CABIN

WASTE COMPARTMENT FIRE CONTAINMENT MOCS AND TEST HARMONIZATION

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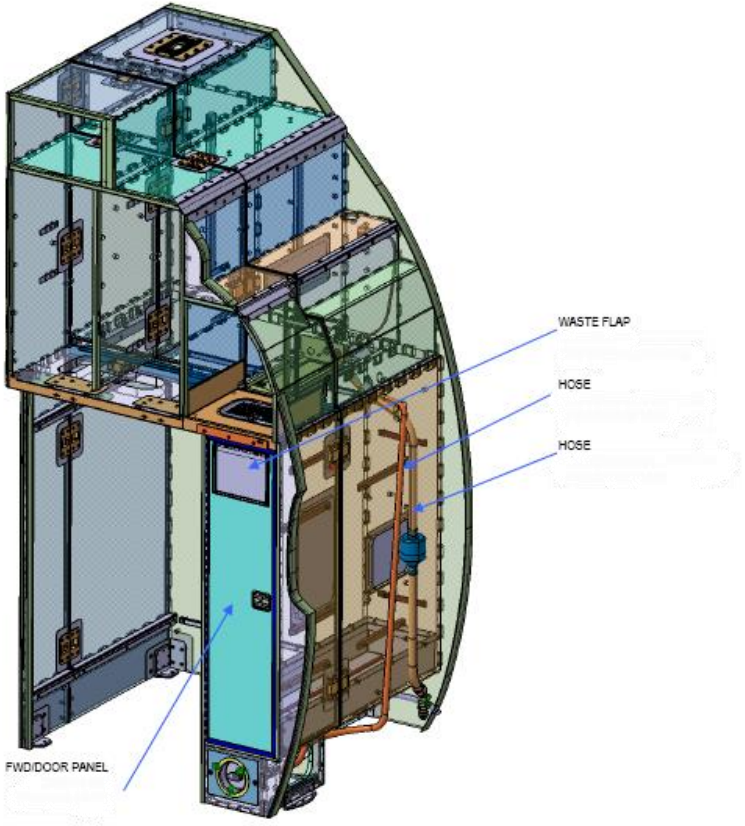
Waste Compartment Fire Containment

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 26 proposed MOCs & design guidelines and 12 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.

But our recent focus is to harmonize several test aspects.

Harmonizing Test Aspects

The task group proposes harmonization in the following test aspects

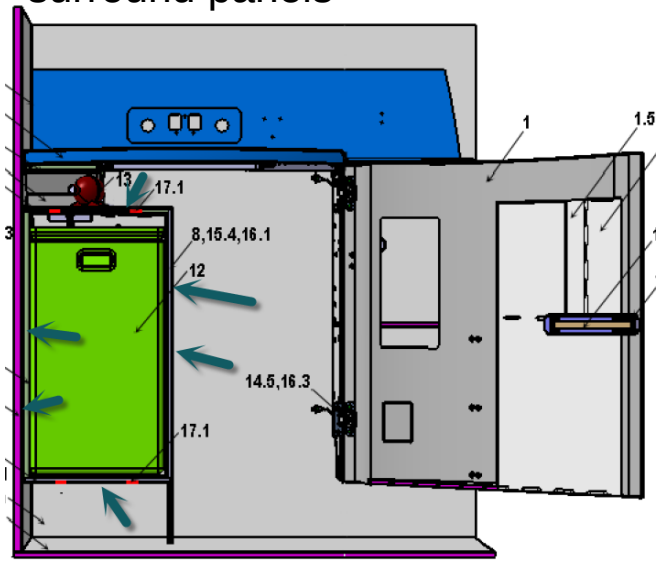
1/ Shim guidelines to simulate wear, tear and misalignment
2/ Update Fire Load
3/ Propose fire load conditioning guidelines
4/ Propose fire load density guidelines
5/ Propose guidelines for what materials must meet 25.853(h) [45-degree burn through test.]
6/ Propose data logger guidelines to ensure necessary data is captured.
7/ Propose test facility guidelines
8/ Eliminate smoke as a test requirement- not a rule or AC requirement. (And helps with fire detection)

Harmonizing Test Asptects-Shimming gaps

Shimming designs with nested doors, overlapping door and door trims that overlap the door surround panels.

