



Comment-Response Document 2013-20

Seat crashworthiness improvement on large aeroplanes — Dynamic testing 16 g

CRD TO NPA 2013-20 — RMT.0069 (26.002) — 20.5.2016

Related Opinion No 02/2016

EXECUTIVE SUMMARY

The aim of the rulemaking task RMT.0069 is to improve the protection of occupants on board large aeroplanes operated in commercial air transportation (CAT) of passengers when they are involved in a survivable accident or emergency landing.

The related Notice of Proposed Amendment (NPA) 2013-20 proposed, within the new framework introduced by Part-26 and CS-26, to introduce additional airworthiness requirements and specifications for operations in order to make CS 25.562 specifications applicable also to newly produced aircraft of already approved types.

This Comment-Response Document (CRD) contains the comments received on NPA 2013-20 and the responses, or a summary thereof, provided thereto by the Agency.

Based on the comments and responses, the production cut-in was confirmed (however, with a longer transition period) and the relevant Opinion No 02/2016 was developed.

For information, the Agency publishes the draft Decision (CS-26) in this CRD. The proposed amendments to the rule are contained in the related Opinion No 02/2016 published in parallel with this CRD.

Applicability		Process map	
Affected regulations and decisions:	Regulation (EU) 2015/640 (Part-26) ED Decision 2015/013/R (CS-26)	Terms of Reference:	17.9.2010
Affected stakeholders:	Manufacturers and operators of large aeroplanes used in CAT of passengers in the EU Member States Aircraft seat manufacturers	Concept Paper:	No
Driver/origin:	Safety	Rulemaking group:	No
Reference:		RIA type:	Full
		Technical consultation during NPA drafting:	Yes
		Publication date of the NPA:	10.10.2013
		Duration of NPA consultation:	3 months
		Review group:	No
		Focussed consultation:	No
		Publication date of the Opinion:	In parallel with this CRD
		Publication date of the Decision:	2016/Q3



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1. Procedural information

1.1. The rule development procedure

The European Aviation Safety Agency (hereinafter referred to as the 'Agency') developed this CRD in line with Regulation (EC) No 216/2008¹ (hereinafter referred to as the 'Basic Regulation') and the Rulemaking Procedure².

This rulemaking activity is included in the Agency's [4-year Rulemaking Programme](#), under RMT.0069 (26.002). The scope and timescale of the task were defined in the related [Terms of Reference](#) (ToR).

The draft regulation, certification specifications (CS) and acceptable means of compliance (AMC) have been developed by the Agency. All interested parties were consulted through NPA 2013-20³, which was published on 10 October 2013. 34 comments were received from 17 interested parties, including industry, national aviation authorities (NAAs) and social partners.

The text of this CRD has been developed by the Agency.

The process map on the title page contains the major milestones of this rulemaking activity.

1.2. The structure of this CRD and related documents

This CRD provides a summary of comments and responses as well as the full set of individual comments (and responses thereto) received on NPA 2013-20. The draft decision text is provided in Chapter 3 of this CRD.

1.3. The next steps in the procedure

The Agency has published this CRD in parallel with Opinion No 02/2016, which contains proposed changes to the European Union Regulation. It is addressed to the European Commission to be used as a technical basis in order to prepare a legislative proposal.

The decision containing the CS and GM will be published by the Agency when the related Implementing Rule is adopted by the Commission.

¹ Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.3.2008, p. 1).

² The Agency is bound to follow a structured rulemaking process as required by Article 52(1) of the Basic Regulation. Such a process has been adopted by the Agency's Management Board and is referred to as the 'Rulemaking Procedure'. See Management Board (MB) Decision 01-2012 of 13 March 2012 concerning the procedure to be applied by the Agency for the issuing of Opinions, Certification Specifications and Guidance Material (Rulemaking Procedure).

³ <http://easa.europa.eu/document-library/notices-of-proposed-amendment>



2. Summary of comments and responses

34 comments in total were received on NPA 2013-20, from 4 authorities (the US FAA and 3 European NAAs), 5 operator organisations and airlines, 3 aircraft manufacturers, 2 aircraft seat manufacturers, 1 aircraft restraint system manufacturer and 1 professional organisation.

Among those comments:

- 2 comments requesting clarification on the aircraft affected by the proposed requirement have been accepted;
- 4 comments requesting a longer transition period have been accepted. The Agency will propose a two-year transition period to comply with the requirement;
- 2 comments proposing to change the repartition of the text between Part-26 (objective) and CS-26 (means of compliance) have not been accepted. The Agency clarified the purpose of the requirements set in Part-26 (objective) and the specifications in CS-26 (means of compliance to the objective);
- 4 comments have been noted, but considered to be beyond the scope of this rulemaking task.

The 3 responding EU NAAs expressed no concern with the production cut-in option proposed by the Agency.



3. Resulting text

3.1. Draft Regulation (Draft EASA Opinion)

The resulting rule text is provided in Opinion 02/2016, which is published in parallel with this CRD on the Agency's website at <http://www.easa.europa.eu/document-library/opinions>.

