

Class E Cargo Compartment Smoke Detection and Active ULD Testing



Federal Aviation
Administration



Presented to: International Aircraft Systems Fire
Protection Working Group. Cologne, Germany

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Date: May 19-20, 2009



*UPS DC-8
Feb. 7, 2006
Philadelphia, PA*



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Cockpit Voice Recorder Transcript¹

2333:44 Aircraft cleared to descend from FL 330 to FL 240

2334:39 “Smell like wood burning”

2335:40 “It’s pretty strong now”

2335:54 Cockpit door opened “It’s more in the back”

2338:39 One pack turned off

2343:18 “Fume evacuation”

2343:27 Packs on max flow, recirc fan off

2347:59 Cockpit door opened again “It’s definitely stronger in the back. No haze or smoke when I shined my light back there” At FL 40

2354:42 “Cargo smoke detectors on” At FL 20

2355:48 Landing gear down

2355:57 “Lower cargo compartment aft smoke detectors on”

2359:00 Touch down

2359:02 “Smoke in cockpit”

2359:45 End of transcript. Crew evacuated through L1 door

¹ Source: NTSB Accident Report



NTSB Recommendation A-07-98 to the FAA.

“Ensure that the performance requirements for smoke and fire detection systems account for the effects of cargo and cargo containers on airflow around the detection sensors and on the containment of smoke from a fire inside a container and should establish standardized methods of demonstrating compliance with those requirements. (A-07-98) “





727 Freighter

Main Deck Airflow approximately one air change every 5.1 minutes (11.8 air changes/hour). Air from one pack supplied with APU bleed air.



