Fuselage Burnthrough Workshop

FAA Technical Center

July 2007

Fuselage Burnthrough

Amendments 25-111, 121-299

- **Test Method for Thermal/Acoustic Insulation**
  - Oil Burner Test of Simulated Frame Sections
  - Fastening Means Must be Considered

Fuselage Burnthrough

- **Requirement provides ~4 min increased post-crash survival time**
- **Commenters agreed with intent of rule—Major comments involved:**
  - Applicable areas of the airplane
  - Better Definition of “Insulation”
  - Performance Standard--not Limited to Insulation
  - Compliance Time Insufficient

Fuselage Burnthrough

- **Applicable to both type design and operating rules**
- **Applies to newly manufactured airplanes entering part 121 service**
  - Only part 121is affected operationally (Expect All Airplanes ≥20 pax *Will* Meet anyway to Allow Future 121 Operation)
- **N/A to Airplanes with Less than 20 Passengers**

  Benefit of Increased Evacuation Time Negligible for these Airplanes

Compliance Time Complications

- **Fuel Nozzle Consistency**
  - Nozzle marking not configuration controlled
  - Inconsistent performance with given configuration
- **Burner availability**
  - Burner no longer produced
  - Parts for existing burners not readily available

Compliance Time Complications

- **Nozzle problems lead to research, which delayed official testing**
  - Fuel nozzle
    - Specified 6 gph nozzle not standard as was believed
    - Variations exist that affect results
    - New 6.5 gph nozzle can be adjusted to give acceptable results
- **Nozzle problems heightened industry concerns with overall test method reliability**

