# AEROSPACE RECOMMENDED PRACTICE

| ARP4712™ | REV. A |
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Superseding ARP4712

(R) Hand-Held Cabin Fire Extinguishers
Transport Aircraft

RATIONALE

This revision changes the scope and purpose of this Aerospace Recommended Practice (ARP) by removing all design related requirements for hand-held fire extinguishers and adding recommendations for their installation in transport category airplanes and for crew member training.

## 1. SCOPE

This SAE Aerospace Recommended Practice (ARP) establishes general criteria for the installation (e.g., type, location, accessibility, stowage) and crew member training needed for hand-held fire extinguishers.

### 1.1 Purpose

To ensure that the appropriate types of portable hand-held fire extinguishers are readily accessible in the areas they are likely to be needed and to ensure crew members have adequate training in the use of hand-held fire extinguishers and the proper techniques for fighting on-board fires. The intent is also to promote expedient access to emergency equipment by encouraging standardization.

## 2. REFERENCES

### 2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.





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https://www.sae.org/standards/content/ARP4712A

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AS245 Water Solution Type Hand Fire Extinguisher

ARP577 Emergency Placarding - Internal and External

ARP997 Installation and Stowage Provisions for Emergency Equipment in the Transport Aircraft Passenger Cabin

AS6271 Halocarbon Clean Agent Hand-Held Fire Extinguisher

2.1.2 Code of Federal Regulations (CFR)

Available from the United States Government Printing Office, 732 North Capitol Street, NW, Washington, DC 20401, Tel: 202-512-1800, www.gpoaccess.gov.

14 CFR 23 Airworthiness Standards: Normal, Utility, Acrobatic, and Commuter Category Airplanes

14 CFR 25 Airworthiness Standards: Transport Category Airplanes

14 CFR 27 Airworthiness Standards: Normal Category Rotorcraft

14 CFR 29 Airworthiness Standards: Transport Category Rotorcraft

14 CFR 91 Airworthiness Standards: General Operating and Flight Rules

14 CFR 121 Airworthiness Standards: Operating Requirements: Domestic, Flag, and Supplemental Operations

14 CFR 135 Airworthiness Standards: Operating Requirements: Commuter and On-Demand Operations and Rules Governing Persons on Board Such Aircraft

2.1.3 EASA Publications

Available from European Aviation Safety Agency, Ottoplatz, 1, D-50679 Cologne, Germany, Tel: +49 221 8999 000, www.easa.europa.eu.

CS-23 Certification Specification for Normal, Utility, Aerobatic and Commuter Aeroplanes

CS-25 Certification Specification for Large Aeroplanes

CS-27 Certification Specification for Small Rotorcraft

CS-29 Certification Specification for Large Rotorcraft

2.1.4 FAA Publications

Available from Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591, Tel: 866-835-5322, www.faa.gov.

Advisory Circular 20-42D, Hand Fire Extinguishers for Use in Aircraft

Advisory Circular 25-17A, Transport Airplane Cabin Interiors Crashworthiness Handbook

Safety Alert for Operators, SAFO 09013, Dated June 23, 2009, Subject: Fighting Fires Caused By Lithium Type Batteries in Portable Electronic Devices. http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Aerospace Technical Report.

2.2.1 FAA Publications

Available from Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591, Tel: 866-835-5322, www.faa.gov.

Advisory Circular 120-80 In-Flight Fires

TSO C-19 Portable Water-Solution Type Hand Fire Extinguisher

2.3 Definitions

2.3.1 CLASS A FIRE: A fire involving combustible solid materials (e.g., wood, textiles, curtains, furniture, and plastics, etc.), usually organic in nature (contains compounds of carbon), which generally produce glowing embers.

2.3.2 CLASS B FIRE: A fire involving flammable liquids, oils, solvents, gases.

2.3.3 CLASS C FIRE: A fire involving energized electrical equipment.

2.4 Mandating and Recommendation Phrases

2.4.1 SHALL: Indicates a mandatory criterion.

2.4.2 SHOULD: Indicates a criterion for which an alternative, including non-compliance, may be applied if it is documented and justified.

3. GENERAL RECOMMENDATIONS

3.1 The installation of hand-held fire extinguishers in an aircraft shall be approved by the FAA and/or other governing Civil Aviation Authority (e.g., EASA, Transport Canada). Note: FAA Advisory Circular AC 20-42D identifies that any fire extinguisher approved by Underwriter's Laboratory (UL), Factory Mutual (FM), or the United States Coast Guard (USCG) is approved for aircraft use. Fire extinguishers qualified to a Technical Standard Order (TSO) are also approved for aircraft use (e.g., water fire extinguishers qualified to TSO-C19).

