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“Reassessing Carbon Dioxide with Minimum Performance Testing for Aircraft Powerplant Halon Replacement.”

Carbon dioxide (CO₂) is a fire extinguishing agent with a known character and history of use in- and outside of aviation. Of its many such uses, CO₂ historically protected aircraft powerplant fire zones, which relates in part to specification found in the guidance of Federal Aviation Administration (FAA) Advisory Circular (AC) 20-100. As time progressed from its use in earlier aviation, it fell from favor synchronously with the onset of the halogenated fire-extinguishing agents, ironically which themselves now require replacement.

When reviewing the traits and capabilities of halon 1301 (bromotrifluoromethane) related to its development and service in this application and considering certain analogies offered in this context, then applying them to CO₂, CO₂ may offer the option as a halon-replacement candidate. One key element in these considerations is the required CO₂ design concentration identified in FAA AC 20-100. If this design concentration can decrease, other systemic aspects may favorably alter so use on a modern aircraft becomes possible.

Given this potential, personnel from the FAA and Technology and Management International (TAMI, an FAA support contractor) conducted testing in 2016 with CO₂ to assess its parity with halon 1301 and here report the experiences and outcomes. The testing occurred consistent with the fourth revision of the “Minimum Performance Standards for Halon 1301 Replacement in the Fire Extinguishing Agents/Systems of Civil Aircraft Engine and Auxiliary Power Unit Compartments” (MPSHRe rev04). The MPSHRe rev04 is a working draft document that prescribes test fixture, environment, and process to assess halon-replacement candidates for possible use in the powerplant fire extinguishment system of a transport-category aircraft.