

# Handheld Fire Extinguisher Optimization Update

Systems Working Group Meeting  
Long Beach, CA

By: Robert Morrison

Date: November 14 - 15, 2012



Federal Aviation  
Administration



# Background

Civil aviation has seen an increase in Halon 1211 hand-held fire extinguisher (HHFE) in-use restrictions since the 1989 Montreal Protocol.

- Most recent cut-off dates for aviation
  - International Civil Aviation Organization(ICAO)
    - 2015 for new aircraft production
    - 2017 for new aircraft type certificate
  - European Aviation Safety Agency (EASA)
    - 2015 for new aircraft production
    - 2025 for new aircraft type certificate
  - Underwriters Laboratories (UL)
    - Pulling its UL 1093 Certification in October 2014.
      - Dated March 2009, Withdrawal of the Fifth Edition of the Standard for Halogenated Agent Fire Extinguishers

# Background

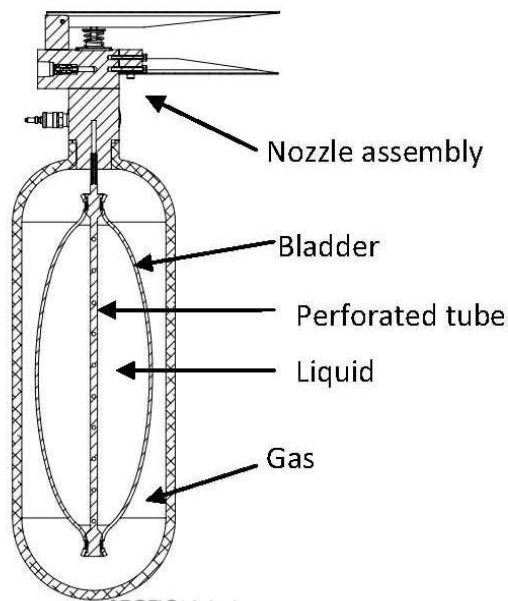
The FAA went out with a solicitation for the redesign or optimization of an aircraft HHFE to replace the Halon 1211 5BC unit currently on civilian transport aircraft that will contain an Environmental Protection Agency (EPA) approved streaming agent on the Significant New Alternatives Policy (SNAP) list

After reviewing many proposals, the FAA was interested in developed research that was already being used inside the NASA International Space Station in the form of a fine water mist extinguisher created and patented by ADA Technologies.

The FAA's decision was to continue NASA's previous work and awarded a Phase III Small Business Innovative Research (SBIR) contract to ADA Technologies in September 2012.

# Accepted Design

The design calls for Novec 1230, a fluoroketone (FK) known as FK 5-1-12, stored in a pressurized elastomeric bladder, pressurized to 500 psi with nitrogen, and discharged through a fine-mist delivery system. This design generates a fine halocarbon mist with droplets averaging 30 – 50  $\mu\text{m}$  in diameter and can be operated upside down with no loss of performance thus offering excellent firefighting capability.



