Certification Memorandum

Halon-free hand fire extinguishers installation

EASA CM No.: Proposed CM–CS-013 Issue 01 issued 11 June 2025

Regulatory requirement(s): CS 23.2325(b)(1) Amendment 6, 23.851 Amendment 4, CS 25.851 Amendment 28, CS 27.1301 Amendment 10, CS 29.851 Amendment 12

EASA Certification Memoranda clarify the European Union Aviation Safety Agency's general position on specific initial airworthiness, validation, continuing airworthiness or organisational items. They are intended to provide guidance on a particular subject and may provide complementary information for compliance demonstration, similar to AMC/GM even if not formally adopted through an ED Decision. Certification Memoranda are not intended to introduce new certification requirements or to modify existing certification requirements.

Log of issues

Issue	Issue date	Change description
01	29 Sep. 2025	First issue.

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1. Identification of Issue

The purpose of this Certification Memorandum is to provide guidance on the certification of the installation of Halon-free handheld fire extinguishers on CS-23, CS-25, CS-27 and CS-29 aircraft.

Regulation (EC) No 2037/2000 of the European Parliament and of the Council of 29 June 2000 on substances that deplete the ozone layer, contains initial provisions for Halon phase-out, but also exemptions for critical uses of Halon, including fire-extinguishing in aviation. The exemptions were predicated on the basis that there were, at that time, no suitable alternate agents or systems available for use on aircraft.

'Cut-off' dates (i.e. Halon no longer acceptable in new applications for type certification) and 'end' dates (i.e. Halon no longer acceptable for use in aircraft) were established by European Commission Regulation (EU) No 744/2010 of 18 August 2010[1].

The end date is defined as the date by which all Halon-based handheld extinguishers must be decommissioned.

Consequently, EASA has amended CS-23, CS-25 and CS-29 to provide guidance on how to address the requirements of the above European Commission Regulations when certifying the installation of handheld fire extinguishers, and more in general, of fire protection systems using Halon-free extinguishing agent.

Historically Halon 1211 has been the most widespread agent in handheld (portable) fire extinguishers to be used in aircraft compartments and cabins. Minimum Performance Standards (MPS) for the Halon-free extinguishing agents are laid down in Appendix A to Report DOT/FAA/AR-01/37 of August 2002, while acceptable criteria to select the fire extinguishers containing said agents are laid down in the FAA Advisory Circular AC 20-42D.

While CS-27 does not explicitly require the installation of handheld fire extinguishers, FAA AC 27.853[2] (referenced in AMC 27 General) clarifies that, if a handheld fire extinguisher is installed to comply with an operating rule, the guidance of FAA AC 20-42D should be followed. Furthermore, handheld fire extinguishers have been installed on CS-27 rotorcraft to enhance safety features, even if not required by the applicable aircraft certification basis.

The relevant AMCs of CS-23, CS-25 and CS-29 clarify that in case an applicant wishes to propose any alternative agent for hand fire extinguishers meeting the mentioned MPS, particular coordination with the Agency would be needed.

Note: EASA intends to revise the previously published CM-21.A-CS-001 Issue 02, as well as AMC 25.851(a)(2) and 25.851(c) Amdt. 28 in order to consolidate the proposed change classifications with the content of this Certification Memorandum.

2. Applicability

This Certification Memorandum is applicable to:

- CS-23 normal-category aeroplanes
- CS-25 large aeroplanes
- CS-27 small rotorcraft
- CS-29 large rotorcraft

[1] European Commission Regulation (EU) No 744/2010 of 18 August 2010 amended Regulation (EC) No 1005/2009 of the European Parliament and of the Council on substances that deplete the ozone layer, with regard to the critical uses of halon (OJ L 218, 19.8.2010, p. 2). Regulation (EU) 2024/590 of the European Parliament and of the Council of 7th February 2024 on substances that deplete the ozone layer, and repealing Regulation (EC) No 1005/2009, confirmed for handheld fire extinguishers the cut-off date set to 31st December 2014, and the end date set to 31st December 2025.

