

DISPOSITION OF INTERDIRECTORATE COMMENTS
DRAFT AC 25.857-X, *Class B and Class F Cargo Compartments*
FAA Contact: Steve Happenny, ANM-112, stephen.happenny@faa

No.	Comment	Requested Change	Disposition
Commenter: Nicole Mikel-Brumfield, AIR-40			
1	In paragraph 6.3.1.1, the AC mentions Halon 1301 and the minimum concentration by volume necessary to control a fire. Although there have not been clearly identified non-halon replacement alternatives, they should be mentioned in this paragraph in anticipation of future agents.	Based on continued ICAO and FAA efforts to progress toward halon replacement, an addition should be made before the final sentence that states “ <i>For non-halon fire extinguishing agents, the minimum concentration by volume may differ.</i> Full-scale or high-fidelity fire extinguishing testing may be necessary.”	We partially agree. We agree with the intent of the comment but not the specific requested change or location of the intended edit. Section 6.4, <i>Extinguishing Agent</i> , represents a better location to place a revised comment on the use of non-halon agents. Advisory circular (AC) 25-851-1 provides additional guidance on built-in fire suppression system requirements, and AC 20-42D provides additional guidance on hand fire extinguishers. Both discuss additional use of non-halon agents, although neither include guidance on all installation issues as these often are species-specific (e.g., boiling point of the agent may require additional testing in the region of application) or design-application specific. We will include the following sentence in paragraph 6.4.1: <i>Both AC 20-42 and AC 25.851-X include guidance on halon and non-halon fire extinguishing/suppression agents in hand fire extinguishers and built-in fire suppression systems.</i>
2	In paragraph 6.4.1, the AC discusses general guidance on fire extinguishing agents, which only mentions non-halon fire extinguishing agents. The discussion on both halon and non-halon fire extinguishing agents is slightly inconsistent throughout the AC and should be clarified appropriately.	Based on continued ICAO and FAA efforts to progress toward halon replacement, the paragraph should be revised to discuss both halon and non-halon alternatives in preparation for this change. Although a viable replacement is several years away and that there is minimal FAA guidance, the information should be added since it is mentioned in AC 25.851-X. As an example, “AC 25.851-X contains guidance for built-in fire extinguishing/suppression systems for both halon and non-halon fire extinguishing agents.”	We partially agree. We agree with including further reference to AC 25.851-1 and AC 20-42 as discussed above (response to the comment 1). However, we do not believe including further information on current International Civil Aviation Organization (ICAO) and the Federal Aviation Administration (FAA) efforts would provide worthwhile guidance at this time. As the commenter stated, we do not currently have any FAA-approved non-halon fire suppression agents for use in cargo compartments. We will add the sentence in paragraph 6.4.1 as discussed above to provide references on the use of non-halon agents.

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No.	Comment	Requested Change	Disposition
Commenter: AIR-500			
1	Page 2, Paragraph 3.1. Refer to Title 14 of the CFR as "14 CFR." Acronym usage.	Rewrite title as "...(14 CFR)..."	Agree. Change made.
2	Page 2, Paragraph 3.2. Use acronym once the term has been defined. Acronym usage.	Rewrite the title to read "ACs."	Agree. Change made.
3	Page 2, Paragraph 3.2. Suggest rewriting this section to remove current versions and simply refer to the "latest revision of the following ACs." Clarity/Currency.	Rewrite to refer to the latest revision of the ACs.	Disagree. This AC references specific versions that are current at the time of publication. To avoid confusion in the event changes are made to any of those ACs, we prefer to list the version we reference in the text. We revised the intro sentences to clarify that these versions are current at the time of publication and that the reader should use the latest version for guidance.
4	Page 2, Paragraph 3.3. A comma is missing after the day "28" when the date is written out. Also, use a bullet. Grammar/format.	Please add a comma to the date: "...dated August 28, 2007." However, suggest simply referring to the latest revision and removing the date altogether. Reformat order as a bullet.	Agree. Added the bullet and the comma. We chose to keep the date as it indicates the current version as of publication of this AC.
5	Page 3, Paragraph 5. The logical flow of the last three sentences would be better if the final sentence was moved up before its previous sentence. Also, the final two words should be changed from "the fire" to "a fire." Ease of reading.	Consider placing the sentence that begins with "The classification is based on..." before the previous sentence: "Classes A, B, and C..." Also, change "the fire" to "a fire."	We rewrote this paragraph using a more logical order and changed "the" to "a" before "fire."
6	Page 3, Paragraphs 5.2, first sentence. Missing comma to set off clause. Grammar.	Insert comma between "flight" and "but". Then, insert comma between "compartment" and "and".	Agree. Commas added.
7	Page 3, Paragraphs 5.2 and 5.3. The way "therefore" is used in each of these paragraphs does not require any punctuation. Grammar.	Remove the commas before and after each use of "therefore".	Agree. Commas removed.
8	Page 4, Paragraph 5.6. It appears that FCCs and FRCs are typically plural, but the acronym should be singular when first defined.	Please rewrite as: "...the use of acceptable fire containment covers (FCC) or fire resistant containers	Disagree. Neither the GPO Style Manual nor the Chicago Manual of Style say acronyms should be singular when first defined. These acronyms (and the