3.2. Draft amended CS-26 (Draft EASA Decision)

CS-26

Additional airworthiness specifications for operations

Book 1

Subpart B — Large aeroplanes

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CS 26.60 Emergency landing — dynamic conditions

Compliance with Part 26.60 is demonstrated by complying with CS 25.562 , or equivalent, or with the following (see GM1 26.60):

- (a) Each seat type design approved for occupancy during taxiing, take-off, or landing must successfully complete dynamic tests or be demonstrated by rational analysis based on dynamic tests of a similar type seat, in accordance with each of the following emergency landing conditions. The tests must be conducted with an occupant simulated by a 77 kg (170 lb) anthropomorphic test dummy sitting in the normal upright position:
- (1) A change in downward vertical velocity (Δv) of not less than 10.7 m/s (35 ft/s) with the aeroplane's longitudinal axis canted downward 30 degrees with respect to the horizontal plane and with the wings level. Peak floor deceleration occurs in not more than 0,08 seconds after impact and reaches a minimum of 14 g.
 - (2) A change in forward longitudinal velocity (Δv) of not less than 13.4 m/s (44ft/s) with the aeroplane's longitudinal axis horizontal and yawed 10 degrees either right or left, whichever would cause the greatest likelihood of the upper torso restraint system (where installed) moving off the occupant's shoulder, and with the wings level. Peak floor deceleration must occur in not more than 0,09 seconds after impact and must reach a minimum of 16 g. Where floor rails or floor fittings are used to attach the seating devices to the test fixture, the rails or fittings must be misaligned with respect to the adjacent set of rails or fittings by at least 10 degrees vertically (i.e. out of parallel) with one rolled 10 degrees.
- (b) The following performance measures must not be exceeded during the dynamic tests conducted in accordance with subparagraph (a) of this paragraph:



- (1) Where upper torso straps are used, tension loads in individual straps must not exceed 794 kg (1 750 lb). If dual straps are used for restraining the upper torso, the total strap tension loads must not exceed 907 kg (2 000 lb).
- (2) The maximum compressive load measured between the pelvis and the lumbar column of the anthropomorphic dummy must not exceed 680 kg (1 500 lb).
- (3) The upper torso restraint straps (where installed) must remain on the occupant's shoulder during the impact.
- (4) The lap safety belt must remain on the occupant's pelvis during the impact.
- (5) Each occupant is protected from serious head injury under the conditions prescribed in sub-paragraph (a) of this paragraph. Where head contact with seats or other structure can occur, protection is provided so that the head impact does not exceed a Head Injury Criterion (HIC) of 1 000 units. The level of HIC is defined by the equation —

$$HIC = \left\{ (t_2 - t_1) \left[\frac{1}{(t_2 - t_1)} \int_{t_1}^{t_2} a(t) dt \right]^{2.5} \right\}_{\max}$$

Where —

't1' is the initial integration time,

't2' is the final integration time, and

'a(t)' is the total acceleration vs time curve for the head strike, and where

'(t)' is in seconds, and '(a)' is in units of gravity (g).

- (6) Where leg injuries may result from contact with seats or other structures, protection is provided to prevent axially compressive loads exceeding 1 021 kg (2 250 lb) in each femur.
- (7) The seat remains attached at all points of attachment, although the structure may have yielded.
- (8) Seats do not yield under the tests specified in sub-paragraphs (a)(1) and (a)(2) of this paragraph to the extent they would impede rapid evacuation of the aeroplane occupants.

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3.3. Draft Guidance Material (Draft EASA Decision)

BOOK 2 — GUIDANCE MATERIAL (GM)

Subpart A — General

GM1 26.1 JAR-26/JAR/CS-25/FAR-25+121/OPS/Part-26/CS-26/GM-26 Cross-reference table

This table is intended to be a quick cross-reference table between those requirements contained, on the one hand, in Part-26, CS-26 and GM-26, and, on the other hand, their 'parent' airworthiness code (when existing), i.e. JAR-26, FAA's requirements FAR-25 and/or FAR Part-121, as well as related EU-OPS and new EASA operational requirements. This table is only indicative and does not pre-empt compliance with applicable requirements, which shall be assessed by the competent authority.

JAR-26	JAR-25 / CS-25	FAR-25 / Part-121	OPS	Part-26	CS-26	GM-26
JAR 26.1	n/a	n/a	n/a	n/a	n/a	n/a
JAR 26.2	n/a	n/a	n/a	n/a	n/a	n/a
JAR 26.3	n/a	n/a	n/a	26.35	n/a	n/a
JAR 26.5	n/a	n/a	n/a	n/a	n/a	n/a
JAR 26.50	JAR 25.785(h), (j) & (k) at Change 8, 30/11/81 CS 25.785(g)	FAR 25.785(g), Amdt 25-51, 06/03/80 FAR 121.311 (d)(f) & (g) at Change 21, 17/02/98	OPS 1.730 CAT.IDE.A.205	Part 26.50	CS 26.50	GM1 26.50(c)
N/A	JAR 25.562 CS 25.562	FAR 25.562 FAR 121.311(j) Amdt 121-315	OPS 1.730 CAT.IDE.A.205	Part 26.60	CS 26.60	AMC1 26.60
JAR 26.100	JAR 25.807(d)(7) at Change 13 and Amdt 93/1 08/03/93 CS 25.807	121.310(m)	n/a	Part 26.100	CS 26.100	n/a
JAR 26.105	JAR 25.813(d) to (f) at Change 8, 30/11/81 CS 25.813	121.310(f)	OPS 1.735 CAT.IDE.A.215	Part 26.105	CS 26.105	n/a
JAR 26.110	JAR 25.811(a) to (d) and (f) to (g) at Change 8, 30/11/81 JAR 25.811(e) at Change 14, 27/05/94 CS 25.811	121.310(b)	OPS 1.815 CAT.IDE.A.275	Part 26.110	CS 26.110	GM1 26.110 (e)(4)