[2] FAA AC 27.853 is included in FAA AC 27-1B, as referenced in 'AMC 27 General' in Book 2 of CS-27.

3. EASA Certification Policy

3.1. Acceptable extinguishing agents

Any of the following halocarbon-free agents may be acceptable for use for handheld fire extinguishers:

- Hydrochlorofluorocarbon HCFC Blend B
- Hydrofluorocarbons HFC-227ea
- HFC-236fa
- 2-BTP, stabilized 2-bromo-3,3,3-trifluoro-propene.

The above extinguishing agents have been evaluated and found to be effective fire-fighting agents. If properly used, these agents are safe to human health.

Note: The use of HCFC Blend B is restricted by EU Regulation 2024/590. At the moment the other agents listed in section 3.1 of this CM are not subject to restrictions imposed by any EU Regulations. EASA is aware that the regulatory framework may evolve in the future and that restrictions to the use of the extinguishing agents in question may be introduced. However, the agents in question are available solutions to meet the requirements imposed by EU Regulation 2024/590, which impose the decommissioning of all halon based portable extinguishers by the end of 2025.

For the assessment of toxicity of 2-BTP (stabilized 2-bromo-3,3,3-trifluoro-propene), which is not addressed in FAA AC 20-42D, it is acceptable to use the same guidance as specified for Halon 1211 extinguishers[3].

The application of this Certification Memorandum for an extinguishing agent other than the ones referenced in this paragraph would have to be confirmed by EASA.

3.2. Classification of design changes

Design changes for the installation of Halon-free handheld extinguishers in compartments occupied by passengers or crew on the aircraft categories specified in paragraph 2. may be classified as minor provided that:

- the design change is based on the guidance of this Certification Memorandum, and
- one of the extinguishing agents referenced in paragraph 3.1 is used, and
- the design change can be classified as minor based on the guidance of GM 21.A.91.

3.3. Minimum performance standards for handheld extinguishers

ETSO-2C515 A1 Aircraft Halocarbon Clean Agent Handheld Fire Extinguisher dated 25.07.2020 provides the requirements which an aircraft halocarbon clean agent handheld fire extinguisher must meet in order to be identified with the applicable ETSO marking.

The Technical Conditions of the ETSO refers to and modifies parts of the following standards:

- SAE AS6271 issued January 2013 for the Minimum Performance Standard,
- American National Standards Institute (ANSI)/UL 2129 for the Environmental Standard
- ANSI/UL 711 for the rating of the extinguisher

In particular, SAE AS6271 requires the extinguisher to pass the Hidden Fire Test and Seat Fire/Toxicity Test specified in FAA Report DOT/FAA/AR-01/37 of August 2002 (also referenced in FAA AC 20-42D).

Handheld extinguishers should be authorised in accordance with ETSO-2C515 Aircraft Halocarbon Clean Agent Hand-Held Fire Extinguisher.

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[3] Colton B. and Poet T., August 27, 2021 Revision 1 — Setting Acute Exposure Limits for Halotron® BrX (2-Bromo-3,3,3-Trifluoropropene) Clean Agent On Board Aircraft Using Physiologically Based Pharmacokinetic Modeling.

Alternatively, it should be demonstrated that the handheld extinguisher is compliant with the technical conditions of the ETSO.

3.4. CS-23 normal category aeroplanes

The following guidance can be applied to the design the installation of handheld extinguishers on all CS-23-types. The guidance is based on CS-23 Amendment 4, but can be used to comply also with equivalent requirements included in later amendments of CS-23.

The general guidance reported in paragraph 3.4.1 is of general applicability, although it is considered more appropriate for CS-23 types with pressurized fuselage.

The simplified guidance reported in paragraph 3.4.2 can be used only for CS-23 types with unpressurized cabin and a maximum seating configuration of up to 9 passengers.

