



**COMMENT RESPONSE DOCUMENT (CRD)
TO NOTICE OF PROPOSED AMENDMENT (NPA) 2008-10**

**for amending the Executive Director Decision No. 2003/02/RM of 17 October 2003
on certification specifications, including airworthiness codes and acceptable means
of compliance, for large aeroplanes (« CS-25 »)**

"Class B/F Cargo Compartments"

Explanatory Note

I. General

1. The purpose of the Notice of Proposed Amendment (NPA) 2008-10, dated 7 May 2008 was to propose an amendment to Decision N° 2003/02/RM of the Executive Director of the European Aviation Safety Agency of 17 October 2003 on certification specifications, including airworthiness codes and acceptable means of compliance, for large aeroplanes (« CS-25 ») as amended by Executive Director's Decision N° 2007/020/R of 20 December 2007 (CS-25 Amendment 4¹).

II. Consultation

2. The draft Executive Director Decision amending Decision N° 2003/02/RM was published on the web site (<http://www.easa.europa.eu>) on 7 May 2008.

By the closing date of 7 August 2008, the European Aviation Safety Agency ("the Agency") had received 34 comments from 13 National Aviation Authorities, professional organisations and private companies.

III. Publication of the CRD

3. All comments received have been acknowledged and incorporated into this Comment Response Document (CRD) with the responses of the Agency.
4. In responding to comments, a standard terminology has been applied to attest the Agency's acceptance of the comment. This terminology is as follows:
 - **Accepted** – The comment is agreed by the Agency and any proposed amendment is wholly transferred to the revised text.
 - **Partially Accepted** – Either the comment is only agreed in part by the Agency, or the comment is agreed by the Agency but any proposed amendment is partially transferred to the revised text.
 - **Noted** – The comment is acknowledged by the Agency but no change to the existing text is considered necessary.
 - **Not Accepted** – The comment or proposed amendment is not shared by the Agency

The resulting text highlights the changes as compared to the current rule.

¹ Note that in the meantime CS-25 was last amended by ED Decision 2008/006/R of 29/08/2008 (CS-25 Amdt 5)

5. The Agency's Decision will be issued at least two months after the publication of this CRD to allow for any possible reactions of stakeholders regarding possible misunderstandings of the comments received and answers provided.
6. Such reactions should be received by the Agency not later than **20 July 2009** and should be submitted using the Comment-Response Tool at <http://hub.easa.europa.eu/crt>.

IV. Results of the consultation

7. 35 comments were received from the industry (manufacturers, aeroclub, airlines), associations) and from National Authorities.
8. Main comments concern missing technical specifications on the Fire Containment Covers (FCCs) or containers used as a means of compliance for Class F cargo compartment approval. The Agency points out that little guidance exists yet but parallel development of such standard, which is not part of this rulemaking task, is under investigation by different working groups such as SAE or ISO.
9. Some comments show that clarification was needed concerning the use of Class F cargo compartments; for instance lower deck cargo compartments are confirmed not to be envisioned to be approved as Class F cargo compartment. New Class F cargo compartments are proposed to certify newly designed large accessible cargo compartments with more flexibility and less constraints that exist with Class C cargo compartments.
10. Finally, commentators highlighted some incoherence in CS-25 coming from the new Class F definition. CS 25.855 h and AMC to CS paragraph 5c were up-dated accordingly. In addition, due to some comments, clarification was also given on the requirement to enable access to new Class B cargo compartment without entering.

IV. CRD table of comments, responses and resulting text

(General Comments)		-
comment	9	comment by: <i>Austro Control GmbH</i> This NPA is supported by Austro Control.
response	<i>Noted</i>	
comment	10	comment by: <i>Luftfahrt-Bundesamt</i> The LBA has no comments on NPA 2008-10.
response	<i>Noted</i>	
comment	14	comment by: <i>Royal Danish Aeroclub</i> The members of Royal Danish Aeroclub do not operate aircrafts with cargo compartments. We have no precise opinion about the specific details in the proposal, but we in general do support the proposal, because the flexibility in aviation in general are increased.
response	<i>Noted</i>	
comment	16	comment by: <i>UK CAA</i> Please be advised that the UK CAA has no comments.
response	<i>Noted</i>	
comment	44	comment by: <i>International Air Transport Association</i> <u>Technical standards required</u> We believe application of the proposed rule by the operators will require agreed technical standards for equipment, which are not available today. Consequently, IATA supports the initiative of International Standardisation Organisation (ISO) Technical Committee 20 Sub-Committee 9, Air Cargo, to develop a new International Standard for Fire Containment Covers (FCCs) performance and testing requirements, to which it actively participates. <u>ISO TC20 SC9 submission</u> Please find attached for your information and hopefully comments the very preliminary draft of an International Standard regarding performance and testing requirements for air cargo containers and pallets Fire Containment Covers (FCCs), to be used in potential new CS-25.857 class F cargo compartments as proposed by the subject NPA. We understand the NPA comments period is over. Anyway, ISO TC20, <i>Aerospace, SC9, Air cargo and ground equipment</i> Sub-Committee, when reviewing the related problems, agreed it was not up to standardisation bodies to comment on a proposed rule concerning aeroplanes certification and operation, but rather up to the airframers and operating airlines. What did pertain to standardisation was determining if the needed equipment was precisely defined by standards. The

last TC20 SC9 meeting in Delft, Netherlands, at mid-July thus agreed to develop a preliminary work item about FCCs, on which no national or international standard is currently known to exist. This does not constitute a comment, but an attempt at providing supporting material. We also need to stress this preliminary draft is under discussion in an experts working group, is far from final, and was not balloted to nor approved by any ISO committee at this stage. Anything about it remains entirely open. Particularly, there remain significant and unresolved technical stumbling blocks on which we seek clarification from EASA, inasmuch as possible, as follow:

(a) would EASA rather envision in the future an ETSO approval for FCCs, or an ad hoc STC one ? The question is not only an administrative one, because the technical requirements to be covered in a standard would have to be different. The operational use of the units would also be different (ETSO = interchange between airlines, STC = FCCs remain within one airline only).

(b) to which extent is the FAA expected to follow suit? We are aware, as outlined in the NPA's explanatory note, that the NPA material was developed jointly, and we have on hand a draft FAA NPRM of 2001 on the same matter including new class F, which is 95% identical in contents. But it was not yet released by the FAA. An International Standard aims at worldwide application, thus has to include U.S. regulatory requirements, which would be awkward should FAR 25.857 not change accordingly.

(c) the major unresolved difficulty is, CS-25 Appendix F Part III requirements appear a sound basis to test the FCC material, but we have no definition of possible test conditions for a whole unit, which do seem necessary, as outlined by the NPA, to determine protection time (see draft § 6.2). What kind of fire should be envisaged ? Specifically: - a class A (see draft's definition) wood, cardboard, etc.. solid flammable materials fire (if so, how to define a "standardised" composition?) and/or a class B fire of flammable liquids such as fuel ? But from a regulatory standpoint, any such liquid materials carried would have to be declared, packed and handled in accordance with the ICAO dangerous goods Technical Instructions, thus could not originate an on board fire ? they are not either identified in the NPA as a possible source. - once the type of fire to be contained is defined, there may remain the question of duration: in order to be effective, testing must last at least as long as the targeted protection time (typically ETOPS diversion time), which may not be easy to guarantee in a deliberately oxygen starved environment under the cover ? Strenuous research on the FAA and NTSB web sites did not produce an answer to this "standardised testing fire" issue. We would very much appreciate any EASA views about it.

(d) less critical, yet significant, is the question of the cover underneath the cargo (see draft § 4.2). All feedback from airlines indicates it would be very difficult in practice, and possibly counter-productive for safety in some instances, to build cargo over a part of the FCC covering e.g. a container. We also have ample evidence that the (4 to 5 mm aluminium alloy sheet) base of nearly all modern containers and pallets would very well withstand the material requirements of CS-25 Appendix F Part I (quite possibly Part III as well). The uncertainty, if there was one, would rather seem to be on the heat insulation capability, obviously limited with a metallic material but which might not be very effectively enhanced by a layer of fire resistant plastic. Would, in EASA's view, a sufficiently thick metal base be considered appropriate protection underneath as long as it meets the tests ?

response *Noted*

(a) On one hand the FCC concept does appear to lend itself to an ETSO/TSO approach as appropriate material standards, test methods etc. are probably going to be something that will be applicable whatever the size, shape etc. of FCC used.

On the other hand, the draft standard is suggesting that FCCs should be designed to fit particular ULDs. We thought that some applicants may wish to have custom designed mechanical restraint solutions in which case this approach would not be so useable.

An ETSO standard does not need to cover all cases though. We could perhaps envision most cases using the ETSO and the "custom" cases covering the FCC performance aspects within the STC. Even with a ETSO there will still need to be an associated a/c manufacturer modification or an STC to cover the overall Class F compartment approval.

EASA suspect in practice the generation of an ETSO will only be something considered after a few Class F compartments using FCCs have been approved. Nevertheless EASA will have a close contact to the SAE WG AGE-2 "Air Cargo and Aircraft Ground Equipment and Systems Committee" which most probably will work on this new standard for FCC.

(b) Our understanding is that the FAA rulemaking activity is still running but on a low priority basis. It is unlikely that the FAA will issue a similar rule change in the near future. This staggered EASA/FAA timing is probably another reason to believe that an ETSO (and TSO) generation will be some time in coming. However, EASA would like to stress that the generation of a standard as initiated by IATA is a very valuable exercise to help approval of FCC based solutions for Class F compartments.

The proposed rule change and associated advisory material are based on a harmonized activity between JAA/EASA/FAA/Transport Canada and should therefore be an acceptable means of compliance outside the EU.