JAR-26	JAR-25 / CS-25	FAR-25 / Part-121	OPS	Part-26	CS-26	GM-26
JAR 26.120	JAR 25.812 (b),(c),(d) & (h) at Change 8, 30/11/81 JAR 25.812 (a) & (e) at Change 12, 16/06/86 CS 25.812	FAR 121.310 (b),(c) & (d) at Change 21, 17/02/98	OPS 1.815(a)(1) CAT.IDE.A.275(b)	Part 26.120	CS 26.120	n/a
JAR 26.125	JAR 25.812 (f) & (g) at Change 8, 30/11/81 CS 25.812	FAR 121.310 (h)(1) at Change 21, 17/02/98	OPS 1.185(a)(1)(iv) and (v) CAT.IDE.A.275 (b)(4) and (5)	n/a	n/a	n/a
JAR 26.130	CS 25.810	FAR 25.2 (a) at Amdt 25-72, 20/08/90 FAR 121.310 (a) & (h)(2) at Change 21, 17/02/98	OPS 1.805 CAT.IDE.A.265	n/a	n/a	n/a
JAR 26.150	JAR 25.791 at Change. 8, 20/11/81 JAR 25.853(a) to (d) at Change 14, 27/05/94 JAR 25.853(e) at Change 13 plus Amdt 91/1, 12/04/91 JAR 25.853(f) and Appendix F at Change 14, 27/05/94 Appendix F, Part I, at Amdt 93/1, 08/03/93 Appendix F, Part II, III, IV, V at Change 13 05/10/89 CS 25.853	FAR 121.312	OPS 1.731 CAT.IDE.A.210	Part 26.150	CS 26.150 App. F	GM1 26.150 (a), GM1 26.150 (c), GM1 26.150 (d)



JAR-26	JAR-25 / CS-25	FAR-25 / Part-121	OPS	Part-26	CS-26	GM-26
JAR 26.155	JAR 25.855 and Appendix F, Part III at Change.13 plus Amdt 93/1, 08/03/93 CS 25.855	121.314	n/a	Part 26.155	CS 26.155 App. F	n/a
JAR 26.160	JAR 25.854 at Change.13 at Amdt 93/1, 08/03/93 CS 25.854	121.308	n/a	Part 26.160	CS 26.160	n/a
JAR 26.200	JAR 25.729 at Amdt 93/1, 08/03/93 CS 25.729	121.289, Amdt 121-227	n/a	Part 26.200	CS 26.200	n/a
JAR 26.250	n/a	121.313(j)(1)(ii)	n/a	Part 26.250	n/a	n/a
JAR 26.260	CS 25.795	121.313(j)(1)(ii)	OPS 1.1255 ORO.SEC.100.A	n/a	n/a	n/a



Subpart B — Large aeroplanes

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GM1 26.60 Emergency landing — dynamic conditions

AC 25.562-1B (dated 10 January 2006) may be used when showing compliance with CS 26.60.

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4. Individual comments (and responses)

In responding to comments, a standard terminology has been applied to attest the Agency's position. This terminology is as follows:

- (a) **Accepted** — The Agency agrees with the comment and any proposed amendment is wholly transferred to the revised text.
- (b) **Partially accepted** — The Agency either agrees partially with the comment, or agrees with it but the proposed amendment is only partially transferred to the revised text.
- (c) **Noted** — The Agency acknowledges the comment but no change to the existing text is considered necessary.
- (d) **Not accepted** — The comment or proposed amendment is not shared by the Agency.

(General comments)

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comment	11	comment by: UK CAA
	Please be advised there are no comments from the UK Civil Aviation Authority on NPA 2013-20, Seat Crashworthiness improvement on large aeroplanes Dynamic testing 16g.	
response	<i>Noted</i> The Agency thanks the UK CAA for its review.	
comment	12	comment by: Embraer - Indústria Brasileira de Aeronáutica - S.A.
	Applicability to Corporate/Executive Aeroplanes	
	Notwithstanding the fact that the regulatory impact analysis recommends that the corporate aircraft of "VIP" aircraft be excluded from the applicability of this regulatory change, principally due to the small passenger capacity, and hence the reduced benefit, the applicability of the rule rests in the general applicability of Part 26 to large aeroplanes in commercial air transport, which would require new production noncompliant corporate/VIP aeroplanes be modified. Since the costs of these modifications were not considered in the RIA, so Embraer suggests that the applicability of Part 26 be revised to say either:	
	"Operators of large aeroplanes with more than 30 passenger seats used in commercial air transport ..." or	
	"Operators of large aeroplanes, except low occupancy aeroplanes, used in commercial air transport ..." with the definition of "Low occupancy" coming from a definition developed by EASA's Executive Interiors Regulations Working Group:	
	Low Occupancy: a low occupancy aeroplane has a maximum authorized passenger occupancy:	
	<ul style="list-style-type: none"> • up to 19 passengers, or • up to one-third of the maximum approved capacity of the type certificated aircraft as indicated in the aircraft Type Certificate Data Sheet. 	
response	<i>Accepted</i>	



The Agency will clarify the applicability of this requirement, to exempt 'low occupancy aeroplanes' involved only in on-demand non-scheduled commercial air transport operations, as developed by the EASA working group on Executive Interiors Regulations.

comment

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comment by: *AmSafe, Inc.*Attachment [#1](#)

AmSafe, Inc. comments per attached PDF file "AmSafe Inc - Comments to EASA NPA-2013-20 - 27 January 2014" submitted 27 January 2014 by Giuseppe Gullotto, Director of Engineering

response

Noted

The Agency thanks AmSafe for the comments provided and the supporting documents. However, the comments are beyond the scope of this rulemaking task and therefore they will not be considered for this task.

comment

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comment by: *Association of Asia Pacific Airlines*

Based on the NPA, there are 2 options available, namely

Option 1 - requiring 16 g seats to be fitted to newly manufactured large aircraft used in commercial air transport

Option 2 - requiring 16 g seats to be fitted to **in-service and** newly manufactured large aircraft used in commercial air transport.

Based on the Regulatory Impact Assessment (RIA) carried out for both Options 1 and 2, the cost impact of Option 2 will be greater than Option 1. The cost benefit of Option 2 is lower than that of the cost benefit of Option 1.

B. AAPA comments:

Option 1:

In the view of the AAPA, Option 1 is a more viable option due to the consideration it gives to air carriers concerning economic and operational burden. With the selection of Option 1, exemption is given to fleet already in service thus reducing both economic and operational impact on air carriers.

Option 2:

Option 2, in the view of the AAPA, poses a number of challenges should it come into effect.

