

# Cargo Compartment Halon MPS

## Water Mist / Nitrogen Fire Suppression System Update

Presented to: International Aircraft Systems Fire Protection Forum Meeting

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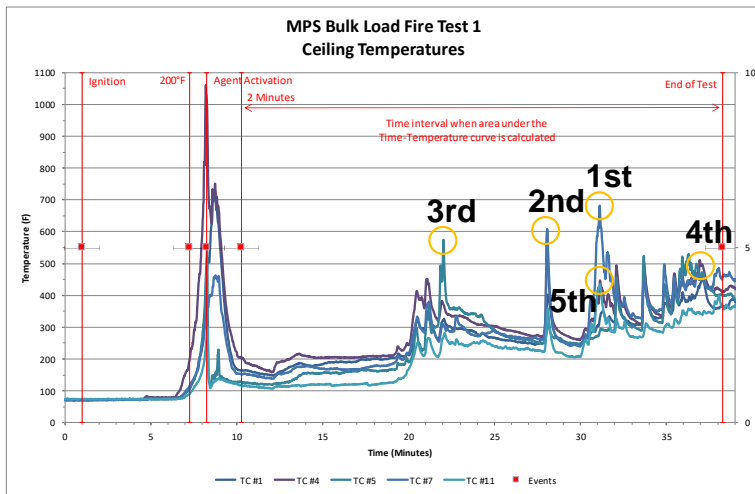
**Federal Aviation  
Administration**

# Background

- MPS for Halon replacement in cargo compartment was conducted at the Tech. Center in 2017.
- Results presented at the November 2017 and May 2018 Systems meetings.
- An error was observed in the way the results were analyzed.
- Reporting the updated analysis of the results.



# Old Analysis

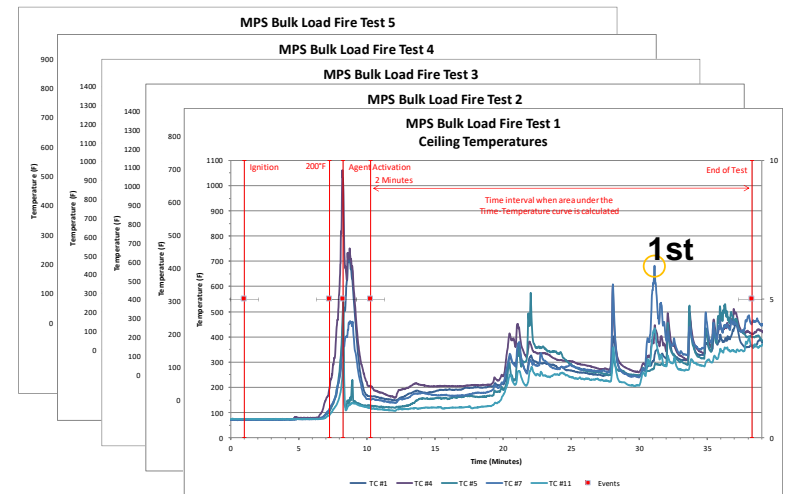


peak	TC #	Temperature
1st	#7	682.1 °F
2nd	#4	599.7 °F
3rd	#5	574.9 °F
4th	#1	474.3 °F
5th	#11	434.8 °F

Average of Test #1 553.1 °F      Average over all Tests 365.8 °F  
 Acceptance Criteria 710.0 °F      Acceptance Criteria 710.0 °F

**Comparison Average vs. Criteria is done for average of highest 5 peaks of each individual Test out of the total of 5 Tests.**

# New Analysis



Test	peak	Temperature
#1	1st	682.1 °F
#2	1st	444.3 °F
#3	1st	485.4 °F
#4	1st	314.3 °F
#5	1st	304.9 °F

Average over all Tests 446.2 °F  
 Acceptance Criteria 710.0 °F

**Comparison Average vs. Criteria is done for average of highest single peak of each Test over all Tests.**



# New Analysis

Test Scenario	Bulk Load Fire Scenario		Containerized Fire		Surface Burning (Pan) Fire		Aerosol Can Simulation
Units	Peak Temp (°F)	Time-Temp (°F-min)	Peak Temp (°F)	Time-Temp (°F-min)	Peak Temp (°F)	Time-Temp (°F-min)	Pressure Rise (psi)
Test 1	682.08	8346.14	535.22	11230.63	121.25	337.02	0
Test 2	444.25	7081.32	409.05	9516.78	174.25	370.03	0
Test 3	485.38	7633.35	543.13	9264.23	129.16	374.83	0
Test 4	314.26	5737.17	610.6	11064.04	130.88	354.83	0
Test 5	304.90	6132.39	432.39	9631.78	146.57	372.49	0
Average	446.17	6986.07	506.11	10141.49	140.42	361.75	N/A
Std. Dev.	137.52	955.65	74.87	831.50	18.80	14.29	N/A
Acceptance Criteria	710	9850	650	14520	560	1190	0
Std. Dev.	78.9	438.1	44.8	942.1	16.8*	21.6	N/A
Performance Margin	37%	29%	22%	30%	75%*	70%	N/A

- Peak temperatures and time-temperature integral were calculated as averages of 5 highest results of each test and then compared to the scenario criteria
- Actual method is to average the top result from each test and then compare to the scenario criteria.
- \* The standard deviation in the 2012 Cargo MPS document was calculated incorrectly. This will be brought up in the Cargo MPS Task Group meeting.



# System Performance

- The Water mist / Nitrogen system still passes the MPS' acceptance criteria.
- The system performs better than Halon as defined by the peak temperature and time-temperature integral criteria.
- The performance margins for each of the fire test scenarios are smaller than previously reported.



# Questions?

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