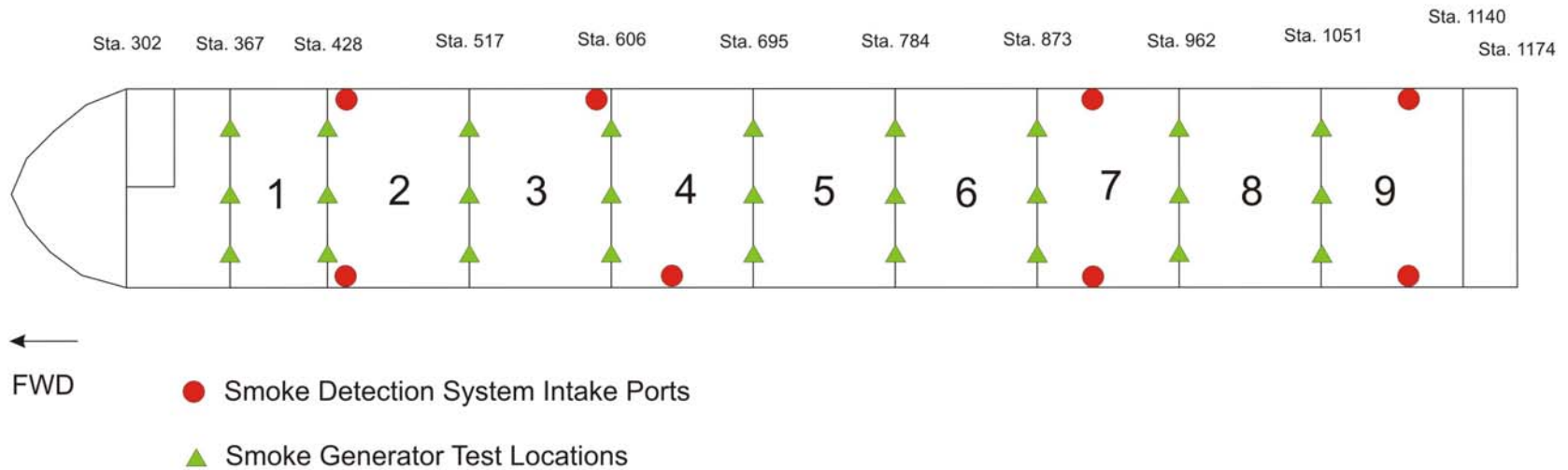


**4 Aspirated Photoelectric
Smoke Detectors (94-96%
light transmission/ft alarm
point)**



**Certified to one minute
detection time (FAR 25.858)**