Compliance challenges of Option 2:

After the effective date of the rule, specific actions are required to be taken by the air carriers. The foreseeable issues are as follows:

- Agencies capable of performing the testing of in-service seating are limited and may not have sufficient resources to support the affected air carriers.
- Testing of in-service seats requires their removal which will leave empty spaces on the aircraft. The reason for this is that in the majority of cases air carriers do not hold in stock complete spare seats



- Passenger seats are customised to air carrier requirements taking into account the level and type of customer service provided including in-flight entertainment systems. Seats are not interchangeable between air carriers.
- There are limited number of passenger seat providers. They are currently supporting new aircraft production and ongoing airline cabin upgrades. These providers do not necessarily have the resources or spare capacity to support requests from air carriers required to change their seats. Long lead-times can only be expected if air carriers look to change their seat provider
- The lead-time for seats could be greater depending on the type of seats to be replaced.
- On removing in service seats for testing purposes some regulators are of the opinion it is simple to reconfigure aircraft cabins and absorb the available space. For some authorities it would require air carriers to seek approval for a reconfiguration which may not be permitted.

Cost Impact of Option 2:

As with the RIA carried out by EASA, AAPA agrees with the cost impact Option 2 will have on air carriers.

- Fleet in service will have to be grounded to provide time for the retrofit of newly approved seats. This will have an impact of loss of revenue for airlines
- Depending on the lead time, a big uncertainty remains on the actual period of loss of revenue
- Additional labour and material costs to retrofit existing fleet
- Difficulty in procuring parts may be a hindrance and add to existing costs
- Additional time to design and implement new seats due to custom airline designs
- Wastages on the costs already spent for previous cabin refurbishment and seat modifications especially in first and business class sections.
- AAPA carriers do recognise the importance of safety and are supportive of airworthiness regulations we are also hoping regulatory requirements are justifiable, practical, cost-effective, and take into account realistic operational timeframes.

C. Summary

After studying the information contained in NPA 2013-20, the Regulatory Impact Assessment Report and from feedback from our carriers, the Association of Asia Pacific Airlines is in support of

“Option 1 (requiring 16 g seats to be fitted to newly manufactured large aircraft used in commercial air transport)”

which is in line with the Option that was favoured by the Agency.

In the event that EASA may have some questions of clarification or requests for additional information do not hesitate to contact the AAPA

response *Noted*

The Agency thanks the AAPA for its analysis and support.



comment	18	comment by: <i>Luftfahrt-Bundesamt</i>
	The LBA has no comments on NPA 2013-20.	
response	<i>Noted</i> The Agency thanks the LBA for its review.	
comment	19	comment by: <i>Swiss International Airlines / Bruno Pfister</i>
	SWISS Intl Air Lines takes note of NPA 2013-20 without further comments.	
response	<i>Noted</i> The Agency thanks Swiss Intl Airlines for its review.	
comment	23	comment by: <i>RECARO Aircraft Seating</i>
	<p>RECARO will support EASA in the implementation of Option 1.</p> <p>Notwithstanding the report supposes the cost will be only supported by the AC manufacturers and airlines, RECARO believes that some effort and additional costs would impact on Seat manufacturers as well.</p> <p>From cost point of <u>view</u> is not acceptable also for Suppliers to implement the “25.562 compliant seat” (seats that are manufactured and installed such that they are fully compliant with the requirements of CS 25.562) on all in service fleet.</p> <p>The possible introduction of airbags would lead to maintenance cost increase. There will also be a weight increase and increase of cost for purchasing, development and testing. In some cases this may also lead to higher interface loads, which in the worst case could lead to interface loads exceedances.</p> <p>For example, the usage of Seat inflatable systems could imply additional effort and costs for Purchasing, Development and Testing. It could also lead to potential loss of number of seats and thus to loss of revenue.</p> <p>Recent experience shows that even inflatable restraints are no magic bullet. In a traditional layout on an aircraft type/layout not yet subject to full HIC requirements keeping the traditional layout (set-back from monuments and seat-to-seat pitch) might not be possible even with inflatable restraints. Hence, there might either be a loss of comfort to the passengers due to reduced space or maybe even a loss of seat places.</p> <p>For the same seat model, the claim that a 16g seat would have less weight than a 9g seat is not supportable. In fact, a 16g seat might add weight (local reinforcements, especially at backrest and structure, and inflatable restraints). A 16g seat will always also be a 9g seat first. The 16g requirements are on top of the 9g requirements, these 16g requirements can add weight.</p> <p>From a testing point of view, it would be very costly to recertify existing 9g seats to 16g. It would at least mean a major modification of such seats.</p> <p>Any weight savings would be linked to a new seat development. But even there, a new 16g seat will be a 9g seat first.</p>	



	<p>A longer transition period should be foreseen especially for long-running programs which were established or started before the “given date”. Seats development may have started and based on a certification basis which does not include the “25.562 fully compliant seat”.</p> <p>Furthermore, it is not always possible to meet HIC requirements (especially for Front Row seats) with the current number of passengers and thus the OEMs/Airlines/Installers should be aware that a fully HIC compliance may lead to a loss of seat places and/or to a closer seat pitch.</p> <p>Only adoption of option 1 would lead to harmonization with FAA requirements.</p>
response	<p><i>Accepted</i></p> <p>The Agency thanks RECARO for its analysis. However, the Agency will propose a two-year transition period to comply with the requirement.</p>
comment	<p>28 comment by: <i>DGAC France</i></p> <p>DGAC France has no specific comment on this NPA</p>
response	<p><i>Noted</i></p> <p>The Agency thanks DGAC France for its review.</p>