(c) The FAA performed some work back in the mid 90's (Reference: DOT/FAA/AR-96/5, June 1996) to investigate possible alternative fire protection methods, including FCCs, for a/c such as combis where the only existing compartment type specified was the Class B (as found inadequate in the SAA 747 accident). This is of course the work that has now finally led to the subject EASA rulemaking activity to limit Class B cargo compartment size and to introduce the Class F compartment.. Class A fires, utilising cardboard boxes, were used. It does not appear that Class B fires were tested.

AMC section 5.b. for Class F cargo compartments makes reference to material tests according Part III of Appendix F for FCC qualification as one means of compliance. In the following paragraphs of the AMC, alternative material test methods are considered appropriate based on negotiations with the Agency.

Design criteria, e.g. air tightness, allowable in-service damage, heat transfer to the aircraft etc. must also be addressed. Therefore, assembly tests for FCCs, i.e. with a fire load will most probably be required. However until an appreciable body of experience has been generated it is difficult to predict the details and extent of this testing.

EASA has had some recent experience with a combi a/c STC modification, with FCCs as the main deck fire protection solution. The maturing Class F definition was used but it was not officially given this designation. Tests on the FCCs were performed, with the above mentioned FAA report providing some guidance on test methods.

The tests performed also included some Class B liquids and it did not seem to make much difference. The oxygen starvation was very effective and the fires were quickly reduced to smouldering conditions which could have been maintained indefinitely (tests lasted for around three hours). No flare up resulted when the FCC was opened. External temperatures were no worry either.

All possible fire situations in the FCC must be controlled such that adjacent systems and structure will not be adversely affected. It looks like either the standard should address directly the concern of flammable liquid fires or increasing experience with FCC testing may show that a more limited range of test fires is sufficient.

Until a standard is fully developed, at the least a minimum required testing with Class A & Class B fires seems to be appropriate.

In regards to the time duration for which fire protection must be assured, it is clear that this must be commensurate with the time required to continue the flight and perform a landing.

(d) EASA's experience with the tests described above is that heat transfer into the pallet base was very low. It would appear that pallet/container bases will be more than adequate to handle any heat that does transfer downwards. Also, the Class F compartment floor panels must meet a defined standard and will almost certainly be able to handle such low heat anyway. However, a particular pallet/container base material type/thickness cannot be assumed and we must be careful that the FCC's ability to transfer heat versus the compartment floor's ability to handle it must be carefully assessed. Although the proposed AMC text in the NPA mentioned as one means that cargo must be completely surrounded, EASA may be open to consider FCC design proposals without a bottom.

AMC text (paragraph 5.b. Class F (2)) will be revised (see resulting text)

resulting
text

AMC to CS 25.855 and 25.857

paragraph 5.b. Class F (2)

" Unless evidence can be presented to support a different design, if FCCs are used as a means of compliance, they should completely surround"

TITLE PAGE

p. 1

comment

15

comment by: DGAC France

The French DGAC has no comment on this NPA 2008-10

response

Noted

A. Explanatory Note - II. Consultation

p. 3-4

comment

18

comment by: International Air Transport Association

Timeframe for comment

EASA requires comment by 7 August 2008. Given this timeframe, EASA must appreciate that the comment contained in this response might not be the most comprehensive possible. There are likely to be further aspects that are not covered here due to a lack of time in which to assemble a comprehensive response based on broad consensus from as many member airlines as possible. For this reason EASA is requested to:

- Regard this response as a draft or interim response;
- Consider possible further comment after the cut-off date;
- Consider a 3-month extension to the comment close date to allow attendees at the meetings of the IATA Interline ULD User Group, the IATA ULD Technical Panel and SAE AGE-2A, to consider in more detail the contents of the NPA and to develop appropriate comments. For information, the ISO TC20/SC9 Air Cargo sub-committee just decided on the basis of the NPA to develop a preliminary proposal for an international standard on Fire Containment Covers performance, which is planned to be discussed in these industry forums.

response *Partially accepted*

For the extension requested: the 3-months extension can not be provided as IATA is the only commenter to request more time. In addition, the reason for extension is not in line with the NPA: The aim of this NPA is not to define any FCC international standard performances. Nevertheless, following this demand, the Agency accepted a comment from IATA after the consultation period, which was integrated in the CRD (comment nr. 44).

Nevertheless, the Agency recognizes that a new standard for FCC or containers would facilitate the industry and would ease the use of class F cargo compartment. So the Agency is very interested in getting information on the new standard that might be developed on Fire Containment Covers performances as it would be a major improvement step for Class F cargo compartment design implementation. In addition, please note that the Agency closely follows the SAE working group activities.

A. Explanatory Note - IV. Content of the draft decision - Envisaged changes to CS-25

p. 5

comment

1

comment by: FAA

(1) Page 5 of 22, Section 12, states,
*"On previous and current large Combi aeroplanes, The Agency believes that **also** in the future this kind of transportation will be possible under the new Class F cargo compartment standard by considering appropriate operational aspects to be determined for each intended usage, as in the past."*

FAA Recommended Change: "....

" The Agency believes that in the future this kind of transportation will be possible under the new Class F cargo compartment standard by considering appropriate operational aspects to be determined for each intended usage, as in the past."

response *Partially accepted*

The sentence is not well worded but the Agency believes the meaning is not confusing.
The comment is agreed in principle but the Explanatory note, being not part of the rule, will not be re-published and so formal revision is not needed.

A. Explanatory Note - V. Regulatory Impact Assessment - 1. Purpose and Intended Effect

p. 5-8

comment

2

comment by: FAA

(2) Page 5 of 22, Section V, 1, A., 1st paragraph states,
*"The purpose of this regulatory activity is to consider In principle, the intended rule change would **significantly** limit the size of Class B compartments and introduce a new Class F cargo compartment."*

FAA Recommended Change: "....

*"The purpose of this regulatory activity is to consider In principle, the intended rule change would limit the size of Class B **cargo** compartments and introduce a new Class F cargo compartment."*

Justification: We do not consider the new regulation would significantly impact airplane design as most class B cargo/baggage compartments on current commercial airplanes have cargo/baggage compartments that are smaller than the recommended volume.

response

Partially accepted

The commenter is correct in that the majority of Class B cargo compartments are smaller than the limit set in the proposed new rule. The use of the word "significantly" was in relation to the small number of large Class B cargo compartments that have been approved in the past, e.g. "Combi a/c" designs. The proposed new upper limitation on compartment dimensions is a significant reduction in comparison to the dimensions of some of these designs. It was not intended to convey the impression that aeroplane cargo compartment design in general was being significantly impacted.

Whilst it is accepted that the wording used in the section "1. Purpose and Intended Effect" could be a little misleading, the text being part of the explanatory note will not be re-published and so a formal revision is not seen as needed.

Concerning the missing word "Cargo", the Agency recognizes that the best way to designate this compartment is to read the full "class B cargo compartment" but "class B compartment" does not lead to any confusion. It implicitly refers to cargo compartment.

The Agency believes the overall idea is not changed and the text, which is not part of the rule itself, will not be up-dated.

comment

3

comment by: FAA

(3) Page 6 of 22, Section(a), 3rd paragraph from top of page states,
"A study by the FAA (see Reference 1, Longer routes, combined with the seat of the fire being inaccessible may allow fires to develop to the level of severity that would damage the liner and subsequently the aeroplane structure or systems."

	<p>FAA Recommended Change: "... Longer routes, combined with a possibility of an inaccessible fire, could result in growth of fires to the level of severity that would damage the liner and subsequently the aeroplane structure or systems."</p>
response	<p><i>Partially accepted</i></p> <p>Whilst it is accepted that the wording used in the section "1. Purpose and Intended Effect" could have been better phrased, this text will not be re-published and so a formal revision is not seen as needed.</p>
comment	<p>4 comment by: FAA</p> <p>4) Page 6 of 22, Section(b)(i), states, <i>"Revised standards for Class B cargo compartments by revising CS 25.857(b)(1) The intent of this change is to limit significantly the size of a Class B compartment."</i></p> <p>FAA Recommended Change: <i>"Revised standards for Class B cargo compartments by revising CS 25.857(b)(1) The intent of this change is to limit the size of a Class B compartment."</i></p> <p>FAA Justification: We do not believe that the proposed regulatory change significantly impacts commercial aviation as most class B cargo compartments on current commercial airplanes are smaller than the limits imposed by.</p>
response	<p><i>Partially accepted</i></p> <p>See answer to comment nr. 2</p>
comment	<p>5 comment by: FAA</p> <p>(5) Page 7 of 22, Section(b)(ii), states, <i>"The introduction of Class F cargo compartments necessitates amending: - CS 25.855 (b) and (c) to add the new compartment type to the liner requirements."</i></p> <p>FAA Recommended Change: <i>"The introduction of Class F cargo compartments necessitates amending: - CS 25.855 (b,)(c) and (h)(3) to add the new compartment type to the liner requirements and to require flight testing for the dissipation of the extinguishing agent in Class F cargo compartments with built in fire extinguishing systems."</i></p> <p>FAA Justification: Current regulatory requirements in 25.855(h) require a flight test to ensure that fire extinguisher agent concentration remains adequate in the event of a fire. The proposed new Class F cargo compartment could contain a built in fire extinguisher system. If so, it should be tested to ensure agent concentration remains effective for a specified amount of time to enable continued safe flight and landing.</p>
response	<p><i>Partially accepted</i></p> <p>The Agency agrees with the commenter: the CS itself will be up-dated (see details hereunder). Nevertheless, the explanatory note will not be up-dated to reflect the change, as it is not published again.</p>

§ CS 25.855 will be amended to take into account § (h) (3) for flight testing of configurations including built-in-fire extinguishing systems or suppression systems (see resulting text).

comment 13

comment by: Boeing

This comment applies to:

Section A.V.1.c., Brief statement of the objectives of the NPA

Page 7 of 22

CONCERN/CHANGE REQUESTED: In summary, the proposed amendment will limit the size of a Class B cargo compartment, and add a new Class F cargo compartment definition. A Class B compartment will be limited to a size that allows a fire to be fought with a hand-held fire extinguisher without entering the compartment (i.e., standing in the doorway). A Class F compartment will not be limited in size, but will have a means to detect a fire, and to control or extinguish a fire without requiring a crewmember to enter the compartment. Boeing's interpretation of the proposed amendment is that it would allow both main and lower deck compartments that are not accessible in flight to be Class F.