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	Acronym usage.	(FRC) may meet these requirements if the FCC or FRC meets certain requirements."	words they represent) could both be used in a singular form, so using the plural form is appropriate in this instance. No change made.
9	Page 5, Paragraph 6.2.1.1. Should a citation be listed for this opening phrase ("To reach any part of the compartment") as is done on page 11 for paragraph 6.5? Consistent formatting.	If appropriate, add the CFR section reference after the opening quotation, as done in 6.5.	This paragraph (and section) has been revised. It is now paragraph 6.2.1 on page 6. We added the regulation reference as suggested.
10	Page 5, Paragraph 6.2.1.1.1. In the sixth line, is the word "intent" the proper word choice, or is it without context? Ease of reading.	Consider rewriting as: "..that would satisfy the requirement's intent for a crewmember to reach...."	Partially agree. Since ARAC was tasked to develop the requirements, the requirements did not exist yet, so the suggested change would not be correct. The FAA's intent for the new regulation was that crewmembers could reach any part of the compartment. Therefore, to add clarity, we changed the sentence to read: "The CSHWG recommendations included an estimate of a Class B cargo compartment that would meet the FAA's intent that a crewmember be able to reach any part of the compartment." (This is paragraph 6.2.2 in the final AC.)
11	Page 6, Paragraph 6.2.1.1. On page 5 in this paragraph there is a reference to "figure 1," which does not appear in the text until page 7. Consistent formatting.	Insert Figure1 closer to its first reference by inserting it above paragraph 6.2.1.2.	Agree. Figure 1 moved as recommended. Note, paragraph numbers have changed in the final version.
12	Page 7, Paragraph 6.3. Use title case. Per template.	Rewrite title as "Means to Suppress or Extinguish a Fire."	The title and paragraph numbers have changed, but we verified that all titles are written in title case.
13	Page 8, Paragraph 6.3.1.3.1. The footnote really isn't a footnote, but a comment to the reader. We assume that the rule will be published prior to the publication of this AC. If not, this wording may need to be revisited.		Agree. Footnote deleted.
14	Page 9, Paragraph 6.3.1.3.2. A comma is needed after the word "top". Grammar. Insert a comma after "top" as follows:	Insert a comma after "top" as follows: "...for the sides and top, and part I of...."	Agree. However, the portion of the sentence commented on was deleted and replaced with other text.

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	"...for the sides and top, and part I of..."		
15	Page 10, Paragraph 6.3.1.5.2. Missing word. Grammar.	Insert "and" or "or" (as appropriate) at the end of the line.	Agree. Added "and" to the end of this paragraph, which is now 6.3.2.3.
16	Page 10, Paragraph 6.4.1. Recommend removing revision levels of ACs per earlier comment. Clarity/Currency.	Recommend removing revision levels of ACs per earlier comment.	Agree. Deleted revision levels here but not in section 3.2 per earlier comment disposition.
17	Page 11, Paragraph 6.5. Format not in accordance with template. Format.	Move text to the line below the title of the paragraph.	Agree. Paragraph format changed.
18	Page 11, Paragraph 6.5.1 Plural needed Grammar	Add an "s" to "recorder" in the first line.	Agree. "s" added.
19	Page 11, Paragraph 6.5.2. The full title of AC25-9A has already been spelled out in the AC, so it is not needed again here. Consistent formatting.	Strike the title that is in italics such that it reads: "AC 25-9A provides guidance...."	Agree. Title deleted.
20	Page 12, Paragraph 7.2. Define acronym upon first usage. Acronym usage. Spell out "aircraft certification office (ACO)" in the last sentence	Spell out "aircraft certification office (ACO)" in the last sentence.	Disagree. The acronym was defined in paragraph 6.3.1.3.3 (now 6.3.3.3.)
21	Page13, last paragraph The AC text is missing a reference to "Appendix A. AC Feedback Form" and the form itself. As per guidance from AIR-501.	Add a reference in the text of the AC, and then add the appendix, putting the title centered and in bold, and inserting page number "A-1".	Partially agree. We agree that the sentence referring to the feedback form and the form itself should be added. However, we disagree that it should be labeled as an appendix. The AC and appendices should provide guidance on complying with Title 14, Code of Federal Regulations (14 CFR). Since the feedback form does not contain AC guidance, we believe it is more appropriate to keep it as an attachment to the AC.
22	Page 13, END. Delete "END" and replace with signature block. Per template.	Delete "END" and replace with signature block	This will be done when the AC is ready for signature.

