AIRCRAFT FUEL-TANK UHHA≤ INERTING USING FIRST-GENERATION HALON-REPLACEMENT AGENTS

Sponsored by: THE JOINT TECHNICAL COORDINATING GROUP ON AIRCRAFT SURVIVABILITY

ON OPTIONS TECHNICAL WORKING CONFERENCE
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AIRCRAFT FUEL-TANK ULLAGE INERTING USING FIRST-GENERATION HALON-REPLACEMENT AGENTS

**OBJECTIVE**

- Determine ullage protection requirements using agents that will be available in the future.
AGENTS TESTED

- PFC-410
- FM-200
- AZ-20
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TEST SETUP

- SIMULATED
  UHVAG IS A 30 CUBIC FOOT STEEL TANK

OTHERS: T4 - bomb sampling system
T5 - test area, ambient temp.
P6 (ambient)
Oxygen Sensor
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TEST PROCEDURE

- FUEL USED TO GENERATE EXPLOSIVE MIXTURE
  - JP-4S @ 3% CONCENTRATION
  - JP-4S IS A JP-4 FUEL VAPOR SIMULANT AND CONSISTS OF 15 DIFFERENT HYDROCARBONS
TEST PROCEDURE CONT.

FIVE DIFFERENT IGNITION SOURCES:

- 110gr FRAGMENT
- 12.7mm API
- 23mm 4FI
- 38mm HEI
RESULTS

Ullage Explosion Suppression Test
(110 GR. Frag.)

Simulator Pressure (psig)

Agent Concentration (%)

- AZEOTROPE
- FM-200
- PFC-410
RESULTS CONT.

Ullage Explosion Suppression Test
(12.7mm API)

Simulator Pressure (psig)

Agent Concentration (%)

- □ AZEOTROPE
- ▲ FM-200
- ○ PFC-410
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RESULTS CONT.

Ullage Explosion Suppression Test
(23mm HEI)

Simulator Pressure (psig)

Agent Concentration (%)
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COMPARISON TO HALON 1301

Ullage Explosion Suppression Comparison (23mm HEI)

- AZ-20, 60/40
- FM-200
- PFC-410
- 1301, AFFDL-TR-78-66
COMPARISON CONTINUED

Ullage Explosion Suppression Test (23mm HEI)

- AZ-20, 60/40
- FM-200
- PFC-410
- HALON 1301

Normalized delta P vs Weight Factor
CONCLUSION

- The protection levels have been defined for the four threats presented.
- For the comparison made to Halon 1301 inverting, Halon was not optimum.