Section A.V.1.c clearly allows Class F cargo compartments without liners if fire containment covers are used over loaded pallets or if fire containment containers are used, which may or may not have additional fire detection and built-in suppression systems. A cargo compartment without a liner and without an active fire suppression system would be permitted by this amendment.

Other than procedure, there is nothing to keep an operator from carrying standard TSO-C90-certified containers in Class F cargo compartments. There have been cases where airlines have carried container or pallet sizes that were not allowed by a specific airplane's weight and balance manual. Likewise, non-fire hardened containers or pallets could be inadvertently carried in Class F compartments. **Boeing recommends that a physical means should be required to prevent the carriage of TSO-C90-certified, non-fire hardened containers and pallets in Class F compartments.**

JUSTIFICATION FOR CHANGE: To prevent the installation of non-fire hardened containers and pallets in Class F cargo compartments.

response *Partially accepted*

It is not intended that any and all cargo compartments may use the certification approach offered by the Class F designation. The introduction of the Class F cargo compartment is intended to offer a practicable and safe alternative to the previous practice of providing large Class B cargo compartments (i.e. in excess of the dimensional limitations for Class B cargo compartments contained in the new AMC material of this amendment). It is not intended that lower deck cargo compartment configurations, which hitherto would have used the Class C or D cargo compartment certification approach, can in the future use the Class F cargo compartment provisions. Future lower deck cargo compartments will be constrained to the Class C provisions, now that the Class D cargo compartment option has been removed from CS-25.

The second aspect raised by this comment was discussed by the working

group. There is a risk that, if possible, incompetent or criminal operators may carry cargo without the approved fire containment means present. On the other hand, a physical restriction against this does not appear to be universally feasible. In the case of fire hardened containers there is the possibility that a modified interface with the cargo compartment floor would prevent installation of standard containers and it is sensible that this becomes the certification norm for such a solution. It should be noted that this modified interface could probably be arranged such that the fire hardened container could however be optionally still carried in a Class C cargo compartment intended for standard containers. This possibility will perhaps be desirable to the industry. However, in the case of a Class F cargo compartment solution involving palletised loads (with or without a custom or modified interface) or standard containers, covered with Fire Containment Covers (FCC), it is difficult to imagine a physical means which would ensure the FCCs are installed. However, the fire and heat insulation properties of pallets may be critical and their fitment can be assured by the provision of a modified interface with the cargo compartment floor. As above, it is sensible that this becomes the certification norm.

The working group concluded that it was not reasonable to limit the application of a fire containment solution to containers with foolproof interfaces to the aircraft. Rather, robust operational procedures, perhaps involving specific mandatory checking of the cargo loading by the aircraft's crew before flight, were seen as an acceptable safeguard where fire containment covers are used.

AMC material will be inserted in order to clarify the above two issues, as follows: a new paragraph will be inserted at the end of Para. 4.e and another one at the end of Para. 5. b. (2).

In addition, to improve clarity, slight renumbering of Para. 5b. was done without any change of the content (see complete resulting text).

resulting
text

CS 25.855 h 3):

"The dissipation of the extinguishing agent in Class C **or Class F (if applicable)** compartments"

AMC to CS 25.855 and 25.857:

Added to the end of Para. 4. e.:

"It is not envisaged that lower deck cargo compartments be approved as Class F cargo compartments. The Class F cargo compartment was introduced as a practicable and safe alternative to the previous practice of providing large Class B cargo compartments. These latter compartments were limited to the main deck for accessibility reasons. Lower deck cargo compartments in aircraft carrying passengers need to comply with the Class C cargo compartment requirements of CS 25.857(c)."

Added to the end of Para. 5. b. (2):

"Class F cargo compartment designs which rely on fire containment, e.g. fire hardened containers/pallets and/or FCCs (placed over palletised loads or non-fire hardened containers) should be considered in regards to the possibility of incorrect usage."

All practicable means to prevent the carriage of cargo in standard containers or pallets and/or the omission of FCCs should be incorporated. Means may include, but not be limited to, physical features at the container/pallet to cargo compartment floor interface or operational procedures such as requiring aircraft crew verification of cargo loading before every flight."

A. Explanatory Note - V. Regulatory Impact Assessment - 4. Impacts - i. Safety

p. 8-10

comment

6

comment by: FAA

(6) Page 9 of 22, Option 3, 2nd paragraph states, *"Based on the in-service accident record and the FAA testing deleting Class B cargo compartments from the regulations However, their removal would force manufacturers to install Class C compartments (with additional cost and weight penalties)"*

FAA Comment: We have certificated three airplane models to date that have incorporated Class C cargo compartments on the main deck in lieu of Class B cargo compartments. Of these three airplanes, two were small executive business airplanes and one was a large transport airplane. So, while FAA would agree that there are additional cost and weight penalties associated with the removal of class B cargo compartments, some applicants have elected to adopt that change.

response

Noted

The Agency notes that from FAA experience, some applicants have already elected to incorporate Class C compartment on the main deck instead of Class B Compartments.

A. Explanatory Note - V. Regulatory Impact Assessment - 4. Impacts - ii. Economic

p. 10-11

comment

11

comment by: Amsafe Bridport Ltd.

This section says:

'This new Class F is intended to allow various means of extinguishing or controlling fire, such as:

1. Use of an approved container or cover,
2. Installation of a suppression system based on a built-in piping and nozzle system,

Item 1 above is for an approved container or cover, these would appear to be items that could be used on different aircraft and are therefore best served by EASA ETSO (FAA TSO) approved products as are existing Containers and other such products (e.g. EASA ETSO C90c for ULD products). The specification for these products would need to be defined, agreed etc and in the same timescale as any change proposed by this NPA. EASA would need to work with those bodies that can help to create such 'standards', i.e. ISO, SAE, manufacturer's representatives etc. The existing material within the NPA would suggest that these approved products (container and cover) may well be part of the TC/STC work, this does not seem the appropriate way forward, it would place restrictions and be economically more costly on implementers of such systems.

In respect of item 2 above, you can see that the TC/STC route is correct as these will be aircraft specific, but Containers and Covers need to provide users with the flexibility to use on different aircraft types, due to the fact that they will be a specific size, as per NAS 3610 and these are currently used on multiple aircraft types.

response *Not accepted*

The development of an ETSO/TSO standard for fire hardened containers and/or Fire Containment Covers (FCC) may make good sense and this is a suggestion that EASA will be open to should there be an overall consensus on such a way forward. Indeed the SAE WG AGE-2 group ("Air Cargo and Aircraft Ground Equipment and Systems Committee") has, prompted by this rulemaking activity, begun considering the need for a standard that in time could be that referenced by the new ETSO/TSO. Technical Committee ISO TC20/Subcommittee SC9 is also working currently on a performance and testing standard for FCCs. However, this work will not be completed within the timescale of this rulemaking activity. The intent of adding the Class F compartment to CS-25 was to provide a way forward for applicants needing to design cargo compartments larger than the size now known to be the practicable maximum for manual fire fighting, without forcing them to the Class C design requirements. It was acknowledged that appropriate performance standards for some possible Class F solutions would need to be developed as and when proposals were put to the Agency because they have never previously been approved as compliant to JAR/CS 25.857. FCC based solutions fall into this category.

Note that ETSO/TSO subject is beyond the scope of this NPA. This rulemaking activity covers changes to CS-25 only.

In regards to the comments about Class F cargo compartment approval via the TC or STC route it should be noted that all such approvals will need to be performed thus. The future development of an ETSO/TSO will not remove the need for TC or STC change approval. An ETSO/TSO will however simplify agreement on the specific performance standard to be shown for the approval of the fire hardened container or FCC element of the Class F cargo compartment.

comment 19

comment by: *International Air Transport Association*

Weight penalty and corresponding fuel burn

Previous work done by the IATA ULD Technical Board (UTB) in the period post the accident indicates that Covers could add significant extra weight for fire containment covers: a minimum hypothesis of 50 kg each (i.e. 500 kg payload for a 10-pallet load) could easily be exceeded depending on performance criteria required. There is no experience to evaluate the weight penalty for fire-resistant containers, but it is certain they would be significantly heavier than the conventional counterpart. Any extra weight has its penalty in increased fuel burn which has become a significant factor now but not foreseen at the time the NPA was drafted (circa 2001). It is therefore suggested that cost estimates quoted based on 1999 dollars when jet fuel was less than one quarter the price that it is today.

response *Noted*

The Agency agrees that the numbers mentioned are not up to date. Nevertheless even with slightly different numbers the issue remains the same.

Large Class B cargo compartments in wide body aircraft have been declared unsafe (refer to AD 93-07-15).
The new Class F compartment was intended to afford industry greater flexibility in meeting the fire protection requirements not to introduce penalties. It is up to the applicant to choose the best cargo compartment design definition considering safety and economical aspects.

comment

25

comment by: *International Air Transport Association*Economic Criteria

While certain economic criteria have been considered, there are some other aspects that are not mentioned:

Development costs and time to develop new ULDs

The scope of the NPA deals only with Combi type aircraft (at this point - the FAA - SE 127R1 document goes further by including current Class E, which might change the situation at a later stage). Given the limited number of these aircraft in service, the potential market of FCCs is extremely limited. This means that the research, design, development and certification costs of the appropriate containers (which are significant) will have to be spread over a very small customer base. This could make the cost of the ULDs very high and it remains to be seen if there is a ULD manufacturer interested in producing such ULDs. For similar reasons there is a limited (but probably bigger) market for the Covers when adding the small volume of replacement Covers to deal with their greater susceptibility to damage. While the covers will in all likelihood cost a lot less than less than the containers, this nevertheless exposes the airline involved to bigger recurrent costs.