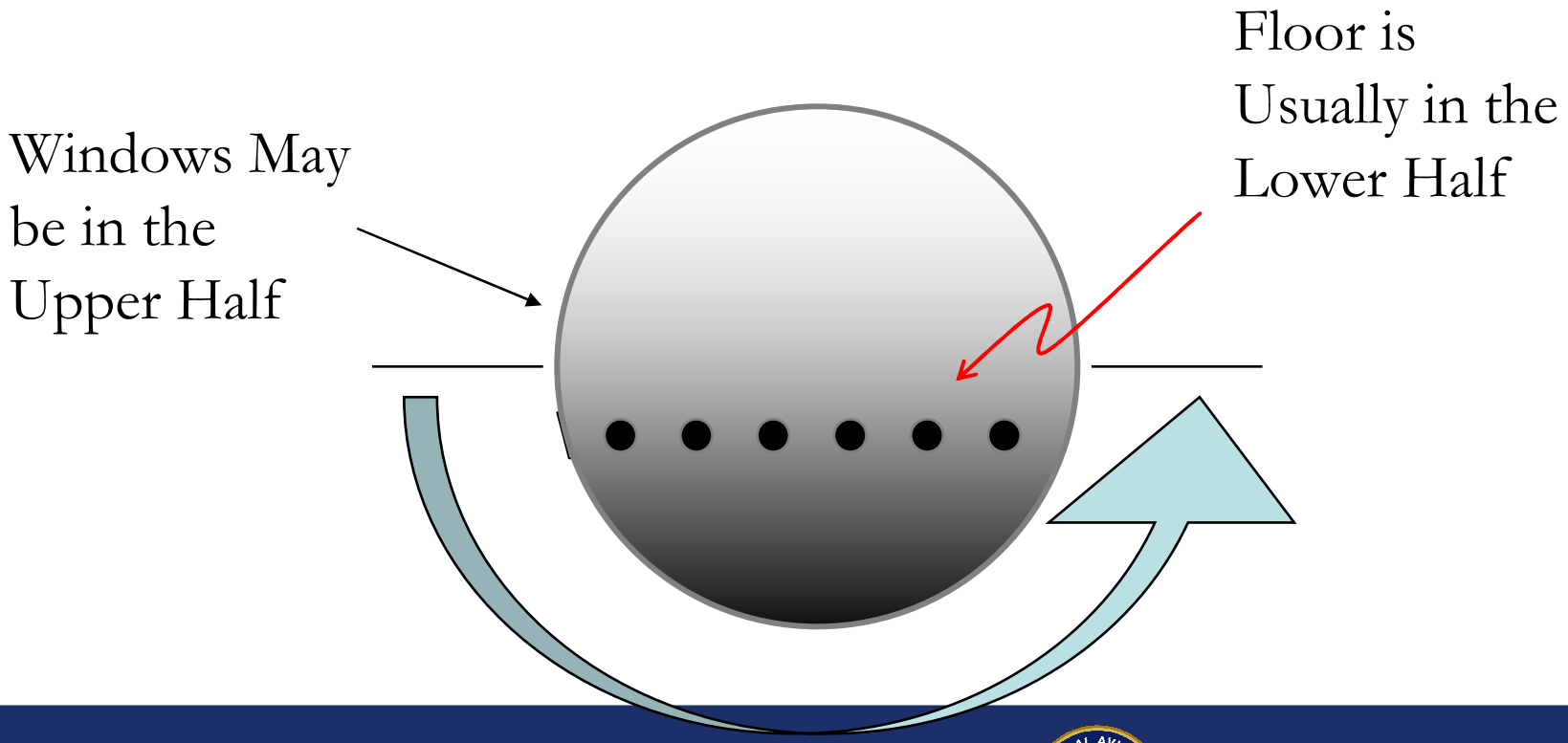
Compliance Time Extension

- **Original Rule Issued in July ’03- 4 Year Compliance Time**
- **NPRM Published in April ’06-Proposed 12 month extension to compliance time**
- **Final Rule (Amendment 121-330) Issued January 2007 with 24 month extension**

New compliance date for new production: September 2, 2009

Applicability of Burnthrough

- **What is the "Lower Half?"**



Cooperative Efforts to Simplify Compliance

- **Advisory Material-AC 25.856-2**
- **Individual design reviews with each affected manufacturer**
- **Additional testing to address new concerns**

Additional Guidance Pending incorporation in revised AC

- **Pass/Fail criteria**
  - Requires all samples to pass
- **'Optimized' materials very close to pass/fail**
- **Additional guidance**
  - Presumes that tests are valid
  - Permits additional testing to obtain typical performance
  - Requires all test results to be included in averaging and average burnthrough time to exceed 4 min.

Additional Guidance Pending incorporation in revised AC

Cases where improved insulation "would not contribute to fire penetration resistance" (ref. § 25.856(b)):

- **Lower lobe cargo doors: lower lobe cargo doors leading into class C cargo compartments, and having a complete liner on the door meeting the requirements of the 'ceiling' portion of appendix F, part III, do not require modification of the insulation inside the door.**

