



# Notification of a Proposal to issue a Certification Memorandum

## Cabin Interior Abuse Loads

**EASA Proposed CM No.: Proposed CM–S-009 Issue 01 issued 31 May 2017**

**Regulatory requirement(s): CS 25.601, CS 25.1309, CS 25.803, CS 25.785**

In accordance with the EASA Certification Memorandum procedural guideline, the European Aviation Safety Agency proposes to issue an EASA Certification Memorandum (CM) on the subject identified above. All interested persons may send their comments, referencing the EASA Proposed CM Number above, to the e-mail address specified in the “Remarks” section, prior to the indicated closing date for consultation.

EASA Certification Memoranda clarify the European Aviation Safety Agency’s general course of action on specific certification items. They are intended to provide guidance on a particular subject and, as non-binding material, may provide complementary information and guidance for compliance demonstration with current standards. Certification Memoranda are provided for information purposes only and must not be misconstrued as formally adopted Acceptable Means of Compliance (AMC) or as Guidance Material (GM). Certification Memoranda are not intended to introduce new certification requirements or to modify existing certification requirements and do not constitute any legal obligation.

EASA Certification Memoranda are living documents into which either additional criteria or additional issues can be incorporated as soon as a need is identified by EASA.



## Log of issues

Issue	Issue date	Change description
01	31.05.2017	First issue.

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## 1. Introduction

### 1.1. Purpose and scope

The purpose of this Certification Memorandum is to provide specific guidance for cabin interior abuse loads.

The implementation of the existing certification specifications has not produced a consistent application of abuse loads for cabin interior certification. Through numerous certification processes, the industry has shown a growing concern over inconsistency in certification standards.

EASA is of the opinion that additional guidance and interpretative material need to be established in relation to cabin interior abuse loads. Where a monument (fixed furniture) or equipment has the capability to have loads applied, either through deliberate use of hand holds, steps or operating interfaces, or accidentally applied loads because of location or configuration, abuse loads should be defined that will ensure a level of structural integrity such that the monument will continue to function safely after the application of the abusive loading. This document refers to large aeroplanes, but may be applicable to other types of aircraft.

The scope of this document is limited to the loads to be applied, it does not address strength or deformation substantiation. Further compliance with the applicable requirements may be shown through capability to sustain the loads, or safe separation of part of the structure, depending on its safety effect. Risk of injury or sudden decompression requirements may justify the use of fuse or breakover features. Additionally, consideration of deformation and functionality may be required. If compliance is shown through test, additional factors on the load applied at test, to take variability into account, may need consideration.

### 1.2. References

It is intended that the following reference materials be used in conjunction with this Certification Memorandum:

Reference	Title	Code	Issue	Date
CS 25.301	Loads	CS-25	19	12/05/2017
CS 25.303	Factor of safety	CS-25	19	12/05/2017
CS 25.305	Strength and deformation	CS-25	19	12/05/2017
CS 25.365	Pressurized compartment loads	CS-25	19	12/05/2017
CS 25.561 (d)	Emergency landing deformations	CS-25	19	12/05/2017
CS 25.562 (c)(5)	Head injury criterion	CS-25	19	12/05/2017
CS 25.601	Design and construction, general	CS-25	19	12/05/2017
AMC to 25.603(a)	Large glass items. §3. Abuse loads tests	CS-25	19	12/05/2017
CS 25.785 (j)	Firm handhold	CS-25	19	12/05/2017
CS 25.803 (a)	Emergency evacuation	CS-25	19	12/05/2017
CS 25.1309	Equipment system and installations	CS-25	19	12/05/2017
ARP 5526 rev. A	Aircraft Seat Design Guidance and Clarifications	---	---	---
ARP 5475	Abuse load testing for In-Seat Deployable Video Systems	---	---	---
AS 8049 rev. B	Performance Standards for Seats in Civil Rotorcraft, Transport Aircraft, and General Aviation Aircraft	---	---	---



Reference	Title	Code	Issue	Date
Gama pub. No. 13	ACCEPTABLE PRACTICES DOCUMENT, CABIN INTERIOR MONUMENT STRUCTURAL SUBSTANTIATION METHODS <a href="https://gama.aero/facts-and-statistics/publications/gama-and-industry-technical-publications-and-specifications/">https://gama.aero/facts-and-statistics/publications/gama-and-industry-technical-publications-and-specifications/</a>		1.0	20/05/2009
FAA Docket No. NM323; Special Conditions No. 25-311-SC	Special Conditions: Boeing Model 747-400 Airplane; Large Non- Structural Glass in the Passenger Compartment <a href="http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgSC.nsf/0/AACCCFF3A99EC718862570F2004FF535?OpenDocument">http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgSC.nsf/0/AACCCFF3A99EC718862570F2004FF535?OpenDocument</a>	---	Final	3/1/2016

## 2. Background

CS 25.601 requires that *“the aeroplane may not have design features or details that experience has shown to be hazardous or unreliable[...]*”

For equipment, according to CS 25.1309(a) *“The aeroplane equipment and systems must be designed and installed so that:*

- (1) Those required for type certification or by operating rules, or whose improper functioning would reduce safety, perform as intended under the aeroplane operating and environmental conditions.*
- (2) Other equipment and systems are not a source of danger in themselves and do not adversely affect the proper functioning of those covered by sub-paragraph (a)(1) of this paragraph.”*

CS 25.803 (a) requires the following: *“Each crew and passenger area must have emergency means to allow rapid evacuation in crash landings [...]*”

CS 25.785 (j) requires firm handhold to be available when using the aisles.