Considerable work was submitted to the JAA working group after the 1987 South African B747 Combi accident by the UTB on the economic aspects and it is suggested that this work be updated to reflect the changes in economic factors and be taken into account.

The Fireworthiness of FCCs will place severe allowable damage restrictions on FCCs and Covers. This will mean more frequent repair actions by specialised repair stations, which will mean greater repair costs. To maintain a certain minimum percentage of serviceable units being available will mean that additional units would have to be purchased - this means still greater capital cost in equipment compared to conventional ULDs. Again - only a comprehensive economic impact study can quantify this.

response

Noted

The Agency reiterates that the intent of the new Class F cargo compartment is to afford industry with greater flexibility on new Combi aircraft as well as on new cargo compartments beyond the size of a Class B. EASA and FAA are following along similar paths per FAA Airworthiness Directive (AD) 93-07-15 issued on large "Combi operation" aeroplane. Neither EASA nor FAA can accept large class B "Combi operations" that led to the South African B747 "combi" accident. Nevertheless, the Agency points out that the cost of developing FCCs (e.g., a fibreglass/silicone or Kevlar/silicone weave composite material) may be similar to the cost of material used as liner material in Class C cargo compartments. This material already exists today and there is no additional cost for developing the material

A. Explanatory Note - V. Regulatory Impact Assessment - 4. Impacts - iii. Environmental

p. 11-12

comment	24	comment by: <i>International Air Transport Association</i>
	<u>Environmental Criteria</u> The NPA does consider environment factors, but no mention is made of the extra burden on the disposal chain. The Cover material and the materials probably used to construct FCCs are unlikely to be environmentally friendly given the fire containment requirements, so disposing / recycling of them is going to be more difficult than the conventional ULDs.	
response	<i>Noted</i> The material used in existing FCCs is similar to that used in cargo compartment liners. The material used may consist of fibreglass/silicone or Kevlar/silicone weave composite material. The Agency is unsure of the cost of recycling this material. However, when considering overall aviation safety, we concur with the FAA that this is a minor concern.	

A. Explanatory Note - V. Regulatory Impact Assessment - 4. Impacts - v. Other aviation requirements outside EASA scope

p. 12

comment	17	comment by: <i>Walter Gessky</i>
	The content of the NPA is supported by the Austrian Ministry of Transport, Innovation and Technology, but due to the safety impact to the existing fleet, retroactive activities are required. It is therefore required that EASA support JAA to expedite NPA 26-XX that the new Class B/F compartment standards proposed to CS-25 becomes retroactively applicable to existing aeroplanes. We recommend initiating the rulemaking task as soon as possible.	
response	<i>Noted</i> The rulemaking activities for NPA 26-005 are part of 2009-2012 Rulemaking Programme and are scheduled to begin in 2011.	

A. Explanatory Note - V. Regulatory Impact Assessment - 4. Impacts - vi. Foreign comparable regulatory requirements

p. 12

comment	34	comment by: <i>LHT DO</i>
	NPA No 2008-10 about Class B und F Cargo Compartments changes the existing definition of Class B cargo compartments and introduces the new type of Class F cargo compartments. The Class F definition requires "means to extinguish or control a fire", but leaves it unclear whether a means to control a fire would need to be an active fire suppression system or not.	
response	<i>Noted</i> The intent of the new Class F compartment is to provide a flexible option for those applicants unable to stay within the new Class B compartment size limitation but who don't desire to go to the full lengths required by the Class C	

compartment requirements.

Thus the new rule deliberately omits to specify which fire extinguishing/controlling means are required. Active or passive solutions may be found acceptable. The associated AMC material does however provide clarification on some of the envisaged solutions.

comment

35

comment by: LHT DO

Regulatory Impact Assessment quotes ICAO requirements that refer to "a built-in fire starvation or suppression system" that resembles the fire starvation properties of former Class D cargo compartments that were deleted from CS-25 at Amendment 3 only. This seems to indicate that a Class D compartment with an additional smoke detection system would qualify for Class F.

On the other hand, the proposed AMC says that "in a Class B or F cargo or baggage compartment, sufficient fire extinguishing agent must be allocated". Given the non-mandatory nature of the AMC and the unclarity of the rule's language "control", the AMC's requirement for sufficient fire extinguishing agent does not overrule the means of compliance quoted by ICAO (fire starvation). It is therefore unclear, whether EASA would find the concept of a sufficiently small and airtight Class F compartment without any active fire extinguishing/ fire suppression system acceptable for future Class F cargo compartments or not. This should be positively clarified in the rule or it's AMC in order to avoid foreseeable case-to-case discussions between applicants and EASA.

response

Partially accepted

The design suggested by LHT, namely a small, airtight Class F compartment, fitted with a suitable liner, may be acceptable without any active fire extinguishing/suppression system and without separate fire hardened containers or FCCs. In effect, such a compartment could be considered a built in fire hardened container.

However, this design concept is in fact similar to a Class D cargo compartment. The Class D cargo compartment was removed from CS-25 (and FAR 25) following in service evidence that safe control of a fire by limiting ventilation and draughts was difficult to achieve by means of the compartment liner itself. An applicant for a Class F cargo compartment as described above would need to provide robust evidence that the chosen design was such that these problems had been solved. However, there might be a compartment size beyond which a design lacking fire suppression/extinguishing system can not be shown to provide sufficient safety.

Due to the need to ensure the air tightness of the compartment, it is unlikely that an approach as discussed above will be accepted if in flight access to the compartment is provided.

A. Explanatory Note - V. Regulatory Impact Assessment - 5. Summary and Final Assessment

p. 13-14

comment

43

comment by: Gulfstream Aerospace Corp

Attachment [#1](#)

response

Gulfstream Aerospace offers the attached as comments to this NPA

Not accepted

First of all, Gulfstream highlights the cost for new Class F design. The Agency has already assessed this cost in the economic impact of the NPA and recognizes that there will be costs associated with developing Class F cargo compartment designs. See also response nr. 19 for additional information.

The commenter makes then two main points:

- Whilst exceeding the 132cm (52 inches) radius in the proposed AMC, the Class B cargo compartments currently installed on their aircraft have internal configurations such that a person would be able and willing to enter in order to fight a fire by hand.
- Items typically carried in a business type aircraft consist of personal luggage, recreational items and food supplies. Such items pose a significantly lower fire safety risk than general cargo.

Taking these in turn;

- The AMC material is one acceptable means of compliance. An applicant may chose to substantiate an alternative. One example might be a compartment with size, shape and internal configuration into which persons will be prepared to step and will be able to effectively fight a fire. Such an approach would need to be fully substantiated by appropriate analysis and testing and will be covered by an Equivalent Safety Finding.
- Whilst the Agency is prepared to accept that the items typically carried in a business class aircraft cargo compartment are as described by the commenter, the significance of this in terms of overall safety is not clear. The Agency cannot see a practicable way to operationally limit the contents to such items and in any case it is not known that a lower fire risk can be assumed. In conclusion, the Agency is not prepared to accept the typical nature of items carried in a business class aircraft cargo compartment as an argument for adopting or accepting different design standards.

B. DRAFT DECISION - CS 25.855

p. 15

comment

7

comment by: FAA

(7) Page 15 of 22, Section B, Proposal 1 proposes changes to 25.855 (b) and (c).

FAA Recommended Change: In addition to the recommended changes to 25.855 (b) & (c), EASA needs to modify 25.855 (h) as follows,

"Proposal 1: To amend CS 25.855 to read as follows:

(b) The following cargo or baggage compartments, as defined in CS 25.857, must have a liner that is separate from, but may be attached to, the airplane structure:

(1) Class B through Class E cargo or baggage compartments; and,

(2) Class F cargo or baggage compartments, unless other means of containing the fire and protecting critical systems and structure are provided.

(c) Ceiling and sidewall liner panels of Class C cargo or baggage compartments, and ceiling and sidewall liner panels in Class F cargo or

baggage compartments, if installed to meet the requirements of subparagraph (b)(2) of this paragraph, must meet the test requirements of Part III of appendix F of this Part or other approved equivalent methods.

(h)(3) The dissipation of the extinguishing agent in Class C cargo compartments **and Class F cargo compartments with built in fire extinguishing systems.**

FAA Justification: The proposed Class F cargo compartment could have a built in fire extinguishing system installed. For such designs, a flight test should be conducted per current 25.855(h) requirements to demonstrate agent concentration is adequate to ensure continued safe flight and landing.

response *Partially accepted*

See answer to comment nr. 5.

comment 20

comment by: *International Air Transport Association*

Applicability

The NPA gives no guidance as to what cargo would be subject to the requirement to be loaded in a FCC or covered by a Cover. Requiring all potentially combustible cargo to be so protected would mean virtually all cargo would be affected - is this the intention of the NPA? A definition of proposed "flammable" and "non flammable" cargo might therefore be called for, making it necessary to make an accurate economic impact study.

Also under "applicability": the key question is, is the future amendment applicable only to new designs (airplanes type certificated after its publication)? Or is a retrofit requirement on existing Combis certified to earlier CS-25 being considered? In the latter case, the economic impact would be much higher, and it is uncertain what could technically be done apart from FCCs, so that the apparent choice of solutions might well not really exist. The draft NPRM prepared, but not released, by the FAA made it clear that other means of controlling or extinguishing fires may be developed in the future and there was no intent to restrict or limit the use of new technologies, the NPA does not offer the same flexibility.

response *Not accepted*

The first part of the comment deals with cargo specification.

There is text in the AMC 5.b. covering this point. It is stated that obviously non-flammable items may be excepted from the need to be covered by FCCs. If the comment is suggesting that other items, whilst strictly speaking flammable but not so "obviously" might also be carried without FCC coverage, this would need to be considered on a case by case basis during detailed discussions associated with an application for approval.