2. Explanatory Note

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comment	<p>3 comment by: <i>Dassault Aviation</i></p> <p>Dassault-Aviation understands from § 2.3 that this amendment would not apply to VIP/Executive airplanes. But the text of the proposed Part 26.60 is not consistent with the last sentence of § 2.3. In addition, CS 26.60 and associated AMC's make no difference for VIP/Executive airplanes.</p> <p>The rule should be more explicite regarding business aviation. Otherwise, the operators will face the administrative burden and cost to apply for exemptions, with no safety added value. Moreover, there is a risk that some NAAs be unsupportive in the exemption process if the rule remains according to current proposal.</p> <p>Consistently with the EIR Working Group proposal, it is proposed to add in Part 26.60 and/or CS 26.60 that airplanes with interior accommodations of less than 19 Passengers are exempted. This is will address at least the business airplanes for which the exemption cost per seat is the highest.</p>
response	<p><i>Accepted</i></p> <p>The Agency will clarify the applicability of this requirement, to exempt ‘low occupancy aeroplanes’ involved only in on-demand non-scheduled commercial air transport operations, as developed by the EASA working group on Executive Interiors Regulations.</p>
comment	<p>5 comment by: <i>Zodiac Seats</i></p>



response	In the second paragraph underneath the bold heading "Regulation history and status - EASA and FAA", the reference to the FAA AC25.562-1A is now obsolete, the NPA should refer to The later revision of the Advisory Circular published in 2006: AC25.562-1B (January 10, 2006).
response	<i>Accepted</i> The reference will be corrected in the final text.
comment	32 comment by: ERA
response	ERA: General comment is that NPA 2013-20 is well balanced and reasonable in its conclusions. In terms of preference, only direct support for Option 1 - Forward Fit was received. <i>Noted</i> The Agency thanks ERA for its analysis and support.

3. Proposed amendments - 3.1 Draft Opinion on Part-26 - Cover Regulation

p. 8-9

comment	3 ❖ comment by: Dassault Aviation
response	Dassault-Aviation understands from § 2.3 that this amendment would not apply to VIP/Executive airplanes. But the text of the proposed Part 26.60 is not consistent with the last sentence of § 2.3. In addition, CS 26.60 and associated AMC's make no difference for VIP/Executive airplanes. The rule should be more explicite regarding business aviation. Otherwise, the operators will face the administrative burden and cost to apply for exemptions, with no safety added value. Moreover, there is a risk that some NAAs be unsupportive in the exemption process if the rule remains according to current proposal. Consistently with the EIR Working Group proposal, it is proposed to add in Part 26.60 and/or CS 26.60 that airplanes with interior accommodations of less than 19 Passengers are exempted. This is will address at least the business airplanes for which the exemption cost per seat is the highest. <i>Accepted</i> The Agency will clarify the applicability of this requirement, to exempt 'low occupancy aeroplanes' involved only in on-demand non-scheduled commercial air transport operations, as developed by the EASA working group on Executive Interiors Regulations.
comment	8 comment by: Cargolux Airlines International S.A.
response	Cargolux comments: With regard to Freighter aircraft personnel/passenger accommodation seats, please ensure that this rule closely matches with FAA rule on the subject. 14 CFR 121.311(j) does not require dynamically tested seats on freighterpersonnel/passenger accommodation seats. The FAA



response	<p>rule applies only to "passenger-carrying operations" and this excludes "revenue cargo operations".</p> <p><i>Accepted</i></p> <p>The Agency will clarify in the final text that the requirement is only applicable to CAT of passengers.</p>
comment	<p>9 comment by: <i>Boeing</i></p> <p>Page:9</p> <p>Section: <i>3.1. Draft Regulation (Draft EASA Opinion)</i></p> <p><i>Item (4)</i></p> <p><u>The proposed text states:</u></p> <p><i>"The applicability of the latter FAR 25.562 requirements were extended by FAA to newly produced and in-service aircraft performing commercial air transport operations via an amendment to FAR 121.311 requiring that 'after October 27, 2009, no person may operate a transport category airplane type certificated after January 1, 1958 and manufactured on or after October 27, 2009 in passenger-carrying operations under this part unless all passenger and flight attendant seats on the airplane meet the requirements of § 25.562 in effect on or after June 16, 1988."</i></p> <p>REQUESTED CHANGE:</p> <p><i>"The applicability of the latter FAR 25.562 requirements were extended by FAA to newly produced and in-service aircraft performing commercial air transport operations via an amendment to FAR 121.311 requiring that 'after October 27, 2009, no person may operate a transport category airplane type certificated after January 1, 1958 and manufactured on or after October 27, 2009 in passenger-carrying operations under this part unless all passenger and flight attendant seats on the airplane meet the requirements of § 25.562 in effect on or after June 16, 1988."</i></p> <p>JUSTIFICATION: The FAA rule 14 CFR §121.311 was NOT applied to in-service aircraft as suggested by the proposed text. Our requested change correctly states the requirements of the final rule that FAA released.</p>
response	<p><i>Accepted</i></p> <p>The reference to in-service aircraft will be deleted in the final text.</p>