3.4.1. General guidance

1) Compliance with CS 23.851(c)(1) / CS 23.2325

   a) CS 23.851(c)(1) requires fire extinguishers located in the pilot and/or passenger compartment to contain a *type* of extinguishing agent that is appropriate for the kinds of fires likely to occur where used. Meeting the design criteria of FAA AC 20-42D is an acceptable means of compliance with CS 23.851(c)(1).

   b) CS 23.851(c)(1) also requires that the *quantity* of extinguishing agent used in each extinguisher required by this paragraph be appropriate for the kinds of fires likely to occur where used. Meeting the requirements of AC 20-42D referring to DOT/FAA/AR/01/37 is an acceptable means of compliance with CS 23.851(c)(1).

2) Compliance with CS 23.851(c)(2) / CS 23.2325

   CS 23.851(c)(2) requires that each extinguisher intended for use in the pilot and/or passenger compartment be designed to minimise the hazard of toxic gas concentration. The guidance of AC 20-42D is an acceptable means of compliance with CS 23.851(c)(2).

   Certain replacement agents addressed in AC 20-42D are identified as evaluated/approved for environmental and toxicological acceptability; however, neither this list of agents is exhaustive, nor does AC 20-42D address the expectation of evaluating the suitability of the proposed replacement agent to the intended airplane environment.

   Therefore, the applicant should address all the criteria of Appendix 4 of FAA AC 20-42D (Effective throw ranges, Safe-use guidance, Extinguisher weight, Aircraft volumes and ventilation) for the used extinguishing agent of the handheld fire extinguisher. Agent concentration levels should not exceed the safe human levels after discharging the fire extinguisher. Data showing equivalency to the limits established for other agents in AC 20-42D should be established compliance and from recognized sources such as industry standard(s), technical publication(s), cognizant government or medical authorities. The agent concentration levels in occupied areas should be shown acceptable for the various phases of flight (taxi, climb, cruise, descent, etc.) and dispatchable ventilation and pressurization configurations. The compliance assessment should include the master minimum equipment list (MMEL) dispatch configurations that could adversely affect ventilation rates.

3) Additionally, the fire extinguishers use in the aeroplane's environment should be substantiated regarding the following aspects:

   a) Cabin pressure (i.e. ASTM, MPS Testing, etc. are conducted at sea level. The cabin will be at a higher pressure altitude)

   b) Environmental qualification data that substantiates vibration, and temperature cycling

c) Throw distance

d) Any life limit installation instructions/limitations and/or maintenance information for post-discharge actions.

3.4.2. Simplified guidance for CS-23 normal category aeroplanes with unpressurized cabin and up to 9 passengers

The following guidance can be applied to the design the installation of handheld extinguishers on CS-23 types, with unpressurized cabin and up to 9 passengers.

1) Compliance with CS 23.851(c)(1) / CS 23.2325

The type and quantity of extinguishing agent used in each extinguisher should be appropriate to the kinds of fires likely to occur where used. For CS-23 aeroplanes with a cabin volume up to 5.66 m^3 (200 ft^3), it is acceptable to provide hand fire extinguishers with a U.S. - UL 2B:C rating or equivalent. A handheld extinguisher with U.S -UL 2B:C rating or equivalent, is considered acceptable for installation also on aircraft cabin with volume up to 7.08 m^3 (250 ft^3), but only if the following conditions are met:

a. The cabin is not used for the carriage of cargo;
b. A fire risk assessment shows that the size of fire that can develop in the passenger cabin, considering the items that may be transported, is compatible with the performance of the available handheld extinguisher.

2) Compliance with CS 23.851(c)(2) / CS 23.2325

CS 23.851(c)(2) requires that each extinguisher intended for use in the pilot and/or passenger compartment be designed to minimise the hazard of toxic gas concentration.
The descent, ventilation, and supplemental oxygen guidance of FAA AC 20-42D Chapter 4, paragraph 3 is an acceptable means to comply with CS 23.851(c)(2). A way to ventilate the compartment might be opening a window, if at all possible. Alternatively, the applicant may elect to select a halocarbon hand extinguisher using the safe-use W/V guidance for the specific compartment size presented in Appendix 4, paragraph 2 of FAA AC 20-42D. In the case of unpressurized aircraft, the safe-use guidance should be considered for the highest altitude for which the aircraft is certified.

