Certification Memorandum CM-PIFS-0xx
-
Fuel Tank Drop Test as per 27.952(a) or 29.952(a)

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CM Fuel Tank Drop Test

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CM Fuel Tank Drop Test

- **1.0 Background:**
  - **Crashworthy fuel tanks are an important design feature.**
  - **In service experience shows a marked safety improvement by reducing Post Crash Fires, to the extent such tanks are becoming a commercial argument.**
  - **Required for all new type certifications and significant changes since 1994.**
  - **Major project risk**

Test rule built to create a standardised test:
more severe than real survivable impact.

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- **2.0 Drop Test Requirement:**
  - **CS 27/29.952(a) requires :**
    - **drop height: 15.2m (50ft),**
    - **impact surface: non deforming,**
    - **tanks filled to 80% with water.**
    - **The test specimen shall include in-tank equipment and representative surrounding structure.**
    - **Tank dropped freely, horizontal impact ±10°.**
  - **Pass fail criteria is simple: no leaks!**

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- 3.0 CM PIFS-0xx
  - Written to presents EASA position on different topic concerning the test.
  - Those positions have already been discussed with one or more applicants during certification exercise.
  - The CM allows EASA to share its position with all applicants.
  - The surrounding structure (§952(a)(4)) is already covered by CM-S-011.

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- 3.0 CM PIFS-0xx (cont'd)
  - What is not this CM:
    - A new interpretation of the rule.
    - A new mean of compliance definition.
    - A new rule making exercise.

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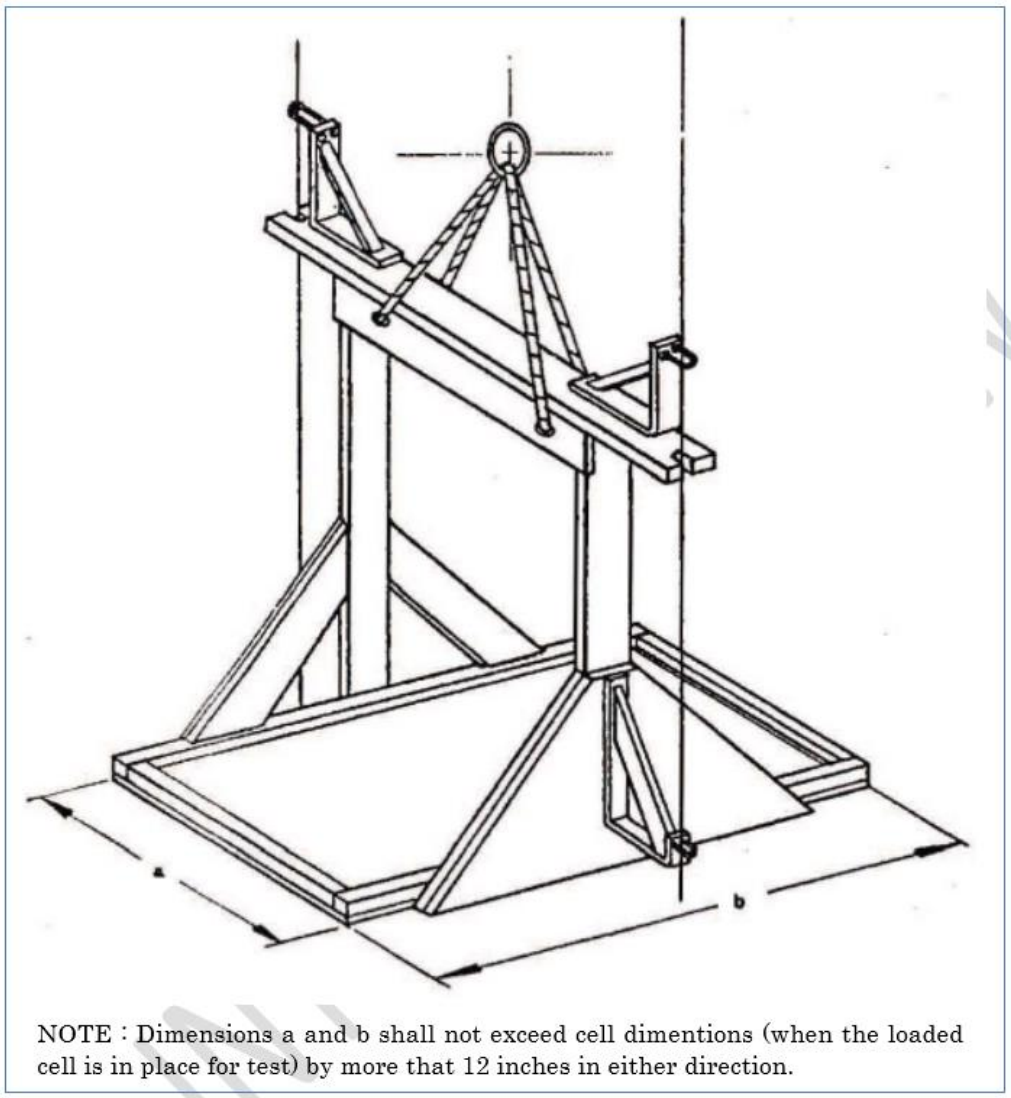
- 3.1 Angle at impact / Platform design:
  - Is not intended to be a pass fail criteria but as a result of the drop becomes one.
  - The prediction of the angle of impact is very difficult without the use of a guiding system.
  - Lead to the use of a platform in almost all test.
  - AC not very talkative on plateform layout



NOTE : Dimensions a and b shall not exceed cell dimentions (when the loaded cell is in place for test) by more that 12 inches in either direction.