Nested Doors: Place shims on door

Overlapping Door: Place shims on surround panels



Door Trim overlaps surround panels: Place shims on surround panels

Harmonizing Test Aspects-Shimming gaps

Shim size and placement- not standardized. Recommend considering approximately 1” x 0.5” x thickness (representing the max engineering gap). [25.4mm x 12.5mm x thickness mm]

Shimming Guidelines

- Door- At least 1” from corners and latches with 5-10” between shims
- Waste flap- 2 shims on the sides or 1 shim centered on the side opposite the hinged side.
- All shims should be placed with the .5” width inserted into the gap.
- Door seals do not need shimming if shown the compressed seal creates a ‘zero’ gap AND the seal material meets an F5 Bunsen burner test.
- No shims required for features such as access panels if the access panel overlaps the compartment panel by a minimum of 0.5” all around.

Harmonizing Test Aspects-Shimming gaps

Shimming Guidelines- Continued

- Do not shim sealed split line features. Shim non-sealed split line features per maximum gap per drawing
- Test plan must define shim placement
- Aluminum tape has been shown to be an acceptable solution for mounting shims.

Harmonizing Test Aspects-Fire Load Discussion

Fire loads in the current requirements do not reflect today's operational environment.

AccuFleet volunteered to conduct a study peering into airline waste compartments.

Current Fire Test Load

…a product of 1960's reality…

How do we know it is outdated?

Cigarettes!


UNITED
KING SIZE
Winston
FILTER CIGARETTES
FULL RICH
TOBACCO FLAVOR
UNITED


KENT
CIGARETTES
FOR THE FINEST
IN SMOKING PLEASURE
...FOR THE FINEST
IN AIR TRAVEL
FLY TWA
U.S.A. · EUROPE
AFRICA · ASIA


KENT
CIGARETTES
COMPLIMENTS OF
PAN AM
WORLD'S MOST EXPERIENCED AIRLINE

Matches!

Play with paper coated with nitrocellulose (gun cotton / flash paper…)

Flammable Liquids!

AccuFleet INTERNATIONAL

Of all these items, only cigarette packs made it into the old fire load.

Looking at the past does highlight a key consideration; in determining what is appropriate today, we need to look at:

- **What is provided to the passengers by the airline**
- **What the passengers are allowed to bring on board**

Industry – Regulator Teamwork

- The Working Group team decided that rather than speculate about current “real world” trash loads, we would review the contents of some post-flight waste receptacles.
- We looked at several bins as found after the flight, weighed the trash, then dumped it out on a plastic sheet to review the contents.
- Average trash weight was about 2.5 pounds per bin, with a few at twice that weight.
- Contents heavily skewed towards material provided by the airline.

Trash Weight

Trash Review and Inventory

Bottles and Cans

Higher Density – Stacked Cups

More Paper and Natural Materials , Less Plastic

First pass inventory by frequency

- **MAJOR:**
  - hand towels
  - tissues
  - used diapers
  - used airsick bags
  - cardboard tubes, packages
    - THEME - WET PAPER
- **MINOR:**
  - amenity kits items - toothbrushes, lotions, mouthwash bottles
  - stacked cups - paper and plastic
  - snack packaging (?cellophane?), bottles and cans

Current Fire Test Load

- Eight 2-ply paper and towels, approximately 10 by 11 inches
- Five 2-ply paper napkins, approximately 16 by 16 inches
- Four 8-ounce paper hot drink cups
- Two 3-ounce paper cold drink cups
- One empty cigarette package

My suggestions, based on aircraft review:

- Remove cigarette package.
- Consider total weight of fire load – is larger or smaller load more critical?
- Consider using damp paper products.

Harmonizing Test Aspects-Fire Load Discussion

Actually, the result of the study prompted to replace the cigarette box with a paper cup.