727 Freighter 88" cargo container positions



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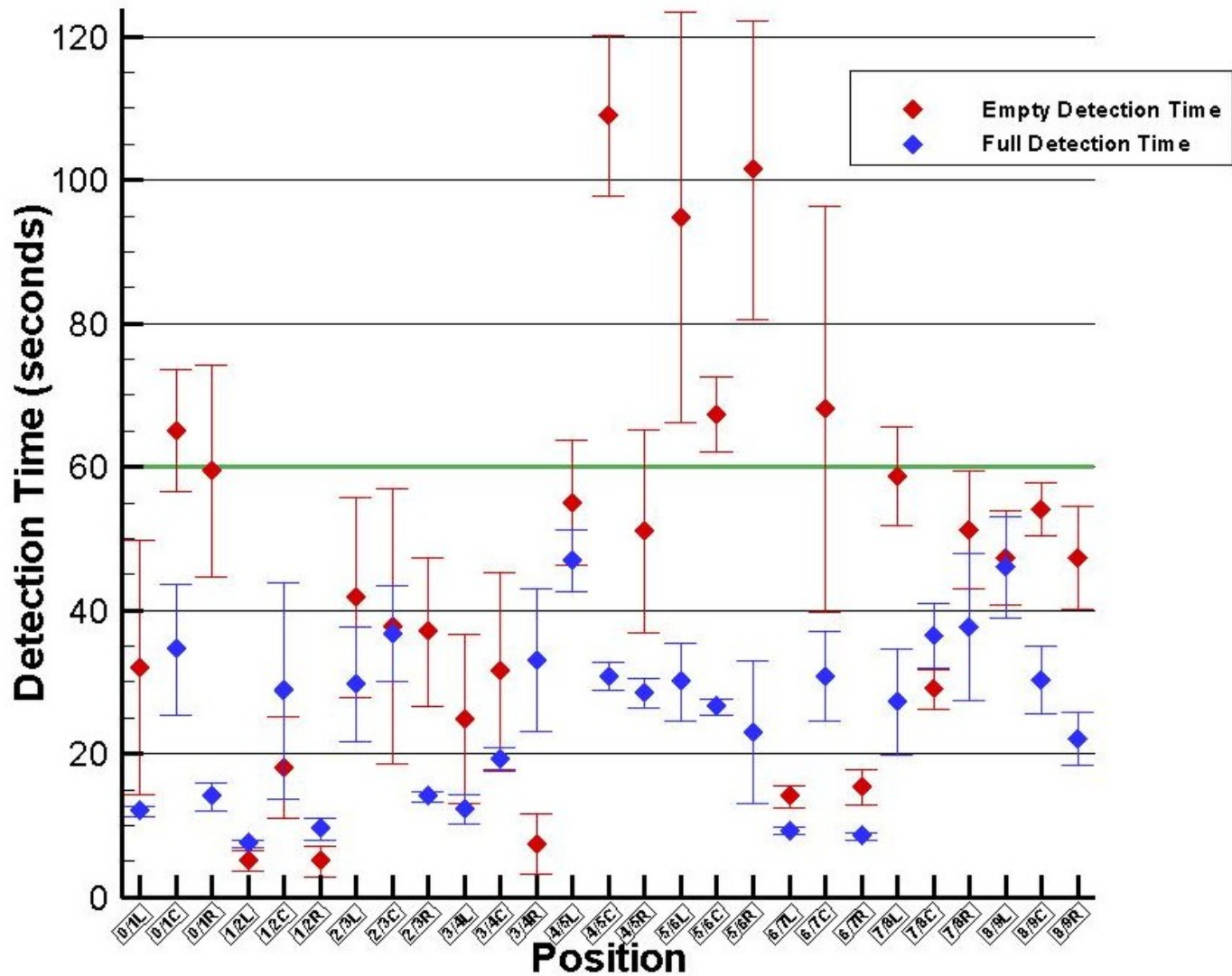
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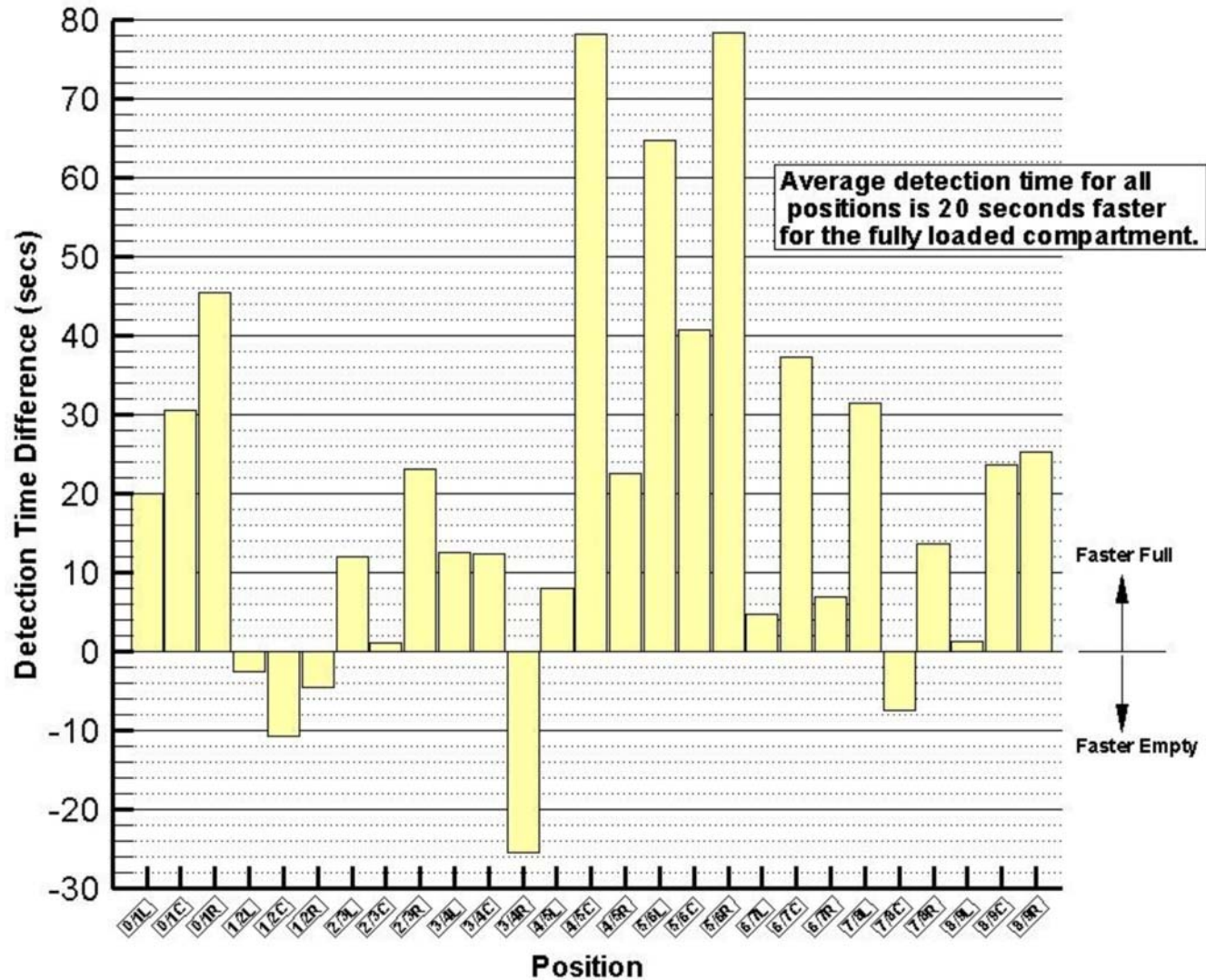