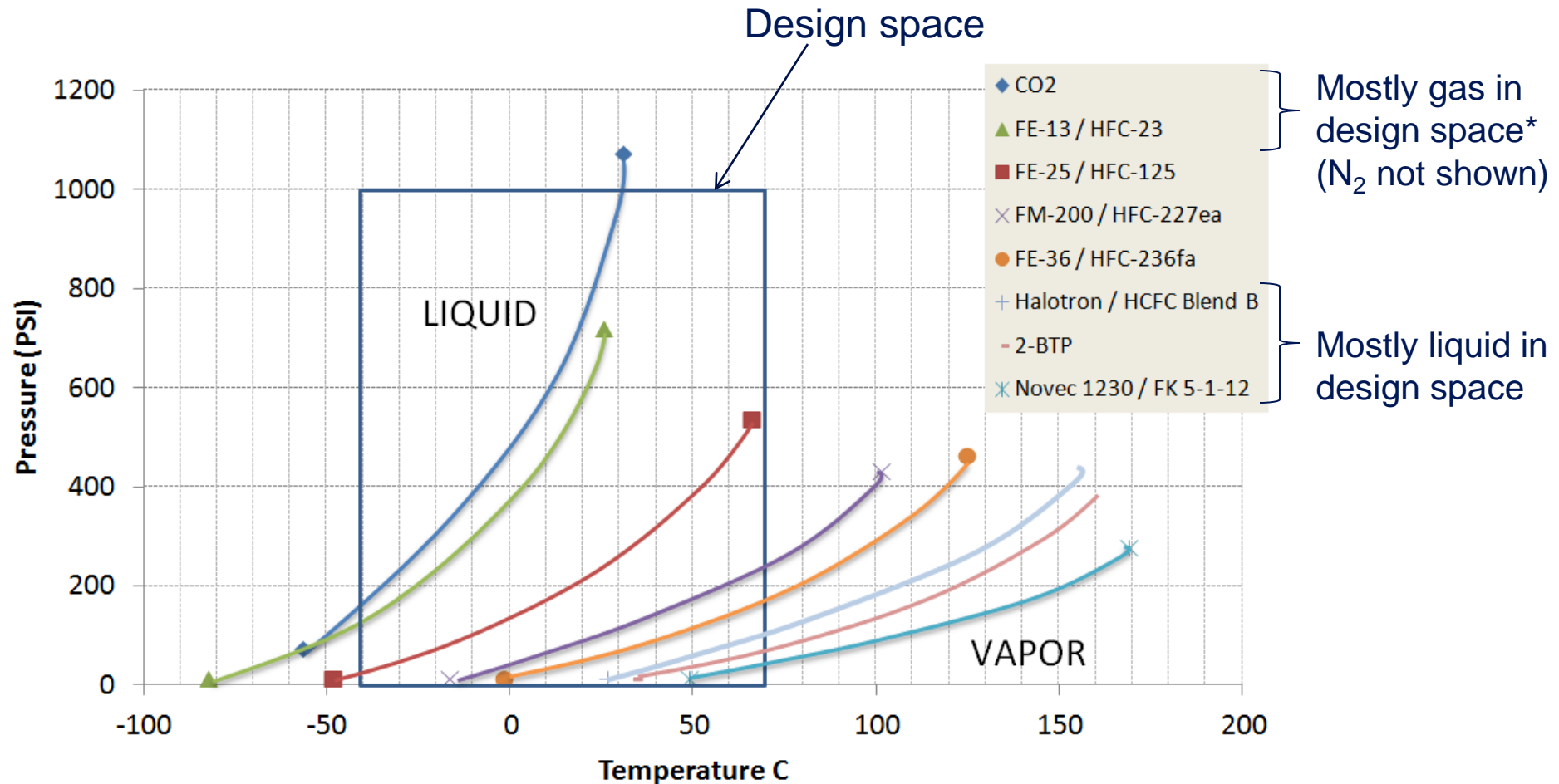
# Current Status

- Held Kick-off Meeting on Tuesday, November 13, 2012.
- Discussed Status and performance related to AC20-42D

Requirement	Description	Proposed Design
UL Approved	At least 5B:C per UL 711 standards	Class C requirement met. Class 5B not tested yet.
EPA SNAP Approval	Listed by EPA	Requirement met
FAA Hidden Fire Test	Extinguish at least 9 out of 20 heptane cups	Requirement met
FAA Seat Toxicity Test	Extinguish fire and limit toxic by-products formation	Not tested yet
Temperature Envelope	-65°F to 120°F	Requirement met
Minimum Throw	8 feet or more	Requirement met
Corrosivity	Not corrosive	Requirement met

# Thermophysical properties of potential agents

FHM Concept requires 1 Liquid and 1 Gas for proper mixing and atomization



\* CO<sub>2</sub> and FE-13 may be liquid at low temperatures

# Planned Work

- Objectives
  - Continuously improve the design of the Novec/nitrogen HHFE so that it achieves the required weight, size, and fire suppression performance.
  - Demonstrate fire suppression performance in full-scale fire tests at the FAA W.J. Hughes Technical Center.
    - FAA Hidden Fire Test
    - FAA Seat Fire Test
    - UL 711 Class 5B Fire Test.
    - Demonstrations planned for March 2013 and June 2013.

