DIRECTORS GENERAL OF CIVIL AVIATION-MIDDLE EAST REGION

Second Meeting (DGCA-MID/2)
(Jeddah, Saudi Arabia, 20-22 May 2013)

Agenda Item 6: Aviation Safety

UPDATE ON THE DEVELOPMENT OF HALON ALTERNATIVES FOR AIRCRAFT FIRE EXTINGUISHING SYSTEMS

(Presented by the Secretariat)

SUMMARY

The production of halogenated hydrocarbons (halon), which have been the main fire extinguishing agent used in civil aircraft fire suppression systems, was banned in 1994 with the signing of the Montreal Protocol on Substances that Deplete the Ozone Layer. This was mainly due to its ozone depleting and global warming characteristics; nevertheless, halon is still widely used in civil aircraft fire suppression systems today. The 37th Session of the Assembly established timeframes for the replacement of halon in lavatories, engines, auxiliary power units (APUs) and handheld fire extinguishers. Subsequently, the Council adopted international Standards on 13 June 2011. This paper presents the development of halon alternatives for aircraft fire extinguishing systems.

1. BACKGROUND

1.1 The 37th Session of the Assembly directed the Council to establish a mandate for the replacement of halon. Assembly Resolution A37-9 also directed the Council to report at the next ordinary session of the Assembly on the status of halon reserves, the progress made on the development of halon alternatives for cargo compartments and engine/auxiliary power unit (APU) fire extinguishing systems, and the status of halon alternatives for hand-held fire extinguishers.

1.2 Subsequently, in response to the resolution, the Council of ICAO adopted new Standards on 13 June 2011, for halon replacement in hand-held, lavatory, engine and APU fire extinguishers contained in Annex 6 — *Operation of Aircraft* and Annex 8 — *Airworthiness of Aircraft*.

1.3 The Standards mandate the use of an alternative agent to halon for:

a) lavatory fire extinguishing systems used in aircraft produced after 31 December 2011;

b) hand-held fire extinguishers used in aircraft produced after 31 December 2016; and

c) engine and auxiliary power unit fire extinguishing systems used in aircraft for which application for type certification will be submitted after 31 December 2014.

1.4 Minimum performance standards (MPS) have been developed for all four affected aircraft systems by the International Aircraft Fire Protection Systems Working Group. This group was established by the United States Federal Aviation Administration (FAA) to explore the viability of halon alternatives. MPS describes the tests that shall be executed to demonstrate that the performance of a replacement agent provides the level of safety equivalent to a halon system.

2. DISCUSSION

2.1 Halon replacement agents

2.1.1 Two halon replacement coordinating meetings with regulators, international organizations, aircraft and fire suppression manufacturers were held in November 2011 and 2012. The meetings reviewed the status of potential halon alternatives, affirmed the agreed upon implementation dates and discussed the progress made in developing halon alternatives for cargo compartments.

2.1.2 Halon replacement agents for fire extinguishers in aircraft lavatories are presently available and several manufacturers have begun installation. The installation of halon replacement in the lavatory is considered to be a “drop-in” replacement.

2.1.3 Three alternatives are currently approved and available for use in hand-held extinguishers. They have an average weight penalty of two times the current halon extinguishers and although all three alternatives have a global warming potential (GWP), there is no current prohibition on their use in aviation.

2.1.4 There is a fourth promising halon replacement agent, 2BTP, which is reported to be neither a greenhouse gas nor an ozone depleting substance, and is considered a “drop-in” replacement. The agent has passed MPS testing and is in the final stage of testing and approval, with commercializatio for aviation expected sometime in 2014. In the event that a “drop-in” halon replacement agent is not available by 2016, the aircraft manufacturers have agreed to put into service the approved hand-held halon fire extinguishing agents in order to meet the 2016 deadline.

2.1.5 Regarding halon replacement agents for engines and APUs, three agents have been successfully tested to the MPS. Although one of three alternatives has a significant GWP, the agents have very little to no ozone-depleting potential (ODP) and there is currently no prohibition on their use for aviation. Research and development is progressing and one agent, HFC-125, is currently approved and is in use by the military, despite its weight and volume penalty. Another promising agent has been successfully tested to the MPS but could not extinguish a live-engine fire during testing. Additional research and development is in progress.

2.1.6 For halon replacement in cargo compartments, an integrated fire protection water mist/nitrogen system is the only alternative that passed the MPS. Although it is a promising concept, it requires significant development and acceptance. This approach uses an agent to knockdown the initial fire flames followed by the on-board inert gas generation system installed on aircraft to reduce fuel tank flammability, to control the fire.

2.1.7 The establishment of a timeframe for the replacement of halon in cargo compartment fire extinguishing system remains a challenge. During the last ICAO International Halon Replacement Coordinating Meeting (IHRCM/3), the International Coordinating Council of Aerospace Industries Associations agreed to coordinate a collaborative approach involving all stakeholders in order to develop an industry recommendation for a halon replacement timeframe for cargo compartment. A working group has been established to submit a comprehensive recommendation with supporting documentation to ICAO by 31 December 2015 in order to introduce a recommendation at the next ordinary session of the Assembly in 2016.

2.2 Halon reserves

2.2.1 Until alternatives are available for all aircraft fire extinguishing systems, the aviation industry will continue to depend on halon reserves. In support of Resolution A37-9, the Secretary General issued a State letter requesting information on halon reserves accessible to the civil aviation industry within each State to support future operations.

2.2.2 Fifty three States replied to the State letter. Most States were unsure if their halon reserve would suffice for the aviation needs of their State, while others responded that their aviation industry relies on outside sources to provide the required halon.

2.2.3 The limited number of replies gives evidence that States do not know how much halon reserves are available to civil aviation. Although the United Nations Environment Programme (UNEP) has a process to estimate global halon reserves, the amount of halon available for civil aviation applications is unknown.

2.3 Contaminated halon

2.3.1 The global aviation supply of halon is now exclusively obtained from recovery, reclaiming and recycling. As time progresses from the end dates of production, halon is more difficult to recycle due to cross contamination. The cost to procure and recycle halon has also increased 100 per cent in the past five years.

2.3.2 Contaminated halon were released to the aviation industry for use in fire-fighting equipment. Based on this, the European Aviation Safety Agency (EASA) issued an emergency airworthiness directive and has subsequently issued four additional airworthiness directives to address contaminated halon in hand-held fire extinguishers. The FAA has also issued an airworthiness directive to address contaminated halon in hand-held fire extinguishers. To avoid any further occurrences with other Member States, the Secretary General issued a State letter urging States to ensure their aviation industry utilize halon that has been recycled to an international or State-recognized performance standard.

2.3.3 Halon contamination is an issue and the quality of halon depends on the quality of the recycling process, as was emphasized in Resolution A37-9. In response, States have taken measures to minimize the probability that non-compliant/contaminated agents are installed on aircraft. The European Aviation Safety Agency (EASA) has initiated a rulemaking task responding to the need to protect against the use of contaminated halon in maintenance, production and air operator organisations. Transport Canada in cooperation with the FAA, the United Kingdom Civil Aviation Authority and EASA have accordingly undertaken a study to identify means to minimize the probability that non-compliant or contaminated agents are installed on aircraft. The project comprises two phases. The first is to document the processes currently in use in North America and Europe, and the second is to identify best practices, deficiencies and gaps, as well as develop proposed standardized quality protocols.

3. ACTION BY THE MEETING

3.1 The Meeting is invited to note the development of halon alternatives for aircraft fire extinguishing systems.

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