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727 Main Deck



727 Main Deck Detection Time Difference (Empty minus Full)



747SP Below Floor Compartment



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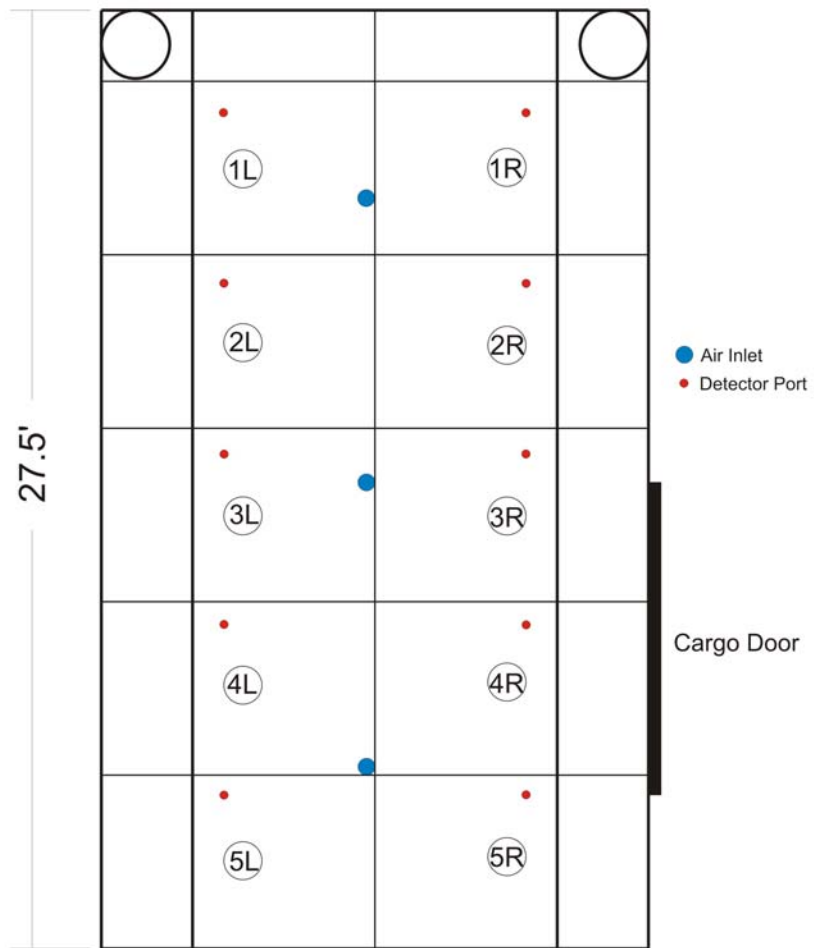
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747SP Aft Cargo Compartment



