



WORKING PAPER

ASSEMBLY — 39TH SESSION

TECHNICAL COMMISSION

Agenda Item 35: Aviation safety and air navigation standardization

HALON REPLACEMENT – CHALLENGES AND SOLUTIONS

(Presented by the International Coordinating Council of
Aerospace Industries Associations (ICCAIA))

EXECUTIVE SUMMARY

Action has been taken by the aerospace industry in line with previous agreements, to introduce halon alternatives for fire protection in aircraft and to engage stakeholders in finding solutions. The manufacturing industry has consistently worked toward these objectives and has been active in researching halon alternatives. Progress has been made in all areas, i.e. engines and auxiliary power units (APUs), hand held extinguishers and cargo compartments. Significant hurdles remain. This paper explains progress made and identifies the hurdles and expectations with respect to completing the work.

Action: The Assembly is invited to:

- a) with respect to engines/APUs, note that a new industry consortium has been established which expects to complete its work in 2017 at which time recommendations could be expected;
- b) with respect to cabin/cockpit handheld fire extinguishers, note that the applicability dates for Standards in Annex 6 — *Operation of Aircraft*, may not be met by States and industry; however, substitute agents have been identified and are currently undergoing a complex approvals process. The total slippage from the applicability date is expected to be about two years;
- c) with respect to the cargo compartment:
 - 1) note that industry is committed to meeting a deadline for development of an alternative agent and/or novel fire suppression system architecture by 2024. Therefore, a deadline for new Type Certification application submittal on or after December 31st, 2024 is recommended;
 - 2) affirm the current ICAO position that retrofit of existing halon based systems should not be required. Any retrofit approach would be economically impractical due to substantial changes required in the aircraft and aircraft system architecture as well as the costs and risks associated with decommissioning existing systems;
- d) consider that the Cargo Compartment Halon Replacement deadline recommended at the time of the 39th Session of the Assembly is not yet based on a fully “conceptually validated” halon-free fire suppression system. As such, significant fire safety, technical and airworthiness risks remain and may endanger timely compliance with the recommended deadline; and
- e) taking into account the industries’ status noted above, and to implement a means to further continue exchanging progress information until, and at the 40th Session of the ICAO Assembly in 2019, a revised date may be proposed.

<i>Strategic Objectives:</i>	This working paper relates to the Safety, Environmental Protection and Economic Development of Air Transport Strategic Objectives.
<i>Financial implications:</i>	
<i>References:</i>	A38-WP/36, TE/2 Doc 10022, <i>Assembly Resolutions in Force</i> (as of 4 October 2013)

¹ English, Arabic, Chinese, French, Russian and Spanish versions provided by ICCAIA.

1. STATUS OF HALON ALTERNATIVES & STAKEHOLDER ENGAGEMENT

1.1 Lavatory systems

1.1.1 For aircraft designed and produced by original equipment manufacturers (OEM's), manufactured by ICCAIA members, implementation of halon free lavatory fire protection systems has now been achieved in new type designs in accordance with Annex 8.

1.2 Cabin and Flight Deck Handheld Extinguishers

1.2.1 Development and testing has been underway for a promising replacement, however, complex approvals processes are required by regulatory authorities and still pending one new, environmentally preferred alternative. This will likely lead to a delay in meeting the date established in Annex 6 — *Operation of Aircraft*. Total slippage is expected to be about two years.

1.3 Engine/APU Systems

1.3.1 After years of unsuccessful testing on promising halon alternatives, the major manufacturers agreed to cooperate in an industry consortium to combine stakeholders' efforts and resources to identify a generic "best choice" for a fire extinguishing agent and system in support of both the ICAO and European Union (EU) 2014 deadlines for halon replacements in new type certification aircraft. Follow on exploratory discussions by industry continuing through 2013 and into 2014 resulted in signature of a formal agreement between Airbus, Boeing, Bombardier, Embraer, Textron and Ohio Aerospace Institute in October 2014 to initiate and fund activities to form the Halon Alternatives for Aircraft Propulsion Systems (HAAPS) consortium (See press-release: http://www.aia-aerospace.org/news/iccaia_supports_international_consortium_seeking_alternatives_to_halon_fire_suppr essant/).

1.3.2 Development of a formal working-together agreement and schedule were well underway by mid-2015 with follow-on outreach to other key stakeholders planned to occur before the end of 2015. The end of 2017 is tentatively set as a goal to complete the consortium's activities at which time recommendations can be expected.

1.4 Cargo compartment system

1.4.1 Since ICCAIA last provided a status report on the work of the Cargo Compartment Halon Replacement Working Group (CCHRWG) at the last Assembly, the group has been developing documentation as part of a commitment to deliver its recommendation by the time of this Assembly. A core group and a "technical specialists" subgroup met twice per month to discuss and document the technical and regulatory basis for a proposed deadline. These documents were shared with over fifty stakeholders (fire suppression system and agent suppliers, airworthiness authorities and research institutions) during multiple teleconferences and six face-to-face meetings (a more detailed summary and key documents - Terms of Reference (ToRs), Deadline Options, Table listing members, Org structure - are provided at : <http://www.iccaia.org/Documents/A39WP-supporting-document-halon.pdf>).

1.4.2 The ICCAIA CCHRWG recommendation to ICAO is based on industry expectation that a cargo compartment halon replacement system will be available for new aircraft designs in approximately nine years. Therefore, a deadline for new Type Certification application submittal on or

after December 31st, 2024 and no retrofit of existing halon systems is recommended by the CCHRWG. However, with industry support, ICAO is recommended to periodically review the status of “conceptually validated” halon replacement candidate systems (as opposed to generic agents and/or components) to ensure the technology readiness level (TRL) is aligned with the industry’s generic development timeline and expectations. If a candidate system with prototype components for the cargo compartment has not been defined and planned for laboratory validation (actively being worked in TRL 4 or 5) by the 40th Session of the ICAO Assembly, the reasons for not adhering to the timeline will need to be identified and ICCAIA will propose a revised date if the situation warrants.

2. CONCLUSION

2.1 The aircraft manufacturing industry has established mechanisms for stakeholder engagement, essential to achieve safe, environmentally responsible and cost-effective solutions for replacement of halon. While much work has been done, implementation of halon replacement in engine/APU fire suppression applications is dependent upon further testing and certification by regulatory authorities and implementation of halon replacement in handheld fire extinguishers has been delayed due to complex agency approvals. These are risks to allow timely compliance with Annex 6 and 8 Standards.

2.2 While challenges remain for cargo compartment fire suppression applications, a concerted effort involving all stakeholders under ICCAIA leadership has resulted in a realistic target date for halon replacement, submitted in good time for the 39th Session of the Assembly in 2016.

2.3 This ICCAIA working paper conveys the manufacturing industries’ recommendation for a halon replacement deadline for normally unoccupied cargo compartments in new aircraft types. This industry-led effort to achieve common solutions and realistic timeframes is worthy of recognition and collaboration/support by States.

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