3) The fire extinguisher use in the aeroplane's environment should be substantiated regarding Environmental qualification data that substantiates at least exposure to vibration and temperature cycling.

4) The fire extinguisher should be located for release and removal by the pilot in the seated position, should not interfere with the pilot's view or with the operation of other systems. When installed inside a stowage compartment, the extinguisher should be protected from damage caused by the shift of other items stowed inside the same compartment. Alternatively, a placard should be placed on the stowage compartment that contains the equipment, and should have the following text contents: 'For soft articles only', 'No stowage', or 'Emergency equipment only'.

5) The supporting structure used to accommodate the new fire extinguisher should be appropriately dimensioned. In case of installation in a location in which no handheld fire extinguishers was previously installed, it is acceptable to follow the guidance included in CS-STAN Amendment 4 (ref. paragraph 3 of Standard Change CS-SC109a).

6) The emergency procedures should be amended as appropriate.

7) The Instruction for Continuing Airworthiness (ICA) should be amended to establish maintenance actions/inspections and intervals, as required.

Note: In case of replacement of a Halon 1211[4] handheld extinguisher with a 2-BTP handheld extinguisher having the same UL rating, of similar dimensions, shape and mass (within a 10 % variation) and located in the same position, and the same accessibility (release and removal), no additional substantiation is necessary to demonstrate compliance in accordance with 1) thru 6). Adequate ventilation should be available in the compartment in which the extinguisher is discharged.

3.5. CS-25 Large aeroplanes

The following guidance should be applied to the design the installation of Halon-free handheld extinguishers on CS-25 types.

1) Compliance with CS 25.851(a)(6)

   CS 25.851 (a) (6) requires fire extinguishers located in the passenger compartment to contain an accepted extinguishing agent that is appropriate for the kinds and classes of fires likely to occur where used. Meeting the design criteria of FAA AC 20-42D is an acceptable means of compliance with CS 25.851(a)(6).

2) Compliance with CS 25.851(a)(7)

   CS 25.851(a)(7) requires that the quantity of extinguishing agent used in each extinguisher required by this paragraph be appropriate for the kinds of fires likely to occur where used. Meeting the design criteria of AC 20-42D referring to DOT/FAA/AR/01/37 is an acceptable means of compliance with CS 25.851(a)(7).

3) Compliance with CS 25.851(a)(8)

   CS 25.851(a)(8) requires that each extinguisher intended for use in a personnel compartment be designed to minimise the hazard of toxic gas concentration. The guidance of AC 20-42D is an acceptable means of compliance with CS 25.851(a)(8). Certain replacement agents addressed in AC 20-42D are identified as evaluated/approved for environmental and toxicological acceptability; however, neither this list of agents is exhaustive, nor does AC 20-42D address the expectation of evaluating the suitability of the proposed replacement agent to the intended airplane environment.

   Therefore, the applicant is requested to address all the criteria of Appendix 4 of FAA AC 20-42D (Effective throw ranges, Safe-use guidance, Extinguisher weight, Aircraft volumes and ventilation) for the used extinguishing agent of the handheld fire extinguisher. Agent concentration levels should not exceed the safe human levels after discharging the fire extinguisher. Data showing equivalency to the limits established for other agents in AC 20-42D should be established to support the compliance demonstration and from recognized sources such as industry standard(s), technical publication(s), or cognizant government or medical authorities. The agent concentration levels in occupied areas should be shown acceptable for the various phases of flight (taxi, climb, cruise, descent, etc.) and dispatchable ventilation and pressurization configurations. The compliance assessment should include the master minimum equipment list (MMEL) dispatch configurations that could adversely affect ventilation rates.