The Agency considers this as relevant to the operator. If an operator selects a built-in fire extinguishing system then there should be no need to utilize FCCs to surround each piece (pallet, container, bulk cargo, etc) of cargo.

The second part deals with applicability of this rulemaking.

The Agency recalls that this rulemaking activity covers changes to CS-25, which is applicable to the applicant for new TC or for significant change affecting 25.855. So retrofit is not concerned except if the change in the cargo is considered significant. Retrofit applicability will be assessed in the associated rulemaking task 26-005.

Concerning the last subject about means of controlling or extinguishing fires, please note that as per 25.857 (f), Class F cargo compartments definition gives a lot of flexibility on extinguishing or controlling systems. No method of compliance is imposed on the designer. New technologies can be considered by the Agency. See answer to comment nr. 43.

B. DRAFT DECISION - AMC to CS 25.855 and 25.857 - 2. Related Documents

p. 17

comment

37

comment by: LHT DO

Paragraph 2 lists several AC's as accepted guidance material for the proposed rule. This is unfortunate in the proposed form, because the listed material contains guidance for the current definition of Class B compartments. Certain parts of it will no longer be acceptable under the proposed Class B definition. EASA should clearly separate the acceptable parts of older AC's from those parts that will become unacceptable under the proposed rule.

response

Partially accepted

All ACs referenced in the AMC (25-17, 25-9A, 25-18, 20-42C, 25-22) have been reviewed once more and no inconsistency with the revised Class B definition was found.

Consequently, the references to ACs will not be revised.

Reference to FAA Order 8150.4 will be added (see complete resulting text).

B. DRAFT DECISION - AMC to CS 25.855 and 25.857 - 3. Background

p. 18

comment

38

comment by: LHT DO

Paragraph 3 erroneously uses the term "without any requirement for access". This language is not in line with the proposed rule and should read "without any requirement to enter". The rule does allow access like opening the compartment door and activating a fire-suppression system at the doorway, for example.

response

Accepted

Text will be changed accordingly in AMC to CS 25.855 and 25.857 in Para. 3. (see resulting text).

resulting
text

AMC to CS 25.855 and 25.857

"3. Background

[...]

A class F cargo compartment is similar to a class C compartment in that there are means to extinguish or control the fire without any requirement to enter the compartment."

B. DRAFT DECISION - AMC to CS 25.855 and 25.857 - 5. Fire Protection

p. 19-22

Features

comment

8

comment by: FAA

(8) Page 21 of 22, Section(d), 1st paragraph states,
""To control a fire" (CS 25.857(f)(2)) implies that the fire does not grow to a state where damage to the aeroplane or harm to the passengers or crew occurs during the time for which the fire protection system is demonstrated to be effective. This in turn implies that critical aeroplane systems and structure are not adversely affected and the temperature and air contaminants in areas occupied by passengers and crew do not reach hazardous levels."

FAA Recommended Change: No definition is provided for time which protection must be provided. We recommend the following be added to the 1st paragraph,

""To control a fire" (CS 25.857(f)(2)) implies that the fire does not grow to a state where damage to the aeroplane or harm to the passengers or crew occurs during the time for which the fire protection system is demonstrated to be effective (i.e., from the time a fire is detected to the time when an emergency evacuation from the airplane can be initiated). This in turn implies that critical aeroplane systems and structure are not adversely affected and the temperature and air contaminants in areas occupied by passengers and crew do not reach hazardous levels."

FAA Justification: The time that the "means to control a fire" is effective should extend from the moment that smoke/fire is detected through the time it takes the airplane to divert and land at the nearest suitable airport and until the airplane comes to a stop and an emergency evacuation is initiated.

response

Accepted

Text will be changed accordingly in AMC to CS 25.855 and 25.857, paragraph 5. d. (see resulting text).

comment

12

comment by: Amsafe Bridport Ltd.

Within section 5. FIRE PROTECTION FEATURES, it is stated that 'some FCCs have already been developed', if this is the case then it would be very valuable to get from those who have developed such products what they have found during development and testing of these products. The lessons learnt so far may well help to prevent mistakes, restrictions, and so on within this NPA. If organisations have done work in this area, then the data from that needs to be used to ensure that these proposals are enhanced.

response

Not accepted

Any data on such FCCs held by the Agency will be of a proprietary nature. However, as is pointed out in Comments nr. 11 and 44, the Technical Committee ISO TC20/Subcommittee SC9 has started work on a standard for FCCs and it can be hoped that all prior knowledge will be made available for use in this or any other industry wide initiative.

Note that FAA Technical Center has tested some FCCs as reported in DOT/FAA/AR-96/5, June 1996

comment

21

comment by: International Air Transport Association

Decompression Criteria

	<p>To enable effective fire suppression / containment, it is necessary to make any FCC airtight. This is in direct conflict with decompression requirements onboard the aircraft. Pressure balance and decompression criteria of containers is currently ensured by deliberate leakage of the door-seals which is in principle contradictory with effective fire containment. This aspect is not addressed in the NPA.</p>
response	<p><i>Partially accepted</i></p> <p>The commenter is correct to point out that the effects of a rapid loss of aircraft pressurisation must be assessed against the requirements of CS 25.365(e). The behaviour of FCCs must be such that no part of the aircraft is damaged, cargo restraint is maintained and cargo shifting is minimised such that the aircraft may continue safe flight to a safe landing. The Agency does not see a need to point this out specifically in the rule or AMC text.</p>
comment	<p>22 comment by: <i>International Air Transport Association</i></p> <p><u>Lack of Specifications</u></p> <p>The NPA provides no specifications or parameters by which it would be possible to start developing suitable FCCs and Covers. Amongst others, and including points raised in Terminology above, the following questions need to be answered:</p> <p>What sort of fire is under consideration? Is it just plain combustion which can be dealt with by oxygen deprivation or is chemical reaction (e.g. fireworks or other dangerous goods) also considered, in which lack of surrounding oxygen could be of no consequence?</p> <p>For what length of time should the materials be capable of containing the specified fire?</p> <p>What sort of detection and possibly reaction times are required of an active FCC should it be envisaged?</p> <p>FCCs (covers and containers), if retained, would need approval criteria that should be covered in an appropriate TSO (like the TSO on security-hardened containers) based on yet to be developed international industry standards, in order to be interchangeable between airplanes and airlines? If this interchangeability was not guaranteed by a TSO, there would be a severe restriction to freedom of trade, to which the Authorities usually are sensitive.</p>
response	<p><i>Partially accepted</i></p> <p>IATA highlights some lacks of specifications.</p> <p>The first one concerns FCC specifications. This NPA is not the place to describe precisely the various envisaged FCC designs. See answers to comments nr. 11, 18 and 44.</p> <p>In respect to the fire specifications to be considered , information are available from tests at the FAA Technical Center (DOT/FAA/AR-96/5, June 1996) where cardboard boxes with shredded paper in a certain density (Class A fire) were used.</p> <p>Further the Technical Committee ISO TC20/Subcommittee SC9 is working currently on a performance and testing standard for FCCs.</p> <p>In absence of any final test configuration the applicant has to determine the</p>

appropriate fire test scenario with the Agency.

The minimum time for fire protection depends on the intended operation. For example, on an ETOPs approved aeroplane on an approved flight the duration may be as long as several hours. If an applicant proposes FCCs for such an aeroplane with that length of time then the applicant would have to submit test data showing that the FCCs, either by themselves or in conjunction with another means (e.g., depressurization of the main deck cargo and lower lobe cargo compartments) afford an appropriate level of safety. See also answer to comment No. 8.

Concerning approval of FCCs (TSO or any standard), this NPA does not aim at defining the FCC standards. See answer to comments nr. 11, 18 and 44.

comment

23

comment by: *International Air Transport Association*

With regard to the Class F compartment

The NPA states that the FCCs and Covers are one option to meeting the requirements of Class F compartments. The other option is to so equip the compartment in question that it meets the Class F requirements itself, but these requirements need better definition. In a Class F compartment it is envisaged that a crew member reacts to a fire alarm by somehow (not defined) connecting a handheld fire extinguisher to a ducting system (also not defined) by means of which the fire is extinguished without the crew member having to enter the Class F compartment. Taking the case of a virtually empty Class F compartment's free volume and comparing it to a full Class F compartment's free volume, it is easy to see that there is a significant difference in the amount of handheld fire extinguishers that would be required to extinguish a fire.

Provision is not clearly made in the NPA for these additional fire extinguishers and neither is their additional weight and maintenance considered in the economic impact. Apart from the additional weight of all of the handheld extinguishers needed for a nearly empty compartment, there would be considerable delay in getting sufficient extinguishant into the compartment, while the crew member connects and disconnects the multitude of extinguishers (assuming there were sufficient in the first place). This operation exposes the crew member and aircraft with passengers to additional unnecessary risk. Bearing the above points in mind, it is difficult to see any material benefit of Class F over Class C. The saving of halon container and triggering system is probably minor compared to the extra risk.

In the NPA there is no provision for other possible ways to obtain the same results when, in fact there are other ways, so that clarification might require they be in different classes or sub-classes : e.g. a compartment with mandatory use of FCCs does not need a fire resistant liner, which makes it very different from one which allows standard containers and pallets.

Also in the NPA it is interpreted that the airframe manufacturer will evaluate what systems to install to meet class F requirements, and submit it to certification approval. For this future activity, it would help if the list of allowable solutions was open and not closed (only two are allowed in the NPA: either the FCCs or the hand extinguishers concepts). Here it would be preferable to recognise new techniques which may come up and be acceptable provided they meet class F defined objectives.

response

Not accepted

The commentator makes some valid points regarding the various aspects that must be considered when designing a Class F cargo compartment. In particular the large number of handheld extinguishers which may need to be provisioned for some design solutions is mentioned. It is correct that many factors need to be considered and during certification of a design relying on this extinguishant source. The number of hand held fire extinguishers, the locations, time involved in gathering them, etc. would all be considered during approval. If a lengthy time would be involved in providing sufficient extinguishing agent then the Agency may be unable to agree that approval is possible.