The task group also proposed to add alternate trash sizes to accommodate non-USA test locations.

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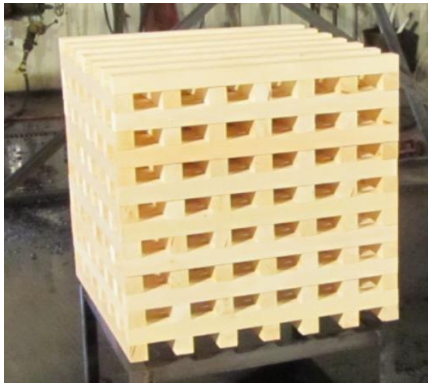
Harmonizing Test Aspects- Other Fire Loads

Explore alternate fire loads.

Gulfstream suggested for consideration the scalable wood crib fuel load specified per UL 711. A small pan of heptane is used to ignite. More to be discussed tomorrow.

And what about the foam block?

All work is committed to ensure that future fire loads are equivalent to those used today.



Harmonizing Test Aspects-Trash Conditioning

The task group recommends that test trash be stored in a conditioned area prior test. An air conditioned office environment is acceptable – it limits high humidity and extreme heat / cold conditions.

Harmonizing Test Aspects-Trash Density

- Does trash density impact fire containment test results?
- FAA Technical study discovered trash density does impact potty bottle (fire extinguisher) qualification results. More densely packed trash was easier to extinguish.
- Dense trash represents more fuel, but more difficult to ignite.
- A compartment with dense trash has less oxygen to support a fire.
- Dense trash could be worse-case for a more ventilated compartments.
- Less dense trash is worse-case for less ventilated compartments

The task concluded that less dense trash is most critical.

Harmonizing Test Aspects-Trash Density

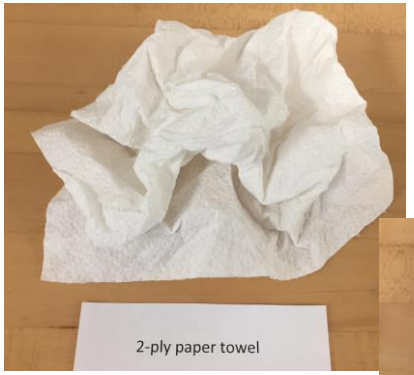
Next, developed an industry trash density exercise that yielded interesting results:

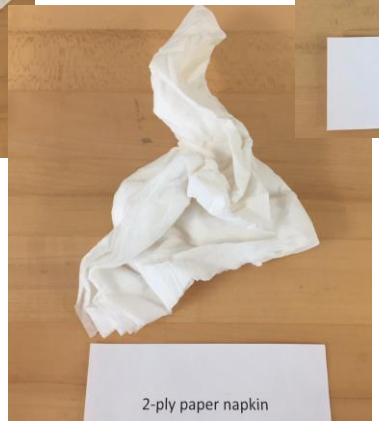
Up to 16% difference in trash weight.

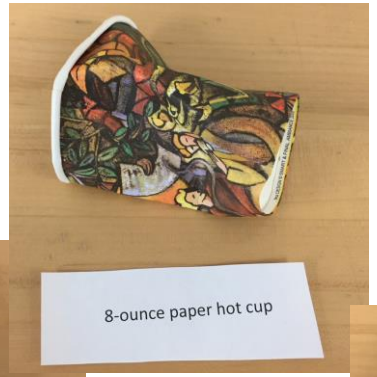
Up to 81% difference in trash density.

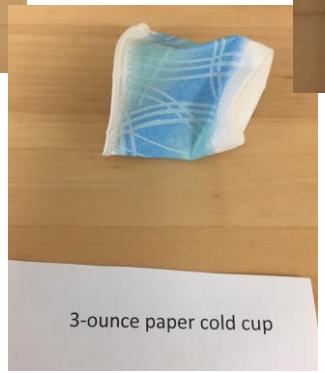
Keeping things simple, the task group decided that photographs of crumpled waste inserted into the fire test handbook could serve as a visual guideline to help harmonize this aspect.