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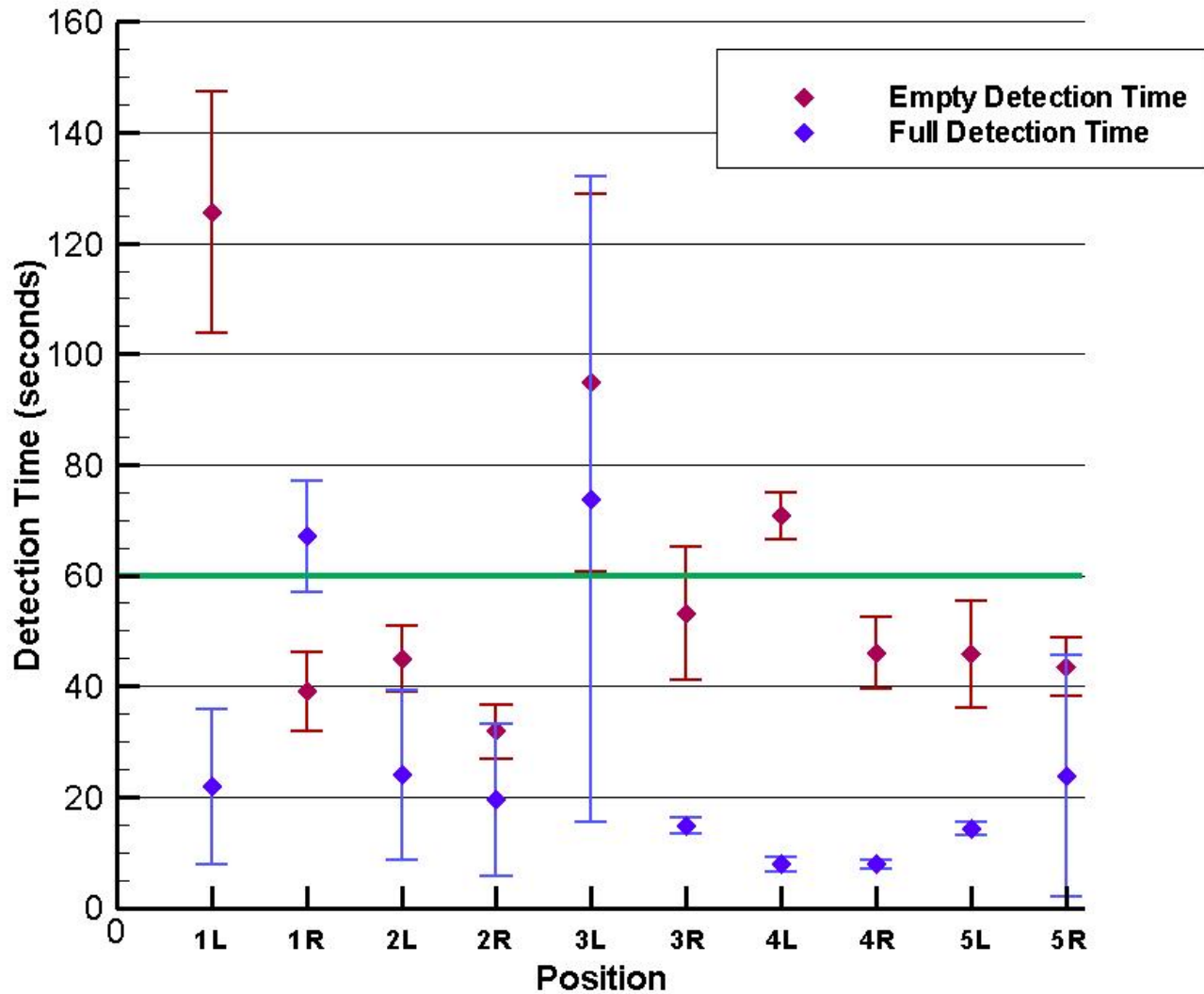
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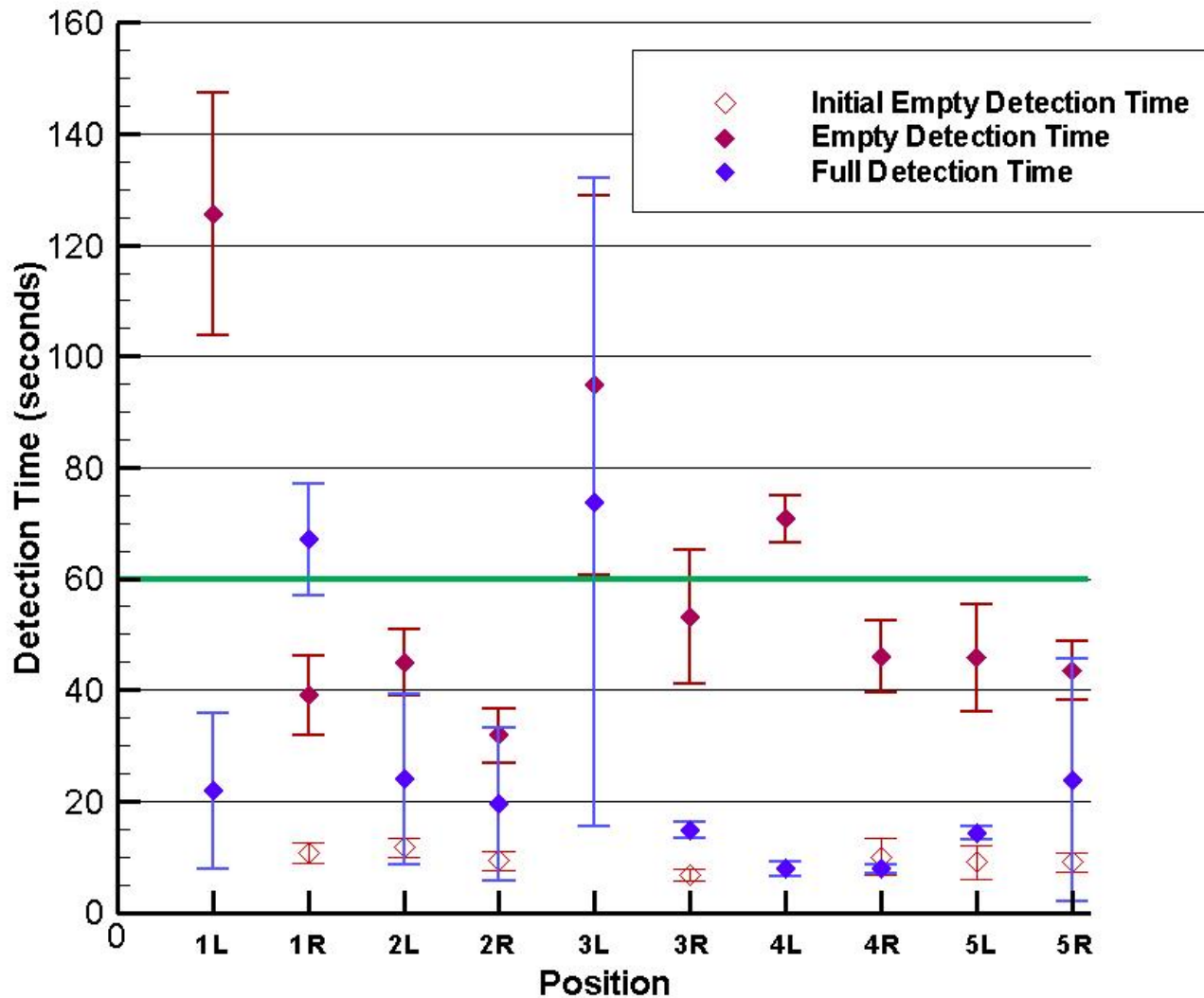