4) Additionally, the fire extinguishers used in the aeroplane's environment should be substantiated regarding the following aspects:

   a) Cabin pressure (i.e. ASTM, MPS Testing, etc. are conducted at sea level. The cabin will be at a higher pressure altitude)

   b) Environmental qualification data that substantiates vibration, and temperature cycling

   c) Throw distance

[4] This applies also to replacements of handheld extinguishers based on Halon 1301 or Halon blend (1211+1301).

d) Any life limit installation instructions/limitations and/or maintenance information for post-discharge actions.

3.6. CS-27 Small rotorcraft

The following guidance can be applied to the design the installation of handheld extinguishers on CS-27 small rotorcraft.

1) The type and quantity of extinguishing agent used in each extinguisher should be appropriate to the kinds of fires likely to occur where used. For small rotorcraft with a cabin volume up to 5.66 m3 (200 ft^3), it is acceptable to provide hand fire extinguishers with a U.S -UL 2B:C rating or equivalent. A handheld extinguisher with U.S -UL 2B:C rating or equivalent, is considered acceptable for installation also on aircraft cabin with volume up to 7.08 m3 (250 ft^3), but only if the following conditions are met:

   a. The cabin is not used for the carriage of cargo
   b. A fire risk assessment shows that the size of fire that can develop in the passenger cabin, considering the items that may be transported, is compatible with the performance of the available handheld extinguisher.

2) Each extinguisher intended for use in the pilot and/or passenger compartment should be designed to minimise the hazard of toxic gas concentration. A way to ventilate the compartment might be opening a window, if at all possible. Alternatively, the applicant may elect to select a halocarbon hand extinguisher using the safe-use W/V guidance for the specific compartment size presented in Appendix 4, paragraph 2 of FAA AC 20-42D.
   As CS-27 rotorcraft are unpressurized aircraft, the safe-use guidance should be considered for the highest altitude for which the aircraft is certified.

3) The fire extinguishers use in the aircraft's environment should be substantiated regarding Environmental qualification data that substantiates at least exposure to vibration and temperature cycling.

4) The fire extinguisher should be located for release and removal by the pilot in the seated position, should not interfere with the pilot's view or with the operation of other systems. When installed inside a stowage compartment, the extinguisher should be protected from damage caused by the shift of other items stowed inside the same compartment. Alternatively, a placard should be placed on the stowage compartment that contains the equipment, and should have the following text contents: 'For soft articles only', 'No stowage', or 'Emergency equipment only'.

5) The supporting structure used to accommodate the new fire extinguisher should be appropriately dimensioned. In case of installation in a location in which no handheld fire extinguishers was previously installed, it is acceptable to follow the guidance included in CS-STAN Amendment 4 (ref. paragraph 3 of Standard Change CS-SC109a).

6) The emergency procedures should be amended as appropriate.

7) The Instruction for Continuing Airworthiness (ICA) should be amended to establish maintenance actions/inspections and intervals, as required.

Note: In case of replacement of a Halon 1211[5] handheld extinguisher with a 2-BTP handheld extinguisher having the same UL rating, of similar dimensions, shape and mass (within a 10 % variation) and located in the same position, and the same accessibility (release and removal), no additional substantiation is necessary to demonstrate compliance in accordance with 1) thru 6). Adequate ventilation should be available in the compartment in which the extinguisher is discharged.

[5] This applies also to replacements of handheld extinguishers based on Halon 1301 or Halon blend (1211+1301).

3.7. CS-29 Large rotorcraft

The following guidance can be applied to the design the installation of Halon-free handheld extinguishers on CS-29 types.

1) Compliance with CS 29.851(a)(2)

CS 29.851 (a) (2) requires that the kinds and quantities of each extinguishing agent used must be appropriate to the kinds of fires likely to occur where that agent is used. Meeting the design criteria of FAA AC 20-42D is an acceptable means of compliance with CS 29.851(a)(2). For large rotorcraft with a cabin volume up to 5.66 m3 (200 ft^3), it is acceptable to provide hand fire extinguishers with a U.S -UL 2B:C rating or equivalent. A handheld extinguisher with U.S -UL 2B:C rating or equivalent, is considered acceptable for installation also on aircraft cabin with volume up to 7.08 m3 (250 ft^3), but only if the following conditions are met:

a. The cabin is not used for the carriage of cargo;

b. A fire risk assessment shows that the size of fire that can develop in the passenger cabin, considering the items that may be transported, is compatible with the performance of the available handheld extinguisher.