Harmonizing Test Aspects-Trash Density









Harmonizing Test Aspects- What must be 45-degree BB Test Compliant?

Panels and substrates that make up the ceiling and vertical walls- Yes

Mortise and tenon panel joints – NO.

Sealant / Seals or other materials used to fill gaps that create a barrier to exit the waste compartment- YES.

Waste containers installed in compartments that require waste containers to be installed

May need to consider repairs for continued compliance.

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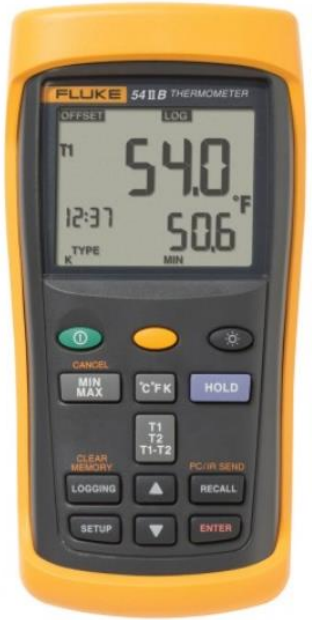
Harmonizing Test Aspects- Data Logger Suggestions

Fire Test Handbook states data should be recorded no greater than every 10-seconds.

Task group recommends for most tests a 1-second time interval to ensure peak temperature is captured- especially for small compartments that extinguish quickly.

Task group also recommends starting the data logger at least 10-15 seconds prior to ignition.



Harmonizing Test Aspects- Test Facility Guidelines

Test Facilities currently come in many forms.

The test facility / test conditions should be relatively draft free. Wind causes worse-case test conditions and should be minimized.

The test unit should be observable from multiple angles. May use mirrors, etc to observe the back of the tested unit.

Waste Compartment Fire Containment- Similarity MOCs

Next Focus of the Task Group will be to revisit and flesh out Similarity MOCs.
Several are already approved per FAA AC25-17A
Other proposals have been organized as aspects related to FAA PS-ANM-25.853-01-R2.
Others from test experience.

Fire Containment Methods of Compliance (MOCs & Design Requirements)

ITEM #	MOC Type	MOC Description	Actions	Comments
1	Approved	Greater compartment volume substantiates lesser volume. [FAA AC25-17A]		
2	Approved	Greater air gap substantiates lesser air gap. [FAA AC25-17A		
3	Approved	Designs with a metal waste can: Testing without the waste can substantiates with waste can 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 (with the same or lesser volume).	Installers may add a metallic container to the compartment if the original design was tested without a container. Additionally, installers may substitute a metallic container, of equal or less volume, in a compartment if the original design was tested using a nonmetallic container- AA	Would also need to verify the fit of a replacement container would ensure trash can not fall between the container and compartment walls. Scott Can we simplify to be a material substitution metal for non-metal container?- Jeff G.
4	PS Related	Thinner core panels substantiate thicker core panels (same materials) for the same application (sides ceilings, etc).	Scott / Tom (Boeing)	
5	PS Related	Less skin plies substantiate more skin plies (same material) for the same application (sides, ceilings, etc)	Scott / Tom (Boeing)	Door panels are more critical than compartment panels for thickness, skin plies, etc.- Tom (Boeing)
6	PS Related	Nomex and Kevlar core are interchangeable and can substantiate aluminum core.		
7	PS Related	Thinner aluminum skins substantiates thicker aluminum skins.		
8	PS Related	Waste door with edge cast can substantiate waste door with aluminum edge trim.		non-metallic substantiates metallic feature.
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.)		
10	PS Related	All material substitutions related to fire containment must also pass a 45-degree test.		Concur with the exception that there may be other considerations such as panel stiffness that also need to be taken into account. - Gulfstream

Purpose of the Waste Compartment Fire Containment Task Group

Harmonize Test Aspects

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

Develop new MOCs as needed.

Always looking for more participation!