3. Proposed amendments - 3.1 Draft Opinion on Part-26 - 26.60 Emergency landing — dynamic conditions

p. 10

comment	<p>3 ❖ comment by: <i>Dassault Aviation</i></p> <p>Dassault-Aviation understands from § 2.3 that this amendment would not apply to VIP/Executive airplanes. But the text of the proposed Part 26.60 is not consistent with the last sentence of § 2.3. In addition, CS 26.60 and associated AMC's make no difference for VIP/Executive airplanes.</p>
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	<p>The rule should be more explicit regarding business aviation. Otherwise, the operators will face the administrative burden and cost to apply for exemptions, with no safety added value. Moreover, there is a risk that some NAAs be unsupportive in the exemption process if the rule remains according to current proposal.</p> <p>Consistently with the EIR Working Group proposal, it is proposed to add in Part 26.60 and/or CS 26.60 that airplanes with interior accommodations of less than 19 Passengers are exempted. This will address at least the business airplanes for which the exemption cost per seat is the highest.</p>
response	<p><i>Accepted</i></p> <p>The Agency will clarify the applicability of this requirement, to exempt 'low occupancy aeroplanes' involved only in on-demand non-scheduled commercial air transport operations, as developed by the EASA working group on Executive Interiors Regulations.</p>
comment	<p>10 comment by: <i>Boeing</i></p> <p>Page:10</p> <p>Paragraph: 26.60(a)</p> <p><u>The proposed text states:</u></p> <p><i>"26.60 Emergency landing — dynamic conditions</i></p> <p><i>Operators of large aeroplanes used in commercial air transport, type certified on or after 1 January 1958, and manufactured on or after [one year after the entry into force of this Regulation] shall ensure that:</i></p> <p><i>(a) each seat and its restraint systems are designed to protect each occupant during an emergency landing condition when --</i></p> <p><i>(1) proper use is made of seats, safety belts, and shoulder harnesses provided for in the design; and</i></p> <p><i>(2) the occupant is exposed to loads resulting from dynamic emergency landing conditions.</i></p> <p><i>(b) with the exception of flight deck crew seats, each seat type design approved for occupancy has successfully completed dynamic tests or is demonstrated by rational analysis based on dynamic tests of a similar type seat, in accordance with emergency landing conditions, with the seat configured in order to provide an optimum level of protection in an emergency landing whilst allowing the occupant's necessary functions and facilitating rapid egress."</i></p> <p><u>REQUESTED CHANGE:</u></p> <p><i>"26.60 Emergency landing — dynamic conditions</i></p> <p><i>Operators of large aeroplanes used in commercial air transport, type certified on or after 1 January 1958, and manufactured on or after [one year after the entry into force of this Regulation] in passenger-carrying operations¹ shall ensure that:</i></p> <p><i>(a) each passenger and flight attendant² seat and its restraint systems are designed to protect each occupant during an emergency landing condition when – ..."</i></p>



JUSTIFICATION:

1. Our requested change is needed to clarify that the applicability of section 26.60 is for passenger-carrying operations, as is noted on page 9, Section 3.1., Draft Regulation (Draft EASA Opinion), Item (4), which is harmonized with the FAA.

2. If paragraph 26.60(a) were issued as proposed in the NPA, it would cause confusion because it could be read (incorrectly) that flight deck seats would also need to be shown compliant with dynamic emergency landing loads as stated in 26.60(a)(2); however, paragraph 26.60(b) clearly states that flight deck seats are excluded from the dynamic requirements. Our requested change would better align paragraphs 26.60(a) and 26.60(b).

response

Accepted

The final text will be modified in order to clarify that the requirement is only applicable to commercial air transport of passengers and is not applicable to flight deck seats, nor to 'low occupancy aeroplanes' involved only in on-demand non-scheduled commercial air transport operations.

comment

13

comment by: *Embraer - Indústria Brasileira de Aeronáutica - S.A.*

26.60 Emergency landing - dynamic conditions

Time to comply

Because compliance with 25.562 can have design impacts on the cabin beyond the simple installation of a compliant seat, Embraer suggests to change the compliance time of one year to 24 months after entry into force of the proposed regulation. We believe this change is necessary to ensure timely implementation of the required cabin modifications without causing delivery delays.

response

Accepted

The Agency will propose a two-year transition period to comply with the requirement.

comment

16

comment by: *KLM EASA DOA 21J.012*

It is proposed to allow operators that currently operate partly compliant aircraft types in certain cabin configurations, to expand their fleet by a maximum of 10% without the need to certify against 26.60, provided these additional aircraft have the same seats and cabin configuration.

response

Partially accepted

The Agency considers that a clear cut-in date is necessary to comply with the requirements. However, the Agency will propose a two-year transition period to comply with the requirement. This should give a positive answer to the proposal from KLM.

comment

20

comment by: *RECARO Aircraft Seating*

Part-26 should reference CS 25.562 instead of quoting it.



	<p>Point 26.60(a)(2) “refer to “generic” dynamic landing conditions and in (b) the “optimum” level of protection is not quantifiable.</p> <p>We recommend thus to clarify these points.</p>
response	<p><i>Not accepted</i></p> <p>The Agency cannot propose reference to Certification Specifications (soft/non-binding law) into European Commission Implementing Rules (hard/binding law).</p> <p>Part-26 (European Commission document) contains high-level requirements, their applicability and entry into force.</p> <p>CS-26 (Agency document) contains the technical details on how to comply with those high-level requirements. In this particular case, CS 25.562 is recognised as one means (but not the only means) to comply with the requirement in Part 26.20. This is why CS 25.562 is only referenced in CS-26.</p>
comment	<p>26 comment by: <i>IACA International Air Carrier Association</i></p> <p>Comment:</p> <p>The referenced EASA study considered an implementation date for Option 1 of 2016 (see NPA pages 46, 48, 117 and 124). The Draft Opinion however translates this into one year after entry into force, which might be sooner than 2016.</p> <p>IACA wishes to highlight to the Agency that leadtimes of shipsets of new seats tend to be considerable; operators typically need 1.5 to 2 years notice to implement.</p> <p>Proposal:</p> <p>The Agency is requested to consider a sufficient transition period in its Draft Opinion.</p>
response	<p><i>Accepted</i></p> <p>The Agency will propose a two-year transition period to comply with the requirement.</p>

3. Proposed amendments - Draft Decision on CS-26 - CS 26.60 Emergency landing - dynamic conditions

p. 11-12

comment	<p>2 comment by: <i>FAA</i></p> <p>Reference to “subparagraph (b)” is incorrect. Change reference to “subparagraph (a)”</p>
response	<p><i>Accepted</i></p> <p>The reference will be corrected in the final text.</p>
comment	<p>6 comment by: <i>Zodiac Seats</i></p> <p>In sub-section (a), the definition of the simulated occupant shall be clarified: the FAA requires the tests to be performed with a "170 lb. anthropomorphic test dummy, as defined by 49 CFR</p>



Part 572, subpart B, or its equivalent, sitting in the normal upright position". Because of parts manufacturing tolerance, the ATD defined in 49 CFR Part 572, subpart B can sometimes be slightly lighter than 170 lbs. Because of the "*or equivalent*" wording used in the FAA regulation and according to many guidance and opinions collected over the many years of performing dynamic tests, it has been argued and proven that there is no detrimental effects to using a simulated occupant weighing under 170 lbs. The Experts in the matter agree that ballasting the ATD to reach the 170 lbs weight is also not acceptable. The EASA wording should align with the FAA wording to eliminate any future discrepancies between the US and EU regulation as the industry is global and the same tests are used to secure US and EU approvals for products used in both regions.