In case of replacement of a Halon 1211[6] handheld extinguisher with a 2-BTP handheld extinguisher having the same UL rating, no additional substantiation is necessary to demonstrate compliance with 29.851(a)(2). Adequate ventilation should be available in the compartment in which the extinguisher is discharged.

2) Compliance with CS 29.851(a)(3)

CS 29.851(a)(3) requires that each extinguisher intended for use in a personnel compartment be designed to minimise the hazard of toxic gas concentration. The guidance of AC 20-42D is an acceptable means of compliance with CS 29.851(a)(3). Certain replacement agents addressed in AC 20-42D are identified as evaluated/approved for environmental and toxicological acceptability; however, neither this list of agents is exhaustive, nor does AC 20-42D address the expectation of evaluating the suitability of the proposed replacement agent to the intended airplane environment.

Therefore, the applicant is requested to address all the criteria of Appendix 4 of FAA AC 20-42D (Effective throw ranges, Safe-use guidance, Extinguisher weight, Aircraft volumes and ventilation) for the used extinguishing agent of the handheld fire extinguisher. Agent concentration levels should not exceed the safe human levels after discharging the fire extinguisher. Data showing equivalency to the limits established for other agents in AC 20-42D should be provided to support the position and from recognized sources such as industry standard(s), technical publication(s), or cognizant government or medical authorities. The agent concentration levels in occupied areas should be shown acceptable for the various phases of flight and considering ventilation conditions. The compliance assessment should include the master minimum equipment list (MMEL) dispatch configurations that could adversely affect ventilation rates.

In case of replacement of a Halon 1211[7] handheld extinguisher with a 2-BTP handheld extinguisher having the same UL rating, no additional substantiation is necessary to demonstrate compliance with 29.851(a)(3).

3) Additionally, the fire extinguishers use in the aircraft environment should be substantiated regarding the following aspects:

a) Environmental qualification data that substantiates vibration, and temperature cycling

[6] This applies also to replacements of handheld extinguishers based on Halon 1301 or Halon blend (1211+1301).
[7] This applies also to replacements of handheld extinguishers based on Halon 1301 or Halon blend (1211+1301).

b) Any life limit installation instructions/limitations and/or maintenance information for post-discharge actions.

4. Supporting Data

4.1. References

It is intended that the following reference materials be used in conjunction with this Certification Memorandum:

Reference	Title	Code	Issue	Date
[1]	Regulation (EU) 2024/590			07/02/2024
[2]	Certification Specifications for Normal-Category Aeroplanes	CS-23	6	
[3]	Certification Specifications and Acceptable Means of Compliance for Large Aeroplanes	CS-25	28	
[4]	Certification Specifications, Acceptable Means of Compliance and Guidance Material for Small Rotorcraft	CS-27	10	
[5]	Certification Specifications, Acceptable Means of Compliance and Guidance Material for Large Rotorcraft	CS-29	12	
[6]	Certification Specifications for Standard Changes and Standard Repairs	CS-STAN	4	
[7]	Additional airworthiness specifications for operations	CS-26	5	
[8]	Hand Fire Extinguishers for Use in Aircraft	FAA AC 20-42D		14/01/2011
[9]	Alternative Agents for Aircraft Fire Extinguisher System	TCCA AC 500-030	2	18/06/2025

4.2. Abbreviations

AC	Advisory Circular
AMC	Acceptable Means of Compliance
ETSO	European Technical Standard Order
FAA	Federal Aviation Administration

MPS	Minimum Performance Standard
UL-Standards	Underwriters Laboratory Standards

4.3. Definitions

n/a	

5. Remarks

1. For any question concerning the technical content of this EASA Certification Memorandum, please contact:

Name, First Name: CANARI, Enzo
Function: Cabin Safety Expert
E-mail: enzo.canari@easa.europa.eu