CABIN

WASTE COMPARTMENT FIRE CONTAINMENT PART 2

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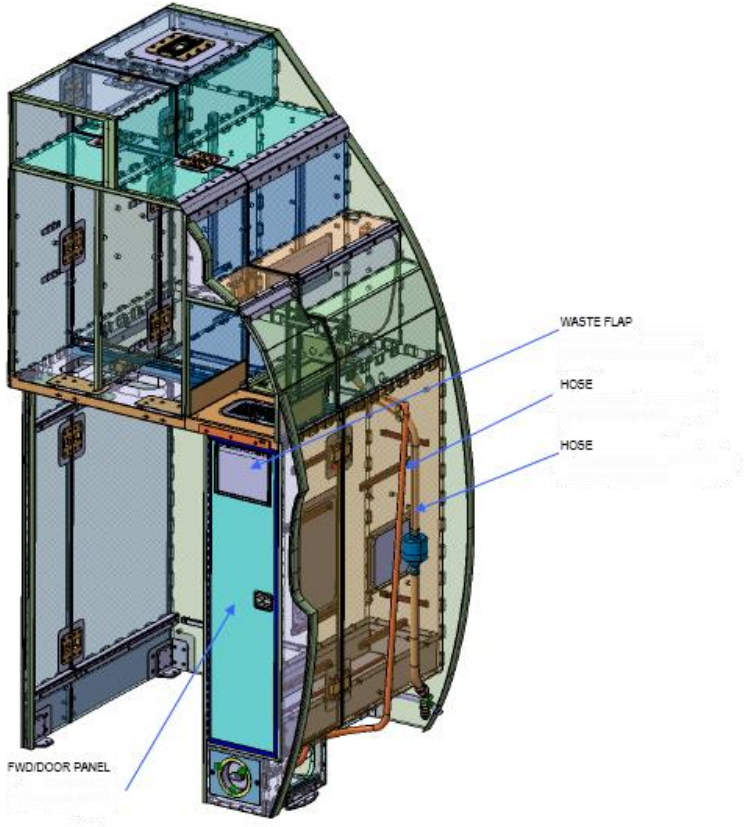
SAFRAN

Waste Compartment Fire Containment

14 CFR 25.853(h)

All Waste Compartments, Meal Trolleys & Waste Trolleys must be substantiated by Test or Analysis.

Industry/Regulators lack harmonized published methods of compliance (MOCs) to substantiate by analysis.



Waste Compartment Fire Containment

Our task group is assessing 20 proposed MOCs & design guidelines and 8 test standardization guidelines.

Only a few of these are specifically mentioned in FAA ACs

The others are straight forward often using aspects of the flammability Policy Statement.

Harmonizing Test Aspects

Last Triennial we discussed aspects the task group would address. We have updated & coordinated a new draft of the Fire Test Handbook, Chapter 10. Highlights include:

1/ Shim guidelines to simulate wear, tear and misalignment
2/ Updated Fire Load- replaced cigarette box with a hot cup.
3/ Fire load conditioning guidelines
4/ Simple Fire load density guidelines (visual)
5/ Guidelines for what materials must meet 25.853(h) [45-degree burn through test.]
6/ Data logger guidelines to ensure necessary data is captured.
7/ Test facility guidelines
8/ Eliminated smoke as a test requirement.
9/ Require the use of a thermocouple.
10/ Clarification of Time/Temperature graph requirements

Methods of Compliance (MOC)- Similarity

Fire Containment Test is costly!

The Task Group set out to identify current MOCs for similarity and propose additional MOCs based on existing MOCs used for Bunsen burner & Heat Release. This work is still in progress- The next several slides discuss several of the proposed MOCs, design guidelines for similarity and current status.