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747 Lower Aft Compartment Sustained Detection

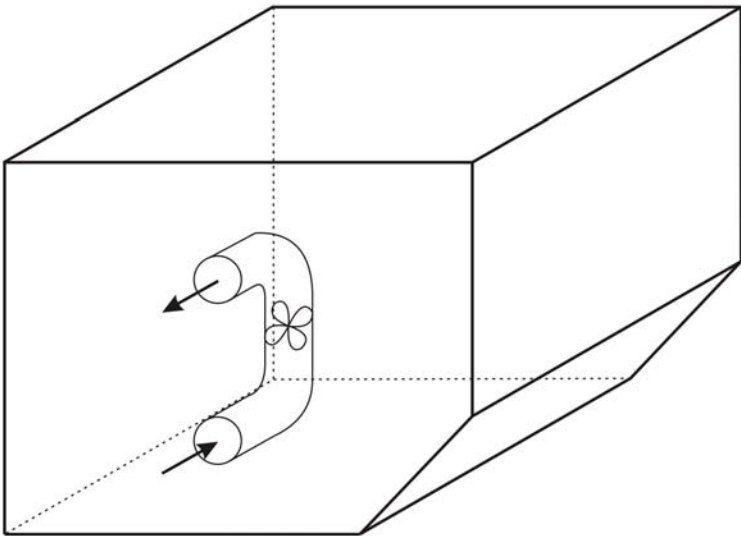


747 Lower Aft Compartment Sustained Detection

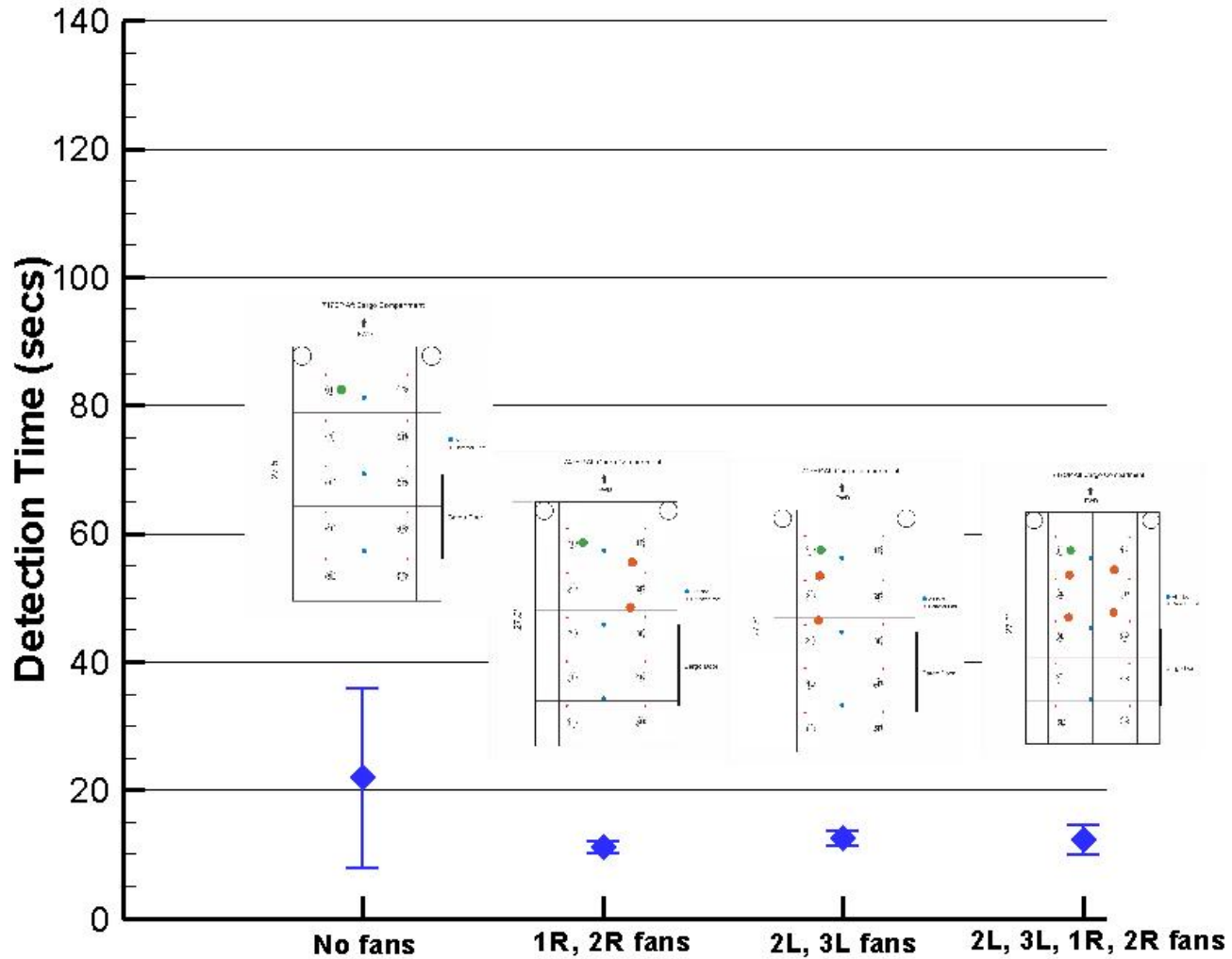


Simulated Refrigerated ULD

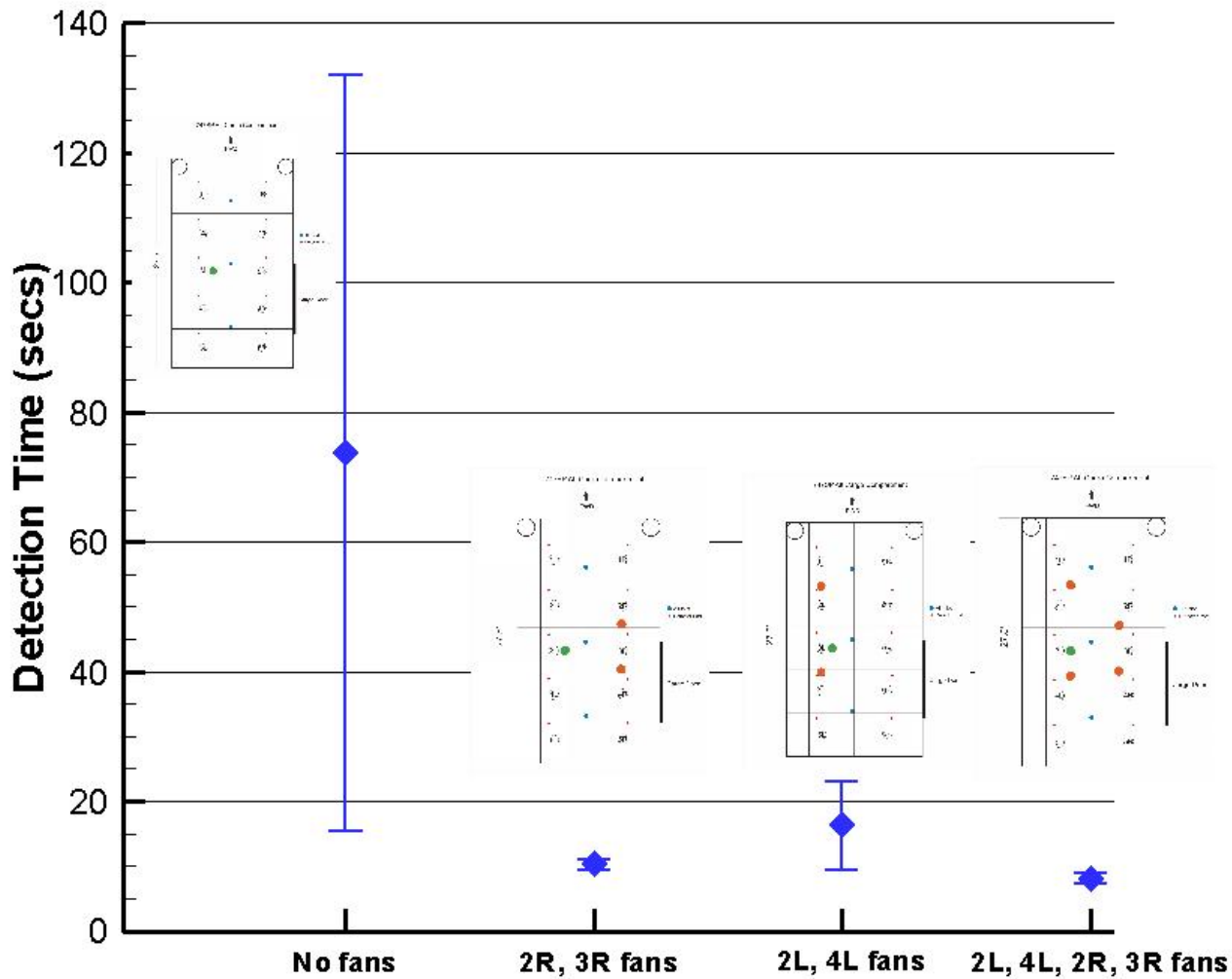
"Active" LD-3 Container.
Cargo compartment air is drawn in low and exhausted high at a rate of 180 ft³/min:



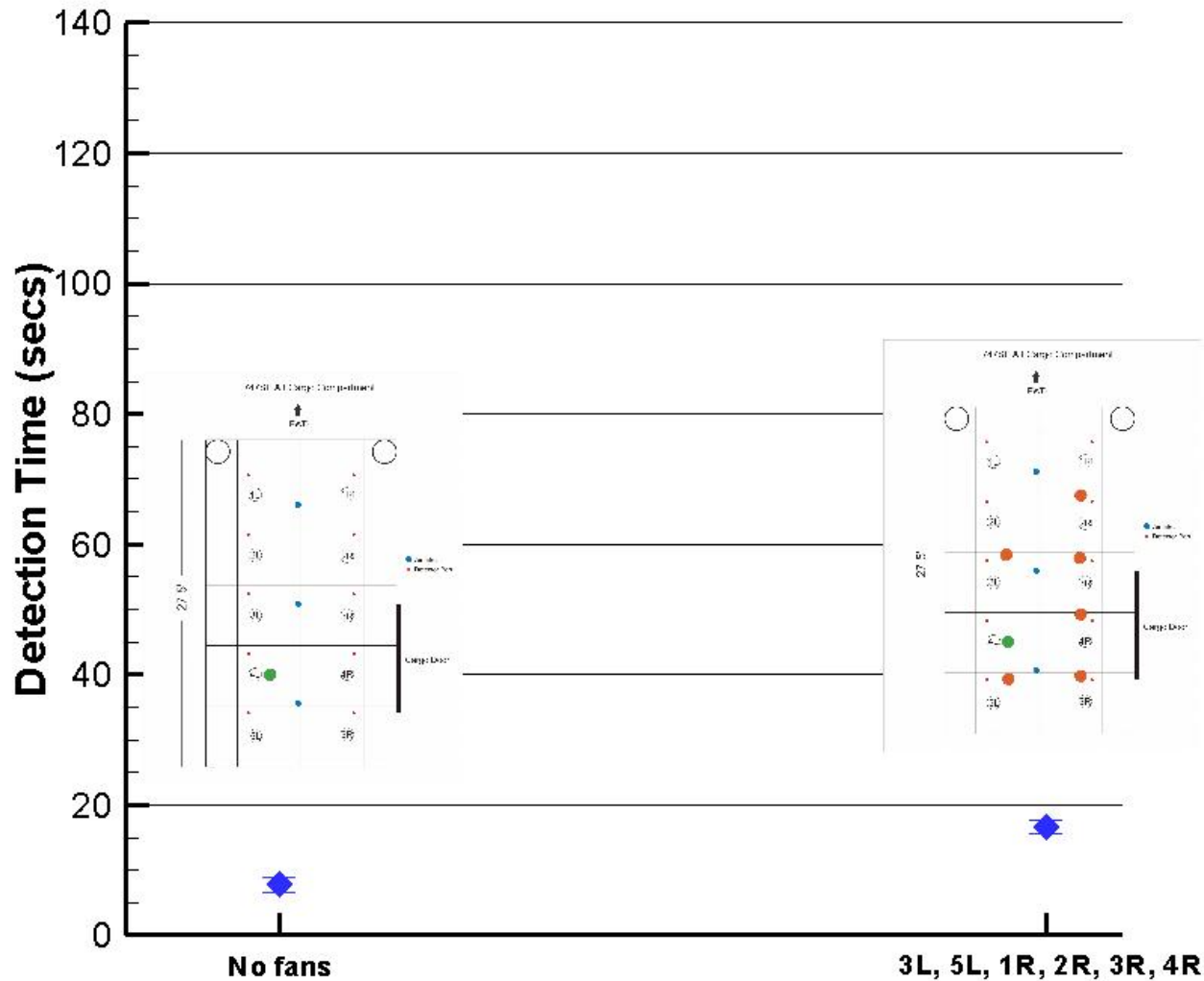
Smoke Gen at 1L, Fully Loaded Compartment, Airflow bottom to top