Figure 3.1 : Crash impact test fixture (from MIL-T-27422B, including the note)

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3.2 Multiple tank testing

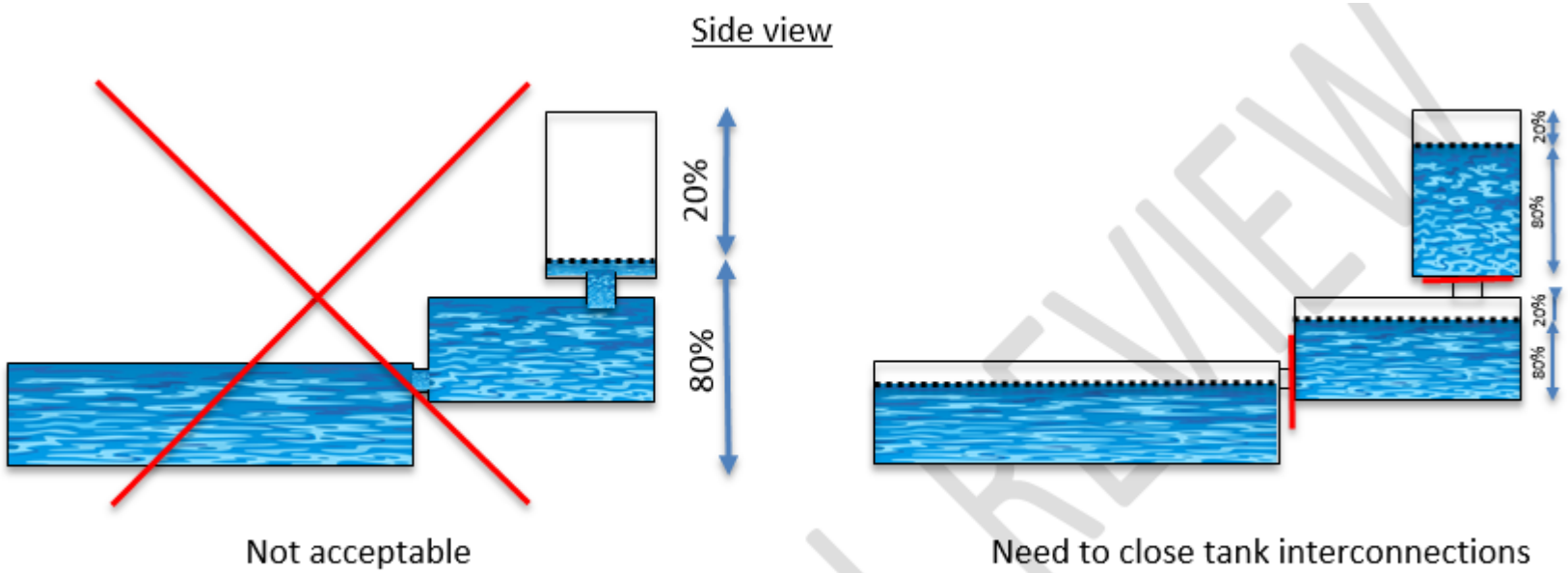

Figure 3.2 : Multiple tank filled at 80%

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- 3.3 Impact surface:
  - Concrete.
  - Used in 100% of the test performed in last certification exercise.

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- 3.4 Free Drop
  - The fall has to be as close as possible of a free fall.
  - Friction forces between guiding cable and specimen has to be as low as possible.
  - Verification of the free fall condition is not obvious but could induce evident discrepancy between test labs.
  - Speed measurement not mandatory but might be necessary to support further compliance demonstration.

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- 3.5 Simulation
  - The regulation requires a test, pass/fail critieria = no leak.
  - The simulation use to support drop test compliance demonstration is under discussion (design change, surrounding structure, specimen selection,…).

- And some more practices:
  - The “no leak” criteria assessment of the tank upper volume (20%)
  - lessons learnt from visual inspection of the drop tested specimen
  - …

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- 4.0 Schedule:
  - CM is currently in internal review at EASA, before public consultation.
  - will be published on EASA website by end of January 2018 for 6 week public consultation.
  - Any participant is warmly invited to provides his comments on EASA website.

EASA
European Aviation Safety Agency

Thank You !

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