Methods of Compliance (MOC)- Similarity

ITEM #	MOC Type	MOC Description
1	Approved	Greater compartment volume substantiates lesser volume. [FAA AC25-17A]

Methods of Compliance (MOC)- Similarity

ITEM #	MOC Type	MOC Description
2	Approved	Greater air gap substantiates lesser air gap. [FAA AC25-17A]

Methods of Compliance (MOC)- Similarity

ITEM #	MOC Type	MOC Description
3	Approved	Designs with a metal waste can: Testing without the waste bin substantiates with waste bin installed. [FAA AC25-17A, Appendix 8, par. 4.1a.]. An agreed upon corollary, testing a compartment with a non-metallic waste bin can substantiate a waste compartment with a metal waste bin (waste compartment with the same or lesser volume/ smaller air gaps). Addtionally, a waste compartment tested with a non-metallic waste bin can substantiate the same waste compartment with a metallic waste bin (similar size and shape as the non-metallic waste bin/ material substitution).

Methods of Compliance (MOC)- Similarity

Items 4-7 are being recommended for approval without additional testing.

ITEM #	MOC Type	MOC Description	
4	PS Related	Thinner core panels substantiate thicker core panels (same materials) for the same application (sides ceilings, etc).	Thicker (core) panels are more stiff (best case) than thinner panels and known to be superiour meeting the same 45-degree test and fire containment tests.
5	PS Related	Less skin plies substantiate more skin plies (same material) for the same application (sides, ceilings, etc)	Proposed panel must have the same minimum type & quantity of skin plies as the tested panel. Added plies must be the same as existing plies (type, grade, class). Added skin plies increase stiffness and resistance to flame penetration.

Methods of Compliance (MOC)- Similarity

ITEM #	MOC Type	MOC Description	
6	PS Related	Thinner aluminum skins substantiates thicker aluminum skins.	All agreed this is well understood.
7	PS Related	Waste door with edge cast can substantiate waste door with aluminum edge trim.	Increased stiffness Assumes good bonding process Requires bonding process review- acceptable adhesive, etc. strength, temperature resistance, etc.

Methods of Compliance (MOC)- Similarity

Items 8 & 9 would require additional information.

ITEM #	MOC Type	MOC Description	
8	PS Related	Nomex and Kevlar core are interchangeable and can substantiate aluminum core.	Confirm location: Bending and compressive strength /stiffness comparisons (Especially for doors and narrow strips of panel between doors and waste flaps.) Acceptable for panels completely captured in mortise & tenon joints. Thermal properties are equivalent.

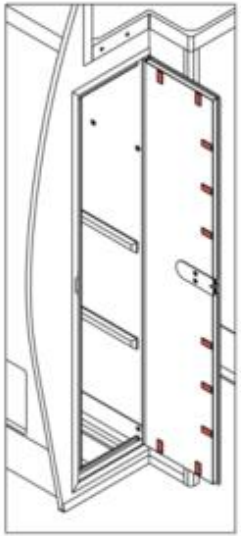
Methods of Compliance (MOC)- Similarity

ITEM #	MOC Type	MOC Description	
9	PS Related	How to substantiate a change in panel skin adhesive films? What about structural joint adhesives? (no failures noted through mortise and Tennon joints.)	Assume skin/core adhesive film meets all other 853(a), (d), (h- 45-degree) requirements as applicable. As good or better strength As good or better heat resistance.

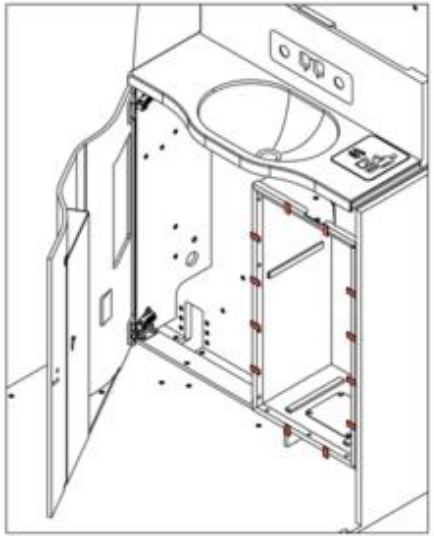
Methods of Compliance (MOC)- Similarity

Items 10-20 are design related conditions for demonstrating similarity.

