

Advisory Circular

GUIDANCE FOR HALON REPLACEMENT FOR FIRE EXTINGUISHING AGENTS

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- 1 **GENERAL.** Pursuant to paragraph 88B of the Air Navigation Order, the Director General of the Civil Aviation Authority of Singapore (CAAS) may, from time to time, issue advisory circulars (ACs) on any aspect of safety in civil aviation. This AC contains information about standards, practices and procedures acceptable to CAAS. The revision number of the AC is indicated in parenthesis in the suffix of the AC number.
- 2 **PURPOSE.** This AC is to provide guidance to Chapter 3.10 of the Singapore Airworthiness Requirements (SAR) for the replacement of Halon as a fire extinguishing agent for use on aircraft.
- 3 **APPLICABILITY.** This AC applies to all Singapore-registered aircraft.
- 4 **CANCELLATION.** This AC supersedes AC SAR-1(0) dated 15 December 2011.
- 5 **EFFECTIVE DATE.** This Advisory Circular is effective on 15 December 2016.
- 6 **REFERENCES.**
 - Handbook for the Montreal Protocol on Substances That Deplete the Ozone Layer, 8th Edition, 2009
 - UNEP Report of the Halons Technical Options Committee Volume 1 – 2014 Assessment Report
 - FAA Report No. DOT/FAA/AR-99-63, Options to the Use of Halons for Aircraft Fire Suppression Systems
 - FAA Advisory Circular AC20-42D, Hand Fire Extinguishers for use in Aircraft
 - FAA Report DOT/FAA/AR-01/37, Development of a Minimum Performance Standard for Hand-Held Fire Extinguishers as a Replacement for Halon 1211 on Civilian Transport Category Aircraft
 - FAA Report DOT/FAA/AR-96/122, Development of a Minimum Performance Standard for Lavatory Trash Receptacle Automatic Fire Extinguishers
 - ICAO A39-WP/36, Update on the Development of Halon Alternatives For Aircraft Fire Extinguishing system
 - ICAO A39-WP/514, Report of the Technical Commission on Agenda Item 35

7 BACKGROUND.

- 7.1 Halogenated hydrocarbons (Halon) have been successfully used for decades by civil aviation for fire extinguishing purposes (halon 1211 and halon 1301), however, it is an ozone-depleting substance that contributes to climate change. Their production has been banned since 1994 with the signing of the *Montreal Protocol on Substances That Deplete the Ozone Layer*. However, their use have been allowed for certain critical usages, such as for fire protection in aviation, while the industry research for feasible alternatives.
- 7.2 At the 37th ICAO Assembly, after considering inputs from all stakeholders¹, ICAO adopted the prohibition of use of Halon as fire extinguishing agents in the lavatories for new aircraft with initial Certificate of Airworthiness issued on or after 31 December 2011 and in hand-held fire extinguishers for new aircraft with initial Certificate of Airworthiness issued on or after 31 December 2016. However, at the 39th ICAO assembly, the industry updated that the Halon replacement agent for portable fire extinguisher was only approved in September 2016 by the relevant environmental agencies and the manufacturers do not have sufficient time to produce and certify the portable fire extinguishers with Halon replacement agent for installation by 31 December 2016. In order not to disrupt aircraft deliveries, ICAO agreed to amend the applicability date for the implementation of Halon replacement agent for portable fire extinguishers. The applicable dates for the various areas of application are as tabulated in Table 1.

Table 1: Applicability dates for Halon replacement agent.

No	Area of application	Applicability dates for Halon replacement agent
1	Lavatory extinguishing systems and agents	Prohibited for aircraft with initial Certificate of Airworthiness issued on or after 31 December 2011.
2	Portable ² fire extinguisher	Prohibited for aircraft with initial Certificate of Airworthiness issued on or after 31 December 2018.
3	Engine and Auxiliary Power Unit (APU) fire extinguishing systems	Prohibited for which application for type certification received on or after 31 December 2014.
4	Cargo compartment fire suppression systems	Prohibited for which application for type certification is submitted in 2024 (specified date to be reviewed and determined).

- 7.3 Singapore Airworthiness Requirements (SAR) Chapter 3.10 had been promulgated with the ICAO requirements at the lavatory extinguishing systems and portable fire extinguisher.

8 MINIMUM PERFORMANCE STANDARDS FOR COMPLIANCE TO SAR CHAPTER 3.10 REQUIREMENTS.

- 8.1 Minimum Performance Standards (MPS) have been developed for all affected aircraft systems by the International Aircraft Fire Protection Systems Working Group established by the Federal Aviation Administration (FAA). MPS define tests to demonstrate that the performance of a replacement agent is able to meet and provide the equivalent level of safety to that of a Halon system.
- 8.2 CAAS may consider an alternative fire extinguishing agent acceptable to be used in an aircraft if it meets the Minimum Performance Standards (MPS) as specified below:
- a) Portable Fire Extinguisher and Agents:
Appendix A to FAA Report DOT/FAA/AR-01/37 dated August 2002.
- FAA Advisory Circular AC20-42D also contains information on the acceptable criteria in selecting fire extinguishers.

¹ Stakeholders include regulators, aircraft manufacturers, the International Aircraft System Fire Protection Working Group (IASFPWG) and fire extinguishing agent manufacturers.

² The term “portable” is equivalent to the term “handheld” in the context of this Advisory Circular.

- b) Lavatory Extinguishing Systems and Agents:
Appendix D to FAA Report DOT/FAA/AR-96/122 dated February 1997.

As specified in the MPS, the alternative agent must have the ability to extinguish a Class A fire and, in case of discharge, does not create an environment that exceeds the chemical agent's 'No Observable Adverse Effect Level' (NOAEL).

- 8.3 HFC-227ea, HFC-236fa and 2-BTP are considered acceptable alternative fire extinguishing agents by CAAS in meeting the MPS.
- 8.4 For the use of any alternative agent other than those contained in the aforementioned paragraph, operators should carry out their assessment based on the MPS and submit applications to CAAS for acceptance.

9 CONTACT INFORMATION.

- 9.1 Should you have any queries relating to the above, please email to CAAS_AFO_Infocenter@caas.gov.sg.