3.2 Acceptable fire extinguishing agents for internal aircraft use include:

a. Water

b. Halon 1211

c. Halocarbon Clean Agent (Halon 1211 replacement)

NOTE: Carbon Dioxide, Dry Chemical and Specialized Dry Powder extinguishing agents are not recommended for internal aircraft use (reference FAA AC 20-42D).

3.3 Halocarbon Clean Agent hand-held fire extinguishers shall be qualified to AS6271.

3.4 All hand-held fire extinguishers installed in an aircraft shall be qualified to operate in the expected operating temperature range of the aircraft.

3.5 The effects of agent toxicity, aircraft ventilation, agent stratification and hypoxia should be considered when selecting the fire extinguisher types and sizes (reference FAA AC 20-42D).

3.6 The color of the hand-held fire extinguishers should be standardized within the operator's fleet and be different from that used for other emergency equipment such as oxygen cylinders, PBEs, etc.

3.7 The hand-held fire extinguisher, after removal from its stowage location, should be controllable with one hand, including actuating, directing, and stopping the discharge. However, a hand-held fire extinguisher equipped with a discharge hose may require two-handed operation.

3.8 The hand-held fire extinguisher shall have an operational safety device to prevent accidental discharge. The safety should be standardized for each extinguisher type and be readily discernible.

3.9 No hand-held fire extinguisher shall be converted from one type to another, nor should the extinguishing agent be replaced with any other type of extinguishing agent.

3.10 Standard hand-held fire extinguisher installations should be established in an operator's fleet to ensure easy recognition and access to the hand-held fire extinguishers and to ensure the extinguishers have consistent operating procedures.

3.11 The operational status of the hand-held fire extinguisher shall be identifiable by a quick visual inspection and/or check to ensure:

a. Security of extinguisher in its installed location

b. Unobstructed access

c. Extinguisher has not been actuated or tampered with

d. No observable physical damage or condition precluding normal operation

e. Pressure reading or indicator is in the operable range or position, if applicable

3.12 When its primary restraint is released, the hand-held fire extinguisher shall remain secure in the mounting bracket until it is deliberately removed by a user (i.e., the fire extinguisher shall not fall from the mounting bracket when the restraint is released).

4. PASSENGER COMPARTMENT

4.1 Minimum Number of Portable Hand-Held Fire Extinguishers

The minimum number of portable hand-held fire extinguishers required for each passenger compartment or deck shall be based on passenger seating capacity of the compartment or deck (reference 14 CFR 25.851 and 14 CFR 121.309).

- 7 through 30 passenger seats: 1 extinguisher
- 31 through 60 passenger seats: 2 extinguishers
- 61 through 200 passenger seats: 3 extinguishers
- 201 through 300 passenger seats: 4 extinguishers
- 301 through 400 passenger seats: 5 extinguishers
- 401 through 500 passenger seats: 6 extinguishers
- 501 through 600 passenger seats: 7 extinguishers
- 601 through 700 passenger seats: 8 extinguishers

NOTE: The quantities of extinguishers noted above are the absolute minimum permitted. Virtually all airplanes with 61 or more passengers will require additional extinguishers due to interior amenities (galleys, lavatories, etc.) and division of cabin (reference FAA AC 25-17A).

4.2 For airplanes with a passenger capacity of at least 31 and not more than 60, at least one of the hand-held fire extinguishers in the passenger compartment shall be Halon 1211 or a Halocarbon Clean Agent equivalent. The extinguishing agent used in any other hand-held fire extinguisher installed in the passenger compartment shall be appropriate for the kinds of fires likely to occur in the area where the extinguisher is installed.

4.3 For airplanes with a passenger capacity of 61 or more, at least two of the hand-held fire extinguishers in the passenger compartment shall be Halon 1211 or a Halocarbon Clean Agent equivalent. The extinguishing agent used in any other hand-held fire extinguisher installed in the passenger compartment shall be appropriate for the kinds of fires likely to occur in the area where the extinguisher is installed.

4.4 The type and location of fires likely to be encountered should be considered when selecting the most appropriate extinguishing agent. At least one extinguisher appropriate for a Class A fire should be provided (reference FAA AC 25-17A).

4.4.1 A fire extinguisher with 5 pounds of Halon 1211 or a Halocarbon Clean Agent fire extinguisher equivalent to a 5 pound Halon 1211 may be used in place of one water fire extinguisher. Alternatively, two fire extinguishers with at least 2.5 pounds Halon 1211 or two fire extinguishers with Halocarbon Clean Agent equivalent to at least 2.5 pounds Halon 1211 installed in close proximity to each other may be used in place of one water fire extinguisher. The 2.5 pound Halon 1211 or equivalent Halocarbon Clean Agent fire extinguisher shall have a UL rating of 5:B:C.