For interior cabin items such as monuments or pieces of equipment, which have the capability to have loads applied, either deliberately, or accidentally because of location or configuration, abuse loads should be defined such that the item:

- Will not be a cause of injury to the crew or passengers; and
- Will continue to function safely after the application of abusive loading; and
- Will not obstruct evacuation.

Three possible situations can lead to the application of abuse loads:

- Persons steadying themselves or falling due to in-flight turbulence;
- Evacuation of crew and passengers from cockpit, main cabin or crew rest compartments;
- Improper use of the cabin item.

It appears that a safe cabin inherently results from good design practice applied over many years. Different manufacturers have developed specifications for abuse load values. Typically different abuse loads are established based on the load likely to be applied. Some of the load values in manufacturer specifications reference to the same source documents (SAE and recognised textbooks). One of them has a higher requirement, as an isolated case.

According to CS 25.301, and based on past experience, the relatively low frequency of occurrence of abuse loads makes it more appropriate to consider them as ultimate static loads.



### 3. EASA Certification Policy

#### 3.1. EASA Policy

When showing compliance with the certification specifications affected by abuse loads, several disciplines can be affected: Cabin Safety, Flight Test and Structures. Co-ordination between these disciplines is required.

The following provides guidance on acceptable abuse load values. Load cases from any other applicable specifications like CS 25.321 (flight loads), CS 25.471 (ground loads) or CS 25.561 (emergency landing conditions) also need to be complied with.

The following abuse load values, derived from current manufacturer design specifications and industry standards, assume a conservative load that may be applied, depending on practicability, to hold or press the item and to exert the person’s weight. These loads serve as general reference. Different values may be justified for specific configurations or by comparison with type certificate criteria.

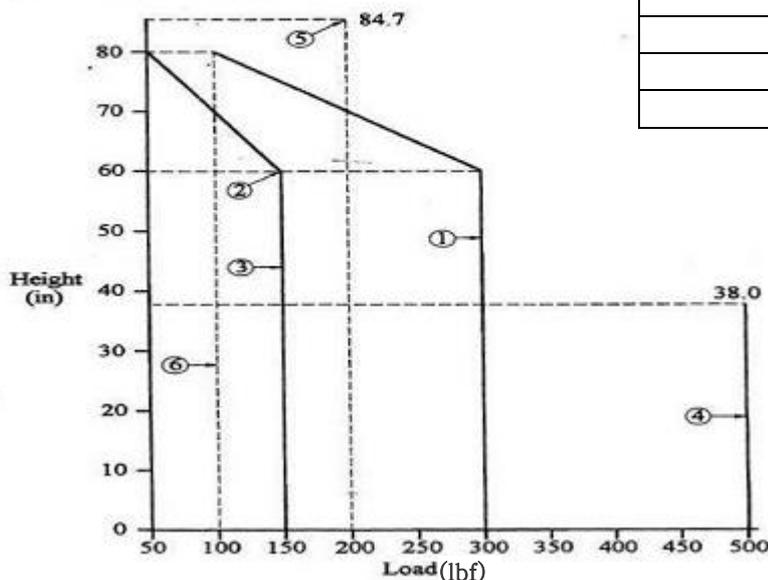
The loads should be applied at the realistically most critical point and direction.

#### 3.1.1. General loads

	0 to 150 cm above floor daN	At 200cm above floor (linear reduction between 150cm (60”) and 200 cm (80”) daN	Area
Pushing	133	44	10 cm x 10 cm
Pulling 1 hand	66	20	10 cm x 10 cm
Pulling 2 hands	133	44	10 cm x 10 cm
Up	66	20	10 cm x 10 cm
Down	133	44	10 cm x 10 cm
Seating or stepping	222	N/A (up to 100 cm)	Seat 30 cm x 30 cm Step 10 cm x 20 cm
Curtain pulling	89	N/A (up to 215 cm)	-

Table 1: General abuse loads

- ① Horizontal Push/Pull, Two Hands, and Downloads
- ② Up Loads
- ③ Horizontal One Hand Pull
- ④ Sitting, Standing Load
- ⑤ Free Span Curtain Track Download
- ⑥ Curtain Download



daN	lbf
22	50
44	100
66	150
89	200
133	300
222	500

Table 2: Unit conversion

Fig. 1 Variation of abuse loads (in lbf) with height (in in)



### 3.1.2. Specific items

	daN	Comments
In-seat deployable video systems	89	Ref. ARP 5475
Aisle Armrests downward	133	Ref. ARP 5526
Aisle Armrests sideways	89	“
Other Armrests downward	111	“
Other Armrests sideways	66	“
Food tray downward	66	“
Seat back reclining	89	“
Seat back breakover forward	11	“
PSU (Passenger Service Unit)	22	
Sidewall and Dado panels	66	
Bassinet fittings	133	
Diaper boards	89	
Partitions, galleys, lavatories	89	
Hand grip interior components	89	
Hand grip exit areas and doors	133	
Hand Rail downward	133	
Hand Rail sideways	89	
Cargo compartment ceiling	27	
Cargo compartment lining and sloping	66	
Cargo compartment partition wall	44	

Table 3: Specific items abuse loads

### 3.2. Whom this Certification Memorandum affects

This Certification Memorandum affects applicants for certification projects installing items in the cabin which can be subjected to abuse loads.

### 4. Remarks

1. This EASA Proposed Certification Memorandum will be closed for public consultation on the **12<sup>th</sup> of July 2017**. Comments received after the indicated closing date for consultation might not be taken into account.
2. Comments regarding this EASA Proposed Certification Memorandum should be referred to the Certification Policy and Safety Information Department, Certification Directorate, EASA. E-mail [CM@easa.europa.eu](mailto:CM@easa.europa.eu).
3. For any question concerning the technical content of this EASA Proposed Certification Memorandum, please contact:
 

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