In sub-section (b), there is a typographical error (see below):

"(b) The following performance measures must not be exceeded during the dynamic tests conducted in accordance with subparagraph ~~(b)~~ (a) of this paragraph:"

In sub-section (b)(1), (b)(2) and (b)(6), suggest expressing the force values in N or daN rather than in Kg as those are more commonly used among the industry when using the metric system.

response

Partially accepted

In relation to sub-section (a):

the comment is noted, and the Agency is considering ways by which this issue might be resolved; however, it is out of the scope of this rulemaking task.

In relation to sub-section (b):

the comment is accepted and the typo will be corrected.

In relation to sub-sections (b)(1), (b)(2) and (b)(6):

The comment is noted. It is a known issue and the Agency agrees that it needs to be addressed. This will be later addressed in a coordinated way among all affected EASA documentation.

comment

21

comment by: *RECARO Aircraft Seating*

Reference to CS 25.562 should be enough.

response

Not accepted

As explained in the response to the comment No 20, CS-26 contains the technical details on how to comply with the high-level requirements of Part-26. In this particular case, CS 25.562 is recognised as one means (but not the only means) to comply with the requirement in Part-26. This is why an alternative to CS 25.562 is also proposed as a means to comply.

comment

24

comment by: *RECARO Aircraft Seating*

Additional harmonization is requested especially between EASA and FAA regulations regarding the Dummy weight which should be harmonized according to the Dummy specifications.

As also discussed during the EASA Seat Certification Issues Meeting in Cologne on 5-6 September 2013, there is a contradiction built into the body of requirements (handed down



from JAR-25.562 into CS-25.562), as well as a requirement which is impossible to meet by the letter. Whatever one will, one will always violate some aspect of the dummy weight requirements.

Without going too much into details, CS-25.562 requires the use of a dummy of 170lbs sharp, while all pertinent acceptable means of compliance (EASA as well as FAA), such as AC-25.562-1B, AS8049A and B, etc. explicitly require the use of an ATD per 49 CFR 572 Subpart B or equivalent, plus shoes and light clothing. However, there simply is no such 170 lbs dummy. There is no 50 percentile ATD, accepted or otherwise, which has weight of 170 lbs sharp or more.

Although there may be the odd ATD specimen which happens to be at the upper very limit of weight tolerance and thus just hit the 170 lbs threshold with shoes and clothing, this is not standard, and altogether out of the influence of the manufacturers, purchasers and users of dummies and dummy parts. The few lucky dummy users who may actually have a 170 lbs dummy cannot be used as basis to declare this a feasible standard, because it isn't.

It was also pointed out by all parties that ballasting ATDs is not acceptable and would lead to non-standardized tests, both concerning test results as such as well as the validity of test results for post-EASA follow-on and add-on certification (e.g. TSO – the FAA explicitly considers ballasted dummies to be unacceptable). Besides, there are no requirements at all on how to actually ballast an ATD.

Incidentally, it appears that the drafters of the more recent CS-23.562 seem to have been aware of this issue and made up part CS-23.562 in a way which avoids these problems. And what is acceptable for 23.562 in terms of occupant protection cannot be wrong for 25.562.

So, actually copying verbatim much of CS-25.562 into the NPA 2013-20 for CS-26.60 and explicitly requiring the use of the non-existent 170 lbs ATD would further aggravate this particular and recognized contradiction.

response

Noted

The comment is noted, and the Agency is considering ways by which this issue might be resolved; however, it is out of the scope of this rulemaking task.

comment

25

comment by: *RECARO Aircraft Seating*

The scope of NPA 2013-20 and CS-26.60 is to endorse part CS-25.562 for a range of aircraft types currently not or not wholly subject to CS-25.562. The proposed CS-26.60 is actually an almost verbatim copy of part CS-25.562.

However, CS-25.562 is already defined and in effect. Therefore, an almost verbatim copy of 25.562 under 26.60 is not only redundant but could lead to built-in contradictions and inconsistencies if and when CS-25.562 was revised at some time in the future. RECARO feels that the correct as well as the most consistent way to implement CS-25.562 under CS-26.60 is by reference and by reference only.

RECARO would like to propose the following wording for CS-26.60:

"After [add date], no person may operate a transport category airplane type certificated after January 1, 1958 and manufactured on or after [add date] in passenger-carrying operations under this part unless all passenger and flight attendant seats on the airplane meet the requirements of CS-25.562 in effect on or after [add date]."



At the end of the day, it will be the same seats which will be installed, and these seats will have to meet the same performance criteria, regardless of whether CS-25.562 has been part of the original type certification basis of the respective aircraft or whether CS-25.562 or equivalent has become applicable per CS-26.60.

response *Not accepted*

The Agency cannot propose reference to Certification Specifications (soft/non-binding law) into European Commission Implementing Rules (hard/binding law).

Part-26 (European Commission document) contains high-level requirements, their applicability and entry into force.

CS-26 (Agency document) contains the technical details on how to comply with those high-level requirements. In this particular case, CS 25.562 is recognised as one means (but not the only means) to comply with the requirement in Part-26. This is why CS 25.562 is only referenced in CS-26.