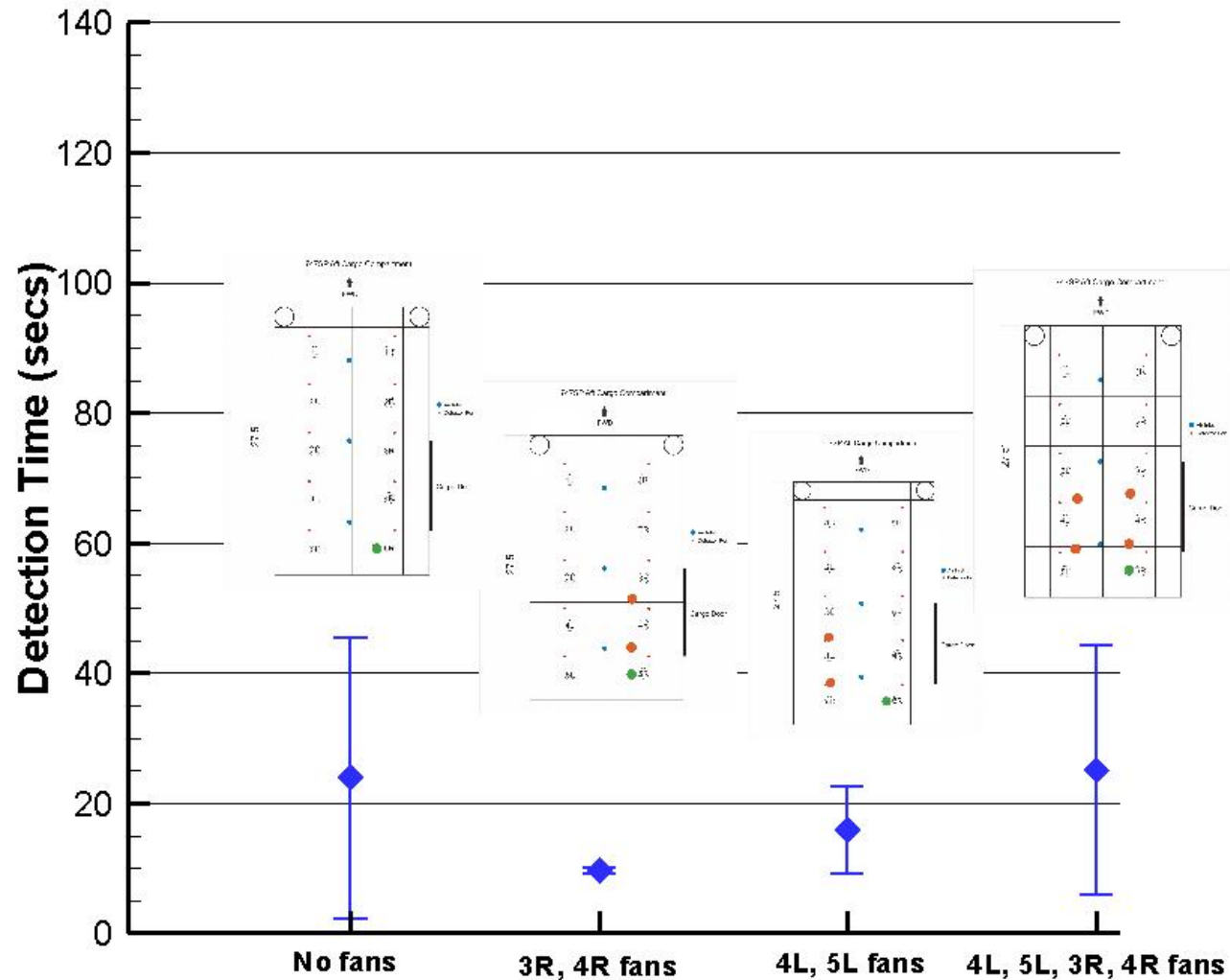
Smoke Gen at 3L, Fully Loaded Compartment, Airflow bottom to top



Smoke Gen at 4L, Fully Loaded Compartment, Airflow Bottom to Top



Smoke Gen at 5R, Fully Loaded Compartment, Airflow Bottom to Top



Additional tests are planned with the airflow direction reversed

"Active" LD-3 Container.
Cargo compartment air is drawn in high and
exhausted low at a rate of 180 ft³/min