The commenter is of the opinion that the Class F cargo compartment offers no material benefit compared to a Class C cargo compartment. For particular situations this may be correct.

The objective of the new Class F cargo compartment definition is to offer the possibility to approve designs which do not lend themselves to convenient assessment within the current requirements. The necessary restriction in Class B cargo compartment dimensions was considered to create a need to provide additional regulatory flexibility for cargo compartments that are desired to be of larger size. The Agency does not imagine that the new Class F cargo compartment definition will be the most preferable in all such cases.

Two possible design approaches for Class F cargo compartments are discussed in the new AMC material, the use of fire containment and the use of a handheld extinguisher based design. These are just examples. Any other design concepts that meet the overriding safety principles outlined in the requirement and supporting AMC will be acceptable.

comment

39

comment by: LHT DO

Paragraph 5 b erroneously uses the same language that the proposed rule deletes from its current wording: "to reach any part of the compartment by hand or with the contents of a hand extinguisher".

Paragraph 5 c refers to CS 25.851 to require that at least one readily accessible hand fire extinguisher be available for use in each Class F compartment. However, the NPA lacks the respective amendment to CS 25.851.

response

Partially accepted

1. For the paragraph 5b.

Although the rule text is slightly changed the AMC describes in various paragraphs what is meant by sufficient access to enable a crewmember to extinguish a fire.

The Agency finds this more detailed information helpful for any applicant to understand the intent of the rule.

Nevertheless the AMC text will introduce the following additional text about how access has to be understood.

"Access is also a function of how the compartment is configured rather than just dimension and/or volume. In determining access, it would not be acceptable for there to be a need to pull baggage or cargo on to the floor of the passenger compartment to gain access to the seat of the fire. Such action may introduce a safety hazard to the passengers."

2. For the paragraph 5c.

LHT DO is correct, the paragraph gives the provision for the up-date of CS 25.851, which needs to be up-dated to add the reference to new class F cargo

compartment:

paragraph CS 25.851 (a) (3) will be amended as following :

Quote

At least one readily accessible hand fire extinguisher must be available for use in each Class A or Class B cargo or baggage compartment and in each Class E or Class F cargo or baggage compartment that is accessible to crewmembers in flight.

Unquote

In addition, paragraph 5c. fails to refer to class A and E so will be up-dated as following:

Quote

In order to effectively extinguish[...] at least one readily accessible hand fire extinguisher be available for use in each Class A or Class B cargo/baggage compartment and in each accessible Class E or Class F cargo/baggage compartment, and one or more hand fire extinguishers be located in the passenger compartment for aeroplanes with a passenger capacity of 7 or more.

Unquote

comment

40

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

Page 20

The AMC to 25.855 and 25.857 proposes fire containment covers (FCCs) as a possible means of complying with the new Class F requirements for fire containment. The AMC discusses the flammability requirements for such covers but there is no mention of how the use of covers would affect compliance with the requirements of CS 25.857(f)(1) to provide a fire or smoke detection system. In Class C compartments, it is required for the detection system to sense the presence of a fire within one minute. In a Class F compartment, it is not clear how to apply that requirement because it will obviously take some time for the smoke to propagate from the ignition source to the exterior of the FCC, and then to the smoke detector. It is doubtful a detection system could be made to comply with a one minute detection time without locating sensors inside the FCC. Based on a number of practical issues, it is difficult to conceive of a reliable smoke detector system placed inside the FCC. EASA should consider more guidance on how FCCs can be show to comply with CS 25.858.

response

Noted

We agree that some questions are raised in regards to compliance to CS 25.858 in the case where fire protection is assured by means of containment. The high level of containment required to meet the safety objectives will make it unlikely that emission of smoke into the compartment will be sufficient to make a one minute detection time by a conventionally installed detector feasible. In the extreme case there may be no detection at all. However, it is not envisaged that fire detection means will be required within the containment means themselves. The one minute detection time of CS 25.858 will need to be demonstrated for an empty cargo compartment as is the practice for other classes of cargo compartment. It can be noted that many forms of non fire hardened cargo enclosures, as currently used in Class C cargo compartments for example (e.g. containers and weatherproof covers on palletised loads etc.) may also increase the fire detection time,

In summary, the Agency does not see a need to provide specific provisions to allow some smoke leakage from fire containment devices in order to provide

timely detection. However, the certification of the containment design must show that no conceivable combination of cargo and ignition source could lead to a hazard.

resulting
text

AMC to CS 25.855 and 25.857 Para. 5.d.

"[...]

To control a fire" (CS 25.857(f)(2)) implies that the fire does not grow to a state where damage to the aeroplane or harm to the passengers or crew occurs during the time for which the fire protection system is demonstrated to be effective (ie, from the time a fire is detected to the time when an emergency evacuation from the aeroplane can be completed)."

B. DRAFT DECISION - AMC to CS 25.855 and 25.857 - 6. Procedures and Limitations

p. 22

comment

41

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

Pages 20, 21, and 22

The NPA makes a reference to establishing AFM limitations for cargo or baggage compartment fire protection times. Because the time of fire suppression provided by the fire protection system does not establish a true limitation except in certain operations (ETOPS for example), Embraer believes that it is more appropriate to provide this information in the procedures section. Embraer notes that the existing the AMC applicable to Class C compartments does not specify that this information be published as a limitation. Alternatively, the AMC could be expanded to provide more detail about what specific information is intended to be conveyed in this "limitation," but any requirement for an AFM limitation to limit the diversion time of an airplane to that of the fire protection system (outside of the existing ETOPS requirement) would have a significant impact on costs that are not reflected in the impact analysis.

response

Not accepted

AMC to 25.851(b), paragraph 7 first sentence (introduced by Amdt. 4) makes it clear that a Class C cargo compartment fire suppression system capability must be maintained "for time duration required to land and evacuate the aeroplane".

Also the ARAC harmonization working group established a draft AC for Class B/F cargo compartment calling out: "For certification purposes, the extinguishing agent concentration should be measured in flight, following airplane flight manual (AFM) procedures, and the length of protection time afforded by the system recorded. This time of protection should be used to establish AFM limitations for cargo or baggage compartment fire protection times."

New AMC text to CS 25.855 and 25.857 (paragraph 6.c) is considered sufficient.

B. DRAFT DECISION - AMC to CS 25.855 and 25.857 - 7. AFM Considerations

p. 22

comment

42

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

Pages 20, 21, and 22

The NPA makes a reference to establishing AFM limitations for cargo or baggage compartment fire protection times. Because the time of fire suppression provided by the fire protection system does not establish a true limitation except in certain operations (ETOPS for example), Embraer believes that it is more appropriate to provide this information in the procedures section. Embraer notes that the existing the AMC applicable to Class C compartments does not specify that this information be published as a limitation. Alternatively, the AMC could be expanded to provide more detail about what specific information is intended to be conveyed in this "limitation," but any requirement for an AFM limitation to limit the diversion time of an airplane to that of the fire protection system (outside of the existing ETOPS requirement) would have a significant impact on costs that are not reflected in the impact analysis.

response *Not accepted*

See answer to comment nr. 41

resulting
text

The changes here below show the changes between the current regulation and this CRD (amendment proposal of the current rules)

The text of the amendment is arranged to show deleted text, new text or new paragraph as shown below:

- deleted text (as per NPA) is shown with a strike through: ~~deleted~~
- new text (as per NPA) is highlighted with grey shading: **new**
- text modified: ~~deleted~~ -new

Book 1

SUBPART D - DESIGN AND CONSTRUCTION

Proposal 1: To amend CS 25.851 to read as follows:

CS 25.851 Fire extinguishers

(a) Hand fire extinguishers.

(See AMC 25.851(a))

...

(3) At least one readily accessible hand fire extinguisher must be available for use in

each Class A or Class B cargo or baggage compartment and in each Class **E** or Class **F** cargo or baggage compartment that is accessible to crewmembers in flight.

....

Proposal 2: To amend CS 25.855 to read as follows:

CS 25.855 Cargo or baggage compartments

(See AMC to CS 25.855 and 25.857)

....

~~(b) Class B through Class E cargo or baggage compartments, as defined in CS 25.857, must have a liner, and the liner must be separate from (but may be attached to) the aeroplane structure. The following cargo or baggage compartments, as defined in CS 25.857, must have a liner that is separate from, but may be attached to, the aeroplane structure:~~

(1) Class B through Class E cargo or baggage compartments; and

(2) Class F cargo or baggage compartments, unless other means of containing the fire and protecting critical systems and structure are provided.

(c) Ceiling and sidewall liner panels of Class C cargo or baggage compartments, and ceiling and sidewall liner panels in Class F cargo or baggage compartments, if installed to meet the requirements of sub-paragraph (b)(2) of this paragraph, must meet the test requirements of Part III of Appendix F or other approved equivalent methods.

....

(h) Flight tests must be conducted to show compliance with the provisions of CS 25.857 concerning –

(1) Compartment accessibility;

(2) The entry of hazardous quantities of smoke or extinguishing agent into compartments occupied by the crew or passengers; and

(3) The dissipation of the extinguishing agent in Class C or Class F (if applicable) compartments.

Proposal 3: To amend CS 25.857 to read as follows:

CS 25.857 Cargo Compartment Classification**(See AMC to CS 25.855 and 25.857)**

....

~~(b) Class B. (See AMC 25.857(b).) A Class B cargo or baggage compartment is one in which –~~

~~(1) There is sufficient access in flight to enable a crewmember to effectively reach any part of the compartment with the contents of a hand fire extinguisher, standing at any one access point and without stepping into the compartment, to extinguish a fire occurring in any part of the compartment using a hand fire extinguisher;~~

....

....

(f) Class F. A Class F cargo or baggage compartment is one in which –

(1) There is a separate approved smoke detector or fire detector system to give warning at the pilot or flight engineer station;

(2) There are means to extinguish or control a fire without requiring a crewmember to enter the compartment; and

(3) There are means to exclude hazardous quantities of smoke, flames, or extinguishing agent from any compartment occupied by the crew or passengers.