3. Proposed amendments — 3.3. Draft AMC/GM — AMC1 26.60 Emergency landing — dynamic conditions

p. 16

comment **1** comment by: *FAA*

FAA AC 25.562-1A is obsolete
FAA AC 25.562-1B dated January 10, 2006 is current

response *Accepted*

The reference will be corrected in the final text.

comment **7** comment by: *Zodiac Seats*

Replace the Reference to AC 25.562-1A (dated January 19, 1996) by AC 25.562-1B (dated January 10, 2006).

response *Accepted*

The reference will be corrected in the final text.

comment **14** comment by: *Embraer - Indústria Brasileira de Aeronáutica - S.A.*

AMC1 26.60 Emergency landing - dynamic conditions

Side facing seats

To make clear that new or previously-approved exemptions/deviations and special conditions are acceptable standards for compliance with Part 26.60 under the “or equivalent” provision in CS 26.60, Embraer suggests that the following be added to AMC1 26.60:

Sides facing seats approved by special condition, or by exemption/deviation to JAR/CS 25.562, are acceptable for showing compliance with CS 26.60.



response	<i>Not accepted</i> This proposal affects only aeroplane types which do not have the requirement to fully comply with emergency landing dynamic conditions (i.e. JAR/CS25.562) in their certification basis. It is to be noted that existing Special Conditions and deviations associated with aeroplane types with later certification basis have been issued on a case-by-case basis. The decision of acceptability of the seat designs for other aeroplane types cannot be made via the subject Part/CS-26 rulemaking task.
comment	22 comment by: RECARO Aircraft Seating It is commonly recognized that Industry currently works with the FAA AC 25.5621B. RECARO would recommend rephrasing: "AC 25.562-1A or later revision (...) is applicable when.....".
response	<i>Partially accepted</i> The reference will be corrected in the final text to refer to FAA AC 25.5621B.

6. Appendices - 6.1. Appendix 1 — RIA - 7. Methodology and data requirements

p. 33-42

comment	29 comment by: ERA ERA: Indication that some members' ATRs may not be 25.562 compliant (JAR 25 changes 8 & 11).
response	<i>Noted</i> The Agency thanks ERA for this input.
comment	30 comment by: ERA ERA: Indication from members that costs associated with the installation of "25.562 compliant seats" for both passenger and cabin crew seats would be in the region of 3000\$/seat place on average (ROM).
response	<i>Noted</i> The Agency thanks ERA for this input.
comment	31 comment by: ERA ERA: Whilst no specific indication of weight changes associated with the installation of "25.562 compliant seats" for both passenger and cabin crew seats was expressed. A general comment was that for the retrofit it may bring a weight benefit as newer seats are generally significantly lighter than older seat for same comfort/certification specs due to improvements in materials, design and manufacturing.
response	<i>Noted</i> The Agency thanks ERA for this input.



6. Appendices — 6.1. Appendix 1 — RIA — 9. Conclusion and Preferred Option

p. 52-53

comment	<p>4 comment by: <i>Nigel Johnstone</i></p> <p>ASG NPA2013-20 response:</p> <ol style="list-style-type: none"> 1) The ASG accepts EASA's recommendation to adopt Option 1. 2) The ASG, however, would suggest that the cost of Option 2 should be computed not only as the overall cost but also the cost per flight (or, preferably, the cost per passenger ticket). The NPA quotes a figure of 5,200,000 flights per year in currently non-compliant aircraft, thus the 250,000,000 Euros extra per year to bring these aircraft up to the same standard as new-builds amounts to less than 50 Euros per flight. 3) The ASG also recommends that EASA should consider directing that all major cabin refurbishments which include seat replacements should be completed to the new CS-26 standard. This would ensure that older aeroplanes were brought up to the current 16g standard during the life of the aeroplane. The costs on a per flight basis would be significantly reduced.
response	<p><i>Noted</i></p> <ol style="list-style-type: none"> 1) The Agency acknowledges the ASG's position in favour of Option 1. The majority of commentators also consider that Option 1 is the preferred one. 2) As there is a wide agreement, including from ASG, that Option 1 is the most appropriate one, the Agency does not intend to modify the RIA. 3) The approach regarding cabin refurbishments of older aeroplanes described by the commentator above was discussed but not included in the final analyses for two reasons. Firstly, it was considered that such a requirement would be likely to result in fewer future cabin refurbishments taking place due to the costs of full compliance with CS 25.562. On the other hand, it was considered that future cabin refurbishments will at least partially comply with CS 25.562 in any case due to, in the main, the available seats being in fact '16 g compliant'. Secondly, it was not considered advisable to introduce the potential for confusion that would come from a disharmonised approach in comparison to the equivalent FAA requirement.

6. Appendices — 6.1. Appendix 1 — RIA — Appendix 2 — Final Report

p. 57-135

comment	<p>27 comment by: <i>IACA International Air Carrier Association</i></p> <p>8 - Cost Model (on page 98)</p> <p>Comment:</p> <p>The cost model does not account for the loss of revenue resulting from an eventual decrease of number of installed passenger seats. The assumption is that non-compliant seats can be changed by compliant seats on a 1:1 basis. Inflatable seat belts are suggested as a possible solution to fulfil the requirement of CS 25.562. Both Boeing and Recaro have indicated that this is not an option due to poor passenger comfort.</p>
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	<p>Proposal:</p> <p>The Agency is requested to reassess the RIA taking into account the loss of revenue due to an eventual decreased number of installed passenger seats.</p>
response	<p><i>Not accepted</i></p> <p>The aeroplane types affected by the proposal already need to comply with the equivalent FAA requirements for deliveries to US airlines and the Agency has seen no evidence that the design changes required have adversely affected seating capacities.</p>



5. Appendix A — Attachments

 [AmSafe Inc - Comments to EASA NPA-2013-20 - 27 January 2014.pdf](#)

Attachment #1 to comment [#15](#)