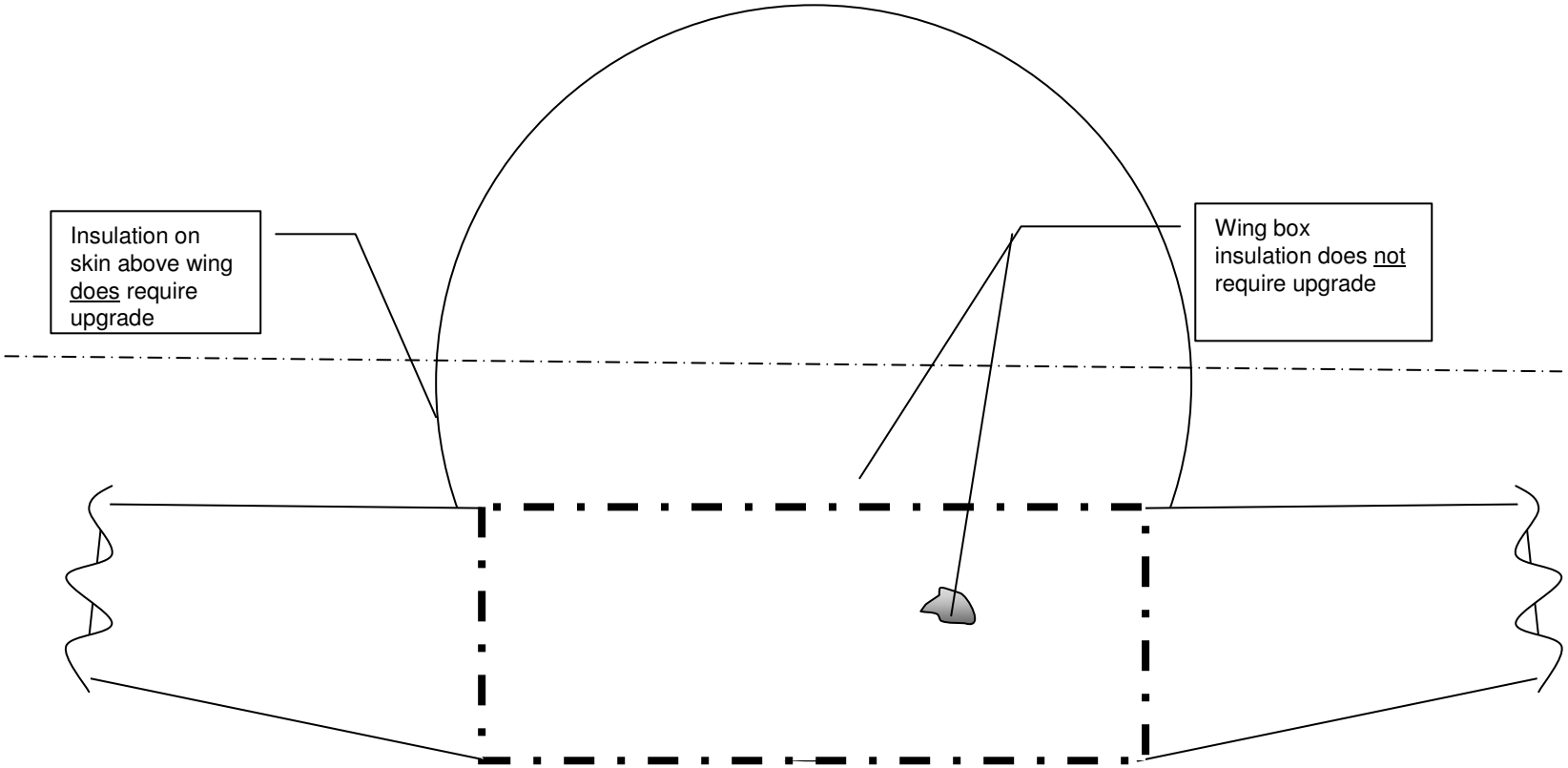
- **Passenger doors: If less than 12" of the door is in the lower half, no modification to the insulation is required. If 12" or more, and insulation is mechanically fastened, add barrier material to insulation, but no test for attachment required. If the insulation is not mechanically fastened.**

Fuselage Burnthrough

Additional Guidance

- **<u>Wing box</u>: The wing box itself does not required improved insulation (assuming it is insulated). Note that the insulation on outer skin in the fuselage above the wing box *does* require improved burnthrough protection (lower half only).**

Insulation in wing root area



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Additional Guidance

Methods of Attachment

- **<u>Fasteners</u> :**
- **Fasteners that maintain the barrier, and are potentially exposed to the fire do not require test, if they are of a material whose melting point exceeds the fire temperature.**
- **Other fasteners should be demonstrated by test.**
- **Fasteners that are not exposed to the fire can be aluminum or high temperature plastic.**
- **Attachments to the structure need not be tested if the attachment to the structure is not critical in maintaining the barrier.**
- **<u>Installation (attachment) tests</u>:**
- **The attachment test is primarily to ensure the *continuity* of the barrier,**
- **Heat flux is not measured in this test,**
- **The installation test shows whether the attachment materials and methods will prevent physical fire penetration.**

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Additional Guidance

Airplane Geometry

- **Window line: Some allowance may be possible if the half-way point intersects the passenger windows. That is, adding insulation between closely spaced windows will not contribute to burnthrough protection in some cases. However, the variation in airplane design is too great to generalize this further.**

- **Flightdeck floor: Similarly, the halfway point may be slightly above the flightdeck floor (due to the change in shape of the fuselage at the nose—it may be acceptable to stop the protection at the flightdeck floor**

NexGen Burner

- New Appendix 2 to AC
- Schematic representation
- Basic equipment and facility needs
- Further details likely in Fire Test Handbook