Proposal 4: To amend subparagraph (a)(1)(ii) and (a)(2)(iii) of Part I of Appendix F

of CS-25 to read as follows:

Appendix F

Part I – Test Criteria and Procedures for Showing Compliance with CS 25.853, 25.855 or 25.869

(a) *Material test criteria–*

(1)....

....

(ii) Floor covering, textiles (including draperies and upholstery), seat cushions, padding, decorative and non-decorative coated fabrics, leather, trays and galley furnishings, electrical conduit, air ducting, joint and edge covering, liners of Class B and E cargo or baggage compartments, floor panels of Class B, C, ~~or E~~ or F cargo or baggage compartments, cargo covers and transparencies, moulded and thermoformed parts, air ducting joints, and trim strips (decorative and chafing), that are constructed of materials not covered in sub-paragraph (iv) below, must be self-extinguishing when tested vertically in accordance with the applicable portions of Part I of this Appendix or other approved equivalent means. The average burn length may not exceed 20 cm (8 inches), and the average flame time after removal of the flame source may not exceed 15 seconds. Drippings from the test specimen may not continue to flame for more than an average of 5 seconds after falling.

....

(2)...

....

(iii) A cargo or baggage compartment defined in CS 25.857 as Class B, C, ~~or E~~ or F must have floor panels constructed of materials which meet the requirements of sub-paragraph (a)(1)(ii) of Part I of this Appendix and which are separated from the aeroplane structure (except for attachments). Such panels must be subjected to the 45-degree angle test. The flame may not penetrate (pass through) the material during application of the flame or subsequent to its removal. The average flame time after removal of the flame source may not exceed 15 seconds, and the average glow time may not exceed 10 seconds.

BOOK 2

AMC – SUBPART D

Proposal 5: To amend AMC 25.857 as follows:

AMC to CS 25.855 and 25.857

~~Cargo Compartment Classification~~ Cargo or baggage compartments

1. PURPOSE

This Acceptable Means of Compliance (AMC) sets forth an acceptable means, but not the only means, of demonstrating compliance with the provisions of the airworthiness standards for Class B and Class F cargo compartments for large aeroplanes. This AMC provides a rational method for demonstrating that the requirements of the related paragraphs of CS-25 are met and that fires occurring in the compartments can be controlled to ensure that they do not present a hazard to the aeroplane or its occupants. Like all AMC material, this AMC is not, in itself, mandatory and does not constitute a requirement. Terms used in this AMC, such as

"shall" and "must," are used only in the sense of ensuring applicability of this particular method of compliance when the acceptable method of compliance described herein is used.

2. RELATED DOCUMENTS

a. Certification Specifications.

CS 25.851 Fire extinguishers

CS 25.855 Cargo or baggage compartments

CS 25.857 Cargo compartment classification

CS 25.858 Cargo compartment fire detection systems

b. FAA Advisory Circulars (AC).

~~Relevant part of the FAA Advisory Circular~~ The following FAA Advisory Circulars are accepted by the Agency as providing acceptable means of compliance with CS 25.857:

AC 25-17, Transport Airplane Cabin Interiors Crashworthiness Handbook, ~~dated 15/7/91~~ (relevant parts addressing the applicable FAR Part 25/CS-25 paragraphs)

AC 25-9A, Smoke Detection, Penetration, and Evacuation Tests and related Flight Manual Emergency Procedures, ~~dated 6/1/94~~

AC 25-18, Transport Category Airplanes Modified for Cargo Service, ~~dated 6/1/94~~

~~are accepted by the Agency as providing acceptable means of compliance with CS 25.857.~~

AC 20-42C, Hand Fire Extinguishers for use in Aircraft

AC 25-22, Certification of Transport Airplane Mechanical Systems

FAA Order 8150.4, Certification of Cargo Containers with Self-Contained Temperature Control Systems (Active ULDs)

3. BACKGROUND

CS 25.857(b) and 25.857(f) provide standards for certification of two classes of cargo compartments, Class B and Class F.

A Class B cargo compartment is configured in a manner that allows a crewmember to extinguish or control any fire likely to occur in the compartment using a hand fire extinguisher. While the person combating the fire must have access to the compartment, it must not be necessary for that person to physically enter the compartment to extinguish the fire (see CS 25.857 (b)(1)). The contents of the compartment may be reached by hand or with the contents of a hand extinguisher while standing in the entry door.

A Class F cargo compartment is similar to a Class C compartment in that there are means to extinguish or control the fire without any requirement to enter the compartment.

Both Class B and Class F cargo compartments have fire or smoke detection systems to alert the crew to the presence of the fire.

4. COMPARTMENT CLASSIFICATION

All cargo compartments must be properly classified in accordance with CS 25.857 and meet the requirements of CS 25.857 pertaining to the particular class involved (see CS 25.855 (a)).

In order to establish appropriate requirements for fire protection, a system for classification of cargo or baggage compartments was developed and adopted for large aeroplanes.

Classes A, B, and C were initially established; Classes D, E, and F were added later. Class D has been eliminated from the CS-25 specifications (by Amdt 3). The classification is based on the means by which a fire can be detected and the means available to control the fire.

a. A Class A compartment (see CS 25.857(a)) is one that is located so close to the station of a crewmember that the crewmember would discover the presence of a fire immediately. In addition, each part of the compartment is easily accessible so that the crewmember could quickly extinguish a fire with a portable fire extinguisher. A Class A compartment is not required to have a liner.

b. A Class B compartment (see CS 25.857(b)) is one that is more remote than a Class A compartment and must, therefore, incorporate a fire or smoke detection system to give warning at the pilot or flight engineer station. Because a fire would not be detected and extinguished as quickly as in a Class A compartment, a Class B compartment must have a liner in accordance with CS 25.855 (b). In flight, a crewmember must have sufficient access to a Class B compartment to reach any part of the compartment by hand or with the contents of a hand extinguisher when standing at any one access point, without stepping into the compartment. There are means to ensure that, while the access provisions are being used, no hazardous quantity of smoke, flames, or extinguishing agent will enter areas occupied by the crew or passengers.

c. A Class C compartment (see CS 25.857(c)) differs from a Class B compartment in that it is not required to be accessible in flight and must, therefore, have a built-in fire extinguishing system to suppress or control any fire. A Class C compartment must have a liner and a fire or smoke detection system in accordance with CS 25.855 (b) and CS 25.857(c)(1). There must also be means to exclude hazardous quantities of extinguishant and products of combustion from occupied areas (see CS 25.857(c)(3)).

d. A Class E compartment (see CS 25.857(e)) is found on an all-cargo aeroplane. Typically, a Class E compartment is the entire cabin of an all-cargo aeroplane; however, other compartments of such aeroplanes may be also classified as Class E compartments. Shutting off the ventilating airflow to or within the compartment controls a fire in a Class E compartment. A Class E compartment must have a liner (see CS 25.855 (b)) and a fire or smoke detection system installed in accordance with CS 25.857(e)(2). It is not required to have a built-in fire

suppression system.

e. A Class F compartment (see CS 25.857 (f)) is one in which there are means to control or extinguish a fire without requiring a crewmember to enter the compartment. Allowing access by a crewmember in the presence of a fire warning is not envisioned. Class F compartments that include a built-in fire extinguisher/suppression system or require the use of acceptable fire containment covers (FCCs) would meet these requirements. The Class F compartment must have a fire or smoke detection system installed in accordance with CS 25.857(f)(1). Unless there are other means of containing the fire and protecting critical systems and structure, a Class F compartment must have a liner meeting the requirements of part III of Appendix F, or other approved equivalent methods (see CS 25.855 (b)).

It is not envisaged that lower deck cargo compartments be approved as Class F cargo compartments. The Class F cargo compartment was introduced as a practicable and safe alternative to the previous practice of providing large Class B cargo compartments. These latter compartments were limited to the main deck for accessibility reasons. Lower deck cargo compartments in aircraft carrying passengers need to comply with the Class C cargo compartment requirements of CS25.857(c).

5. FIRE PROTECTION FEATURES

Based on the class of the compartment, fire protection features must be provided. The fire protection features must be shown to meet the standards established by the original type certification basis for the aeroplane or later CS-25 standards. These features may include liners, fire or smoke detection systems, hand fire extinguishers, and built-in fire suppression systems.

a. Liners

The primary purpose of a liner is to prevent a fire originating in a cargo compartment from spreading to other parts of the aeroplane before it can be brought under control. For Class B compartments, it is assumed that the fire will be quickly extinguished. Therefore, the liner does not need to be qualified to the requirements of Part III of Appendix F. For Class F cargo compartments, the fire might have grown larger prior to being suppressed, and therefore, better protection is needed to prevent damage to surrounding systems and structure. However, the liner does not need to serve as the compartment seal. It should be noted, however, that the liner is frequently used to perform the secondary functions of containing discharged extinguishing agent and controlling the flow of oxygen into the compartment. If other means, such as compartment walls, are not capable of performing those functions, the liner must be sufficiently airtight to perform them.

The liner must have sufficient fire integrity to prevent flames from burning through the liner before the fire can be brought under control and the heat from the fire is sufficiently dissipated. As stated in Part III of Appendix F, in addition to the basic liner material, the term "liner" includes any design feature, such as a joint or fastener that would affect the capability of the liner to safely contain a fire.

b. Access

(1) Class B. Class B compartments must provide sufficient accessibility to enable a crewmember to reach any part of the compartment by hand or with the contents of a hand extinguisher without physically entering the compartment. This

requirement, by its nature, tends to limit the size and shape of the compartment. Additionally, the access provisions should be sufficiently large to enable the crewmember to determine visually that a fire has been extinguished. Access is also a function of how the compartment is configured rather than just dimension and/or volume. In determining access, it would not be acceptable for there to be a need to pull baggage or cargo on to the floor of the passenger compartment to gain access to the seat of the fire. Such action may introduce a safety hazard to the passengers.