4.4.2 If two Halon 1211 or Halocarbon Clean Agent fire extinguishers are used in place of one water extinguisher, the two extinguishers are counted as one extinguisher when calculating the minimum number of required hand-held fire extinguishers. If there is an existing Halon 1211 extinguisher nearby, it cannot be used as part of the substitution (i.e., three 2.5 pound Halon 1211 extinguishers (or Halocarbon Clean Agent equivalents) are needed to be equivalent to one 2.5 pound Halon 1211 and one water extinguisher).

4.5 Location of Hand-Held Extinguishers

4.5.1 The required number of hand-held fire extinguishers shall be uniformly distributed throughout the passenger compartment in accordance with ARP997 and they shall be located in close proximity to amenities/hazardous areas such as galleys, lavatories, accessible baggage stowage areas, etc.

4.5.2 If there are no defined amenities/hazardous areas, the hand-held fire extinguishers should be located in accordance with the following criteria (reference FAA AC 20-42D).

4.5.2.1 When one hand-held fire extinguisher is required, it should be located at the flight attendant's station. If no attendant is required, the extinguisher should be located at the passenger entry door.

4.5.2.2 When two or more hand-held fire extinguishers are required, one shall be located at each end of the passenger cabin and the remainder shall be uniformly distributed throughout the cabin.

4.6 Installation of Hand-Held Fire Extinguishers

4.6.1 In the installed position, the extinguisher shall be readily accessible to the crew and passengers. The stowage location shall protect against damage from abrasion, temperature, vibration, pressure, and tampering, and preclude interference with adjacent equipment, loose cabin supplies, carry-on items, reclined seat backs, etc.

4.6.2 The extinguisher shall be restrained in its stowage location and be able to withstand the applicable inertial loading forces specified in national aviation regulations (e.g., 14 CFR/CS 23.561, 25.561, 27.561, 29.561).

4.6.2.1 If an extinguisher is installed in a location where, if it were to become dislodged from its bracket it could cause injury to an occupant (e.g., an extinguisher installed on a wall above a flight attendant's seat), it shall be provided with a secondary restraint.

4.6.3 Extinguishers should be clearly visible in their installed position, and a placard should be used to indicate such location. Extinguishers that are not visible due to installation in stowage compartments (i.e., overhead bins, etc.) shall be placarded on the outside of the installation location in accordance with ARP577.

4.6.4 The extinguishers shall be readily accessible and quickly retrievable by anyone ranging from a 5th percentile female to a 95th percentile male (height).

4.6.5 The extinguisher restraint(s) shall be releasable with a simple, quick method. The extinguisher should be installed to permit inspection of gauges or indicators (if applicable) that show its operational status without removal of the extinguisher from its restraint.

4.6.6 If extinguishers intended for different classes of fire are installed in close proximity to each other, their intended use should be identified on a conspicuously placed placard, or other equivalent means, to help ensure the proper extinguisher is retrieved for the type of fire.

5. FLIGHT DECK COMPARTMENT

5.1 At least one hand-held fire extinguisher capable of extinguishing Class B and C fires shall be located in the flight deck.

5.2 Each hand-held fire extinguisher installed in the flight deck shall be conveniently located, clearly marked with unobstructed access for retrieval by the flight crew members.

5.2.1 For aircraft designed for single pilot operation, the hand-held fire extinguisher should be located for release and removal by the pilot in the seated position.

6. ACCESSIBLE CARGO COMPARTMENT

6.1 There shall be at least one readily accessible hand-held fire extinguisher conveniently located for use in each Class A, Class B, or accessible Class E cargo or baggage compartment.

7. REMOTE CREW REST COMPARTMENT

7.1 At least one hand-held fire extinguisher appropriate for the kinds of fires likely to occur shall be provided in each remote crew rest compartment (e.g., overhead or lower crew rest compartments).

7.2 Analysis of the potential fire threats should be used in determining the placement of the hand fire extinguisher(s). The location of the hand fire extinguisher(s) should allow a person located in any approved seat or berth to access a fire extinguisher to fight a fire inside the crew rest compartment.

8. CREW TRAINING

All crew members shall be trained in the use of hand-held fire extinguishers and the proper techniques for fighting on-board fires. All applicable recommendations should be included in the operator's fire fighting procedures and training material. The training shall be provided by an instructor(s) that has in depth knowledge and experience in the following areas:

a. The various types of fires that can occur onboard an aircraft.

b. Experienced in fighting the various type of fires with various extinguishing agents.

c. Unique challenges with fighting fires in an aircraft environment.