2* Classroom Instruction. 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) Basics 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) Relative effectiveness of extinguishers,
(f) Inspection requirements, and
(g) Health and operational safety concerns.

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 extinguishers.

5-3.2 All classes shall be conducted by qualified instructors who are knowledgeable of the aircraft environment as well as fire protection.

5-3.3* Each flight crew member shall demonstrate the knowledge and skill required to select the appropriate 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.

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, Batterymarch Park, Quincy, MA 02269.

NFPA 10-1988, *Standard for Portable Fire Extinguishers.*

6-1.2 Other Publications.

ANSI/UL 626-1982, *Standard for 2½ Gallon Stored Pressure Water Type Fire Extinguishers*

ANSI/UL 711-1979, *Standard for Rating and Fire Testing of Fire Extinguishers*

CAN 4-S507, *Two Imperial Gallon Stored Pressure Water Type Fire Extinguishers*

Military Specification, *MIL-B-38741*

Military Specification, *MIL-M-12218C.*

Appendix A

This Appendix is not a part of the requirements of this NFPA document but is included for information 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 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 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 or 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 which is 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, 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 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 Class B Fire. European classes of fire are generally equivalent to North American classifications except that the flammable liquid/gas type fires are separated into two groups. European classes of fire are as follows: Class A — Wood, paper, cloth, etc; Class B — Flammable liquids; Class C — Flammable gases; Class D — Metal fires; Class E — Electrical fires. Extinguisher ratings are not comparable.

A-1-3 Class C Fire. See A-1-3, Class B Fire.

A-1-3 Class D Fire. See A-1-3, Class B Fire.

A-1-3 Listed. 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.

A-2-1.1.1 In the United States, the authority having jurisdiction is the Federal Aviation Administration.

A-2-1.3 Aircraft hand 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 should also include pressure variations, positive and negative accelerations, vibration, corrosion, and ambient temperature variations.

A-2-3.1 Exposure to undecomposed halogenated agents may produce varied central nervous system effects depending upon exposure concentration and time. Halogenated agents will also 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 are also 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) Both Halon 1211 and Halon 1301 decompose 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-2-3.5 Halon 1301. Halon 1301 extinguishers are effective on Class B and C fires. Halon 1301 extinguishers are not rated for Class A fires at this time. Detailed information on Halon 1301 agent characteristics, concentration requirements, health hazards, and extinguishing limitations may be found in NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems.*

A-2-4.1 Pound for pound, carbon dioxide has substantially less fire extinguishing capability compared to Halon 1211 on expected fire scenarios in aircraft.

A-2-4.2 Pound for pound, carbon dioxide has substantially less fire extinguishing capability compared to Halon 1211 or multipurpose dry chemical agents on expected fire scenarios in aircraft cargo compartments.

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 12A, Standard on Halon 1301 Fire Extinguishing Systems, and Appendix A of NFPA 12B, Standard on Halon 1211 Fire Extinguishing Systems, as appropriate.*)

A-5-3.3 Although not required by this standard, 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 should be used in the scenarios required in 5-3.3.2.

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, Batterymarch Park, Quincy, MA 02269.

NFPA 12A-1989, *Standard on Halon 1301 Fire Extinguishing Systems*

NFPA 12B-1985, *Standard on Halon 1211 Fire Extinguishing Systems.*

B-1.2 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.

Toxicity of BCF Fire Extinguishing Agents; Deus, H. R., SAFE Journal, Volume 8, Number 3, Fall of 1978.

FAA Advisory Circular 20-42B.

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SUBMITTING PROPOSALS ON NFPA TECHNICAL COMMITTEE DOCUMENTS

Contact NFPA Standards Administration for final date for receipt of proposals on a specific document.

INSTRUCTIONS

Please use the forms which follow for submitting proposed amendments. Use a separate form for each proposal.

1. For each document on which you are proposing amendment indicate:
   (a) The number and title of the document
   (b) The specific section or paragraph.

2. Check the box indicating whether or not this proposal recommends new text, revised text, or to delete text.

3. In the space identified as "Proposal" include the wording you propose as new or revised text, or indicate if you wish to delete text.

4. In the space titled "Statement of Problem and Substantiation for Proposal" state the problem which will be resolved by your recommendation and give the specific reason for your proposal including copies of tests, research papers, fire experience, etc. If a statement is more than 200 words in length, the technical committee is authorized to abstract it for the Technical Committee Report.

5. Check the box indicating whether or not this proposal is original material, and if it is not, indicate source.

6. If supplementary material (photographs, diagrams, reports, etc.) is included, you may be required to submit sufficient copies for all members and alternates of the technical committee.

NOTE: The NFPA Regulations Governing Committee Projects in Paragraph 10-10 state: Each proposal shall be submitted to the Council Secretary and shall include:

(a) identification of the submitter and his affiliation (Committee, organization, company) where appropriate, and

(b) identification of the document, paragraph of the document to which the proposal is directed, and

(c) a statement of the problem and substantiation for the proposal, and

(d) proposed text of proposal, including the wording to be added, revised (and how revised), or deleted.

FORM FOR PROPOSALS ON NFPA TECHNICAL COMMITTEE DOCUMENTS

Mail to: Secretary, Standards Council
National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269

Date 5/18/85 Name John B. Smith Tel. No. 617-555-1212

Address 9 Seattle St., Seattle, WA 02255

Representing (Please indicate organization, company or self) Fire Marshals Assn. of North America

1. a) Document Title: Protective Signaling Systems NFPA No. & Year NFPA 72D

   b) Section/Paragraph: 2-7.1 (Exception)

2. Proposal recommends: (Check one) ☐ new text
   ☐ revised text
   ☒ deleted text.

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:

   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.
   ☐ This Proposal is not original material; its source (if known) is as follows: _____

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

I agree to give NFPA all and full rights, including rights of copyright, in this Proposal and I understand that I acquire no rights in any publication of NFPA in which this Proposal in this or another similar or analogous form is used.

John B. Smith
Signature

PLEASE USE SEPARATE FORM FOR EACH PROPOSAL

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Mail to: Secretary, Standards Council
National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269

Date _____ Name _____ Tel. No. _____

Address _____

Representing (Please indicate organization, company or self) _____

1. a) Document Title: _____ NFPA No. & Year _____

   b) Section/Paragraph: _____

2. Proposal recommends: (Check one) ☐ new text
   ☐ revised text
   ☐ deleted text.

3. Proposal (include proposed new or revised wording, or identification of wording to be deleted):

4. Statement of Problem and Substantiation for Proposal:

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

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