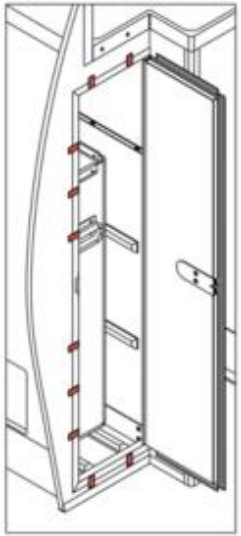
Nested Doors:
Place shims on door



Overlapping Door:
Place shims on surround panels



Door Trim overlaps
surround panels:
Place shims on surround panels



Methods of Compliance (MOC)- Similarity

10	Design	Latch features: must have similar or greater engagement and made of similar material. Must be in a similar location and same quantity (some W.C have two latches but most with just one). Thin doors more critical with latch location.

Methods of Compliance (MOC)- Similarity

11	Design	Waste flap design features must be similar (hinge, movement, overlap, material, thickness, location, etc).
12	Design	Waste compartment door features must be the same (same hinge type, similar door closeout features- does door metal trim overlap the door gap? Or does it nest with closeout metallic rubstrips on the inside?)
13	Design	Compartments with unique access panel/removable panel designs or pass through plumbing features must be similar to the test unit tested

Methods of Compliance (MOC)- Similarity

14	Design	Waste flap location and surround panel must be similar (ceiling vs side). Designs featuring a narrow strip of panel between a side mounted flap and the waste compartment door has shown to be more vulnerable to panel material/width of panel material.
15	Design	Design requirement: All seals that actively help prevent fire from escaping the compartment may be bonded but additionally must be mechanically fastened. Generally applicable to seals installed around waste compartment door and / or waste flaps.

Methods of Compliance (MOC)- Similarity

16	Design	For Galley carts: Similarity must be 1st based on same generic design (meal cart, entrée cart, waste cart or standard container box. These applications have different test methods (different combustibles). Next, cart ventilation must be taken into account. Some have galley air over carts, air piped through the cart, or ice cooling. Then similarity MOCs in 1-15 may be taken into account
17	Design	Tested waste compartment with split line can be used to substantiate a waste compartment without split line. (same or less airgap, volume)
18	Design	Fastening features- consider spacing, edge margin, stress concentration effects, etc. At a fastener component level, blind fasteners are not similar to through fasteners. Consider fastener engagement, torque, and strength to meet approved standards.

Methods of Compliance (MOC)- Similarity

19	Design	Number of waste flaps is a condition for similarity. Several manufacturers have experience when testing a compartment with 2 waste flaps to substantiate another comparment with 1 waste flap.
20	Design	Access panel gap: with gasket- no gap. Without gasket- shim. Is size and number of attach points critical? Pitch and overlap considerations. Testing without a gasket can substantiate with a gasket.

Methods of Compliance (MOC)- Similarity

Other topics in discussion:

21- Can waste compartments less than 0.5 cubic feet in volume be exempted from testing? What design criteria would be necessary for exemption?

22- What about joint sealant? Some test with sealant to represent design and others test without sealant as potential worse-case for air ventilation.

23- All material substitutions for panels, seals, components that prevent a waste compartment fire from exiting the compartment must meet a 45-degree Bunsen burner test.

24- Non-metallic waste bins should meet a 45-degree Bunsen burner test.

Next Steps for the Fire Containment Task Group

Work with FAA to release the updated Chapter 10 to the Fire Test Handbook.

Harmonize and publish industry and regulator accepted 25.853(h) Similarity requirements & MOCs for waste compartments and galley trolley carts.

We welcome all those interested in participating!

Conclusion

You know you’re one of us if you mitigate the following undesirable situation in an aircraft lavatory as shown!!