

**THE TENTH TRIENNIAL INTERNATIONAL AIRCRAFT FIRE AND CABIN SAFETY
RESEARCH CONFERENCE**

**“Identification and Lab Scale Testing of New Fire Extinguishing Agent Blends as a Cargo
Compartment Halon Replacement”**

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Abstract

The search for acceptable replacements for Halon 1301 for cargo compartments has been on-going for over two decades. Various replacement fire suppression agents have been proposed and evaluated but none have been found to be acceptable and put forward for certification. In 2004 the candidate agent 2-bromo-3,3,3-trifluoropropene (2-BTP) was shown to enhance combustion in the exploding aerosol can test. Similar behaviour was observed with HFC-125 and the fluoroketone Novec 1230 [1] This effectively eliminated two widely used classes of suppressants in ground-based suppression applications.

In 2014 Kidde proposed a test method to “screen” agents rapidly and at low cost. This method was to examine the performance of candidate agents at sub-inert concentrations against very lean propane-air explosions, just above the lower explosive limit (LEL). Testing with HFC-125 and Novec 1230 closely mirrored these agents’ behaviour in the full-scale aerosol can test [2]. It was concluded that when used at sub-inerting concentrations and at lean propane-air mixtures the agents were exhibiting “fuel-like” behaviour.

At the ninth Triennial Conference in 2019, Kidde reported investigations into blends of agents using the screening test described above [3]. Blends of CF₃I with HFC-125, Novec 1230 and HCFO-1233zde were tested. For each blend the minimum quantity of CF₃I to render the blend “non-flammable” was determined. This gave interesting insights into the extent of the fuel-like behaviour of some of these less stable suppressants.

Having defined several blends it is then possible to draw up trade tables of weight and volume efficiency compared with halon 1301 and other agents.

This paper is a continuation of this work. Results will be presented of further blends of CF₃I and other fire suppression agents.

References

[1] “Behaviour of Bromotrifluoropropene and Pentafluoroethane When Subjected to a Simulated Aerosol Can Explosion”, John W. Reinhardt, DOT/FAA/AR-TN04/4 (May 2004)

<https://www.fire.tc.faa.gov/pdf/TN04-4.pdf>

[2] “Halon alternatives for aviation Behaviour of fluorinated compounds at sub-inert concentrations in explosion suppression” Josephine Gatsonides and Adam Chattaway at the International Aircraft Systems Fire Protection Working Group Meeting, Bremen, Germany, May 14-15, 2014.

<https://www.fire.tc.faa.gov/pdf/systems/May14Meeting/Gatsonides-0514-HalonAlt.pdf>

[3] “Lab-scale Evaluation of Potential Agents for Cargo Compartment Fire Suppression”, Adam Chattaway, Ninth FAA Triennial Conference, Atlantic City, October 28-31, 2019

https://www.fire.tc.faa.gov/2019Conference/files/Cargo_Halon_Replacement_I/ChattawayInertingSphere/ChattawayInertingCF3IBlendsPres.pdf