"To reach any part of the compartment" means that the crewmember should be able to open the door or hatch and, standing in the opening, reach by hand anywhere in the compartment where cargo or baggage can be located. The extension of the crewmember's reach through the use of fire extinguisher wands, etc., should not be considered in determining reach.

Based on the estimated reach of a 95 percentile male, the outline of any compartment, viewed from above, should fit within a vertical cylinder of radius 132 cm (52 inches) measured from the centreline of the access door or hatch (see Figure 1). This dimension assumes the above male can reach a one foot square box located anywhere within the compartment. Access by a smaller crewmember to reach the same area within the compartment could require that the crewmember move laterally within the access door or hatch opening, while not physically entering the compartment.

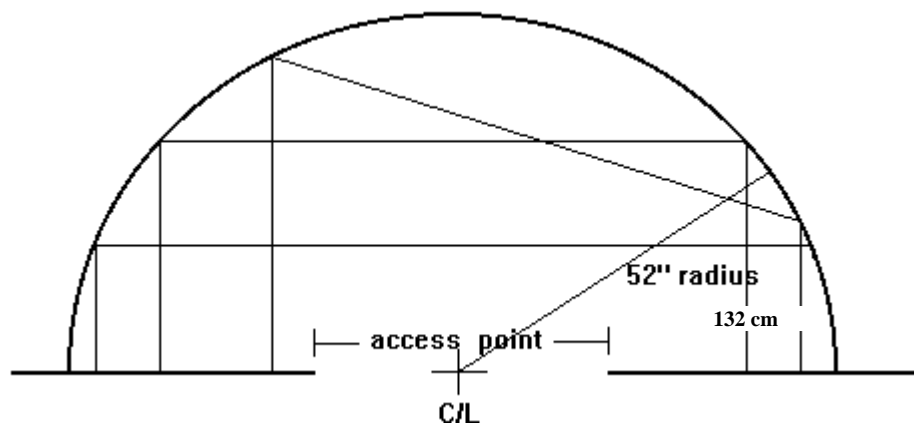


Figure 1

Example of possible cargo compartment shapes within 132 cm (52 inches) reach from access point centreline.

(2) *Class F.* In the case of a Class F compartment, a means should be provided to control or extinguish a fire without a crewmember entering the compartment.

One means is to design the compartment to Class C requirements but not include a built-in fire suppression system. One suppression method might be to utilize a plumbing and nozzle distribution system within the compartment that would provide acceptable suppression capability throughout the volume of the compartment. The source for such a system could be hand fire extinguishers, which interface with the distribution system through a suitable interface nozzle. This reduces the complexity and costs associated with a built-in suppression system and could be suitable for smaller compartments. For certification purposes, the extinguishing agent concentration should be measured in flight, following aeroplane flight manual (AFM) procedures, and the length of protection time afforded by the system should be recorded. This time of protection should be used to establish AFM

limitations for cargo or baggage compartment fire protection times. The operator, for route planning, could then use these times. For Halon 1301 fire extinguishing agent, a minimum five percent concentration by volume at all points in the compartment is considered adequate for initial knock-down of a fire, and a three percent concentration by volume at all points in the compartment is considered the minimum for controlling a fire after it is knocked down. This option requires the use of a liner as stated in CS 25.855 (b).

Another means of providing fire protection in a Class F compartment might be the use of cargo containers or fire containment covers (FCCs) shown to be capable of containing a fire. Some FCCs have already been developed and are typically constructed of woven fibreglass-based materials that will pass the oil burner test requirements of Part III of Appendix F.

This is in line with the revised CS 25.855 which for a Class F cargo or baggage compartment not using FCCs requires a ceiling and sidewall liner constructed of materials that meet the requirements of Part III of Appendix F and be separated from the aeroplane structure (except for attachments), while the floor panels must comply with Part I of Appendix F.

Similarly, if FCCs are proposed as a means of compliance for the new Class F compartment, it is likely that in order to meet the intent they must also meet these standards (i.e. Part III of Appendix F for the sides and top and Part I of Appendix F for the bottom). However, based on full scale qualification testing there is evidence that alternative materials, not fully in compliance with Part III of Appendix F, might also be acceptable for FCC side and top portions, as long as they are successfully tested and meet the intent of the rule.

It is recommended that the Agency be contacted for concurrence when FCC or Container qualification is envisaged in order to address the relevant test method.

Unless evidence can be presented to support a different design, if FCCs are used as means of compliance, they should completely surround all cargo, including underneath the cargo, except for obviously non-flammable items, such as metal stock, machinery, and non-flammable fluids without flammable packaging. Because the fire is controlled or extinguished within the isolated compartment, but is separated from the actual cargo compartment boundaries, the cargo compartment liner requirements of CS 25.855(c) would not apply. However, the effects of the heat generated by the contained/covered fire should be evaluated to ensure that adjacent systems and structure are not adversely affected. For certification purposes, test data with the actual design configuration and possible fire sources would have to be provided. The temperature and heat load time history measurements at various locations above, around and below the FCC are needed to ensure the continued safe function of adjacent systems and structure. The time history data should be used to establish the length of protection time afforded by the system and subsequent AFM limitations for cargo or baggage compartment fire protection times. The operator would then use these times for route planning purposes.

Class F cargo compartment designs which rely on fire containment, e.g. fire hardened containers/pallets and/or FCCs (placed over palletised loads or non-fire hardened containers) should be considered in regards to the possibility of incorrect usage.

All practicable means to prevent the carriage of cargo in standard containers or pallets and/or the omission of FCCs should be incorporated. Means may include, but not be limited to, physical features at the container/pallet to cargo compartment

floor interface or operational procedures such as requiring aircraft crew verification of cargo loading before every flight."

c. Extinguishing Agent.

In order to effectively extinguish or control a fire in a Class B or F cargo or baggage compartment, sufficient fire extinguishing agent must be allocated. Guidance on this topic has been contained in FAA AC 20-42C. This guidance material is accepted by the Agency as addressing how to implement the provisions of CS 25.851(a) that require that at least one hand fire extinguisher be located in the pilot compartment, at least one readily accessible hand fire extinguisher be available for use in each Class A or Class B cargo/baggage compartment and in each accessible Class E or Class F cargo/baggage compartment, and one or more hand fire extinguishers be located in the passenger compartment for aeroplanes with a passenger seating capacity of 7 or more.

d. Fire Control.

"To control a fire" (CS 25.857(f)(2)) implies that the fire does not grow to a state where damage to the aeroplane or harm to the passengers or crew occurs during the time for which the fire protection system is demonstrated to be effective (ie, from the time a fire is detected to the time when an emergency evacuation from the aeroplane can be completed). This in turn implies that critical aeroplane systems and structure are not adversely affected and the temperature and air contaminants in areas occupied by passengers and crew do not reach hazardous levels.

(1) Adequate protection should be provided for cockpit voice and flight data recorder and wiring, windows, primary flight controls (unless it can be shown that a fire cannot cause jamming or loss of control), and other systems and equipment within the compartment that are required for safe flight and landing.

(2) Regardless of a compartment's classification, it must be demonstrated that hazardous quantities of smoke, flames, extinguishing agent, or noxious gases do not enter any compartment occupied by passengers or crewmembers. FAA Advisory Circular 25-9A, Smoke Detection, Penetration, and Evacuation Tests and Related Flight Manual Emergency Procedures, provides guidance concerning smoke penetration testing.

(3) If an aeroplane has one or more Class B cargo compartments, portable protective breathing equipment must be provided for the appropriate crewmembers in accordance with CS 25.1439.

(4) Additional protective breathing equipment or breathing gas supply, and additional fire extinguishers, may be required for Class B cargo compartment operation to ensure that the fire can be controlled for the time the aeroplane is expected to be in the air after onset of a fire.

6. PROCEDURES AND LIMITATIONS

a. To ensure that the contents of Class B and F compartments are either accessible or located such as to allow firefighting, any cargo or baggage loading limitations and any operational limitations or procedures provided must be identified with placards in the compartment. The loading and operational limitations must also be addressed in the appropriate weight and balance or loading document.

b. Any operational limitations or procedures necessary to ensure the effectiveness of the fire protection system for Class B and Class F cargo and baggage compartments should be clearly defined in the AFM. This should include such items as any changes to the ventilation system to prevent the entrance of smoke or gases into occupied areas, use of hand fire extinguishers, use of protective breathing equipment, use of protective clothing, and use of the FCCs. The certification engineers should work closely with the Agency to ensure that additional training necessary for crewmembers assigned to combat fires is adequately addressed.

c. Any time limit for a cargo or baggage compartment fire protection system, or other conditions or procedures related to combating a fire in a compartment, should be clearly defined in the AFM.

7. AFM CONSIDERATIONS.

a. Crewmember(s) designated to combat a fire in a Class B compartment will need special training. Fires occurring in luggage are difficult to extinguish completely and rekindling may occur. Crewmembers designated to combat fires in Class B compartments should be trained to check periodically to ensure that a fire has not grown back to hazardous proportions.

b. Aeroplane flight manuals should contain instructions to land at the nearest suitable airport following smoke/fire detection, unless it can be positively determined that the fire is extinguished.

c. Any limitations regarding occupancy of Class B and Class F compartments during flight, or during takeoff and landing, should be defined in the AFM.

d. Any loading restrictions associated with access to cargo or baggage or special containers should be clearly identified in the AFM. This would include, but not be limited to, placement of luggage in a Class B compartment or identification of special containers or covers associated with fire protection in a Class F compartment. If covers are used in conjunction with a Class F cargo compartment, they should be easy to install and sufficiently durable to withstand in-service conditions.

Appendix A - Attachments

 [A&C-08-237 EASA NPA 2008-10 Class B & F Cargo Compartment.pdf](#)

Attachment #1 to comment [#43](#)