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Commenter: Francis Smith, ANM -150S, Cabin Safety and ECS, (425) 917-6596			
1	<p>Background: Some ULDs and HAZMAT cargo have high energy components (batteries, compressors, pumps, etc.) present an aircraft-level hazard, whereby its carriage previously relied on a cargo compartment’s fire suppression system (FSS) or fire-fighting actions from the crew to minimize fire propagation. The redefining of the Class B cargo compartment and the new definition creating the Class F cargo compartment specify that</p> <ol style="list-style-type: none"> 1) There doesn’t need to be an FSS and 2) The fire must be controlled or extinguished without needing a crew member to enter the compartment. <p>Concern: With the now more flexible cargo compartment designs, there may be a potential of moving certain cargo in an aircraft configuration where they could contribute to a fire/high heat event during flight due to its lack of ability to extinguish or suppress fires beyond the basic protective features, perhaps such as an active ULD designed to inert itself (shut down), and rely on the crew or the aircraft FSS to control the heat and fire, only to ignite from an adjacent container catching fire/emitting high heat to cause thermal runaway on its internal battery.</p> <p>Carriage of ULDs and HAZMAT are primarily controlled by AFS oversight, however, there</p>	<p>Requested consideration: Add in a new section to the proposed advisory circular stating that the combined fire protective features of the new Class B and the Class F cargo compartments and its contents must both be considered in providing compliance to 25.857(b) and (f). If the cargo compartment does not have an FSS or approved cargo liner, then all cargo must be protected with an <i>explicitly approved</i> FCC, FRC, or other acceptable fire protection method by the FAA, approved for use in a Class B or Class F cargo compartment.</p>	<p>We concur with the commenter’s concerns; however, we believe that the definitions of the Class B and Class F cargo compartments address these issues. For example, Class F cargo compartments require similar fire protection features as present in Class C cargo compartments. However, in Class F, these features may be provided by alternate means. For example, if the Class F compartment does not have a built-in fire suppression system then each cargo container that is used for carriage of cargo must have a built-in fire suppression system or equivalent means (e.g., fire containment covers (FCCs) or fire resistant containers (FRCs)). Similarly, if a Class F was constructed of material that did not meet the flammability requirements specified in § 25.855, then each cargo container must be constructed of material that meets the flammability requirements, is fire resistant, and will contain a fire from the intended cargo. Similar requirements would exist for the use of cargo container and pallet loads that are covered with FCCs.</p> <p>Historically, the FAA has not defined the fire threat. The FAA’s expectation is that industry will use appropriate (i.e., realistic) fire threats in demonstrating compliance to our performance-based standards. The airplane manufacturer and the operator should collaborate to identify the kinds of fires resulting from the carriage of the intended cargo. In all cases, the FAA will require test data that corroborate that the means to carry cargo and the means to address issues of fire protection (i.e., fire detection, fire suppression/extinguishment, fire/smoke penetration, control of ventilation) will be addressed, and that these</p>

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	appears to be no distinct limitations or specific controls on transporting these high energy cargo in a redefined Class B or Class F cargo compartment outside the AFM. There should be guidance to provide “hard set” limitations for cargo lacking fire protection being loaded in the Class B and F compartments also lacking the necessary supplemental fire protection.		means ensure an acceptable level of safety. In addition, the commenter mentions the carriage of hazardous materials (HAZMAT) or specialized unit load devices (ULDs) (e.g., active ULDs) that incorporate compressors, pumps, etc., into the design. Historically, active ULDs are seen on larger transport airplanes that operate in all cargo/freighter configurations only. In contrast, Class B cargo compartments are typically seen on smaller airplanes (e.g., business jets) used to carry passengers and their baggage. They are not typically used for the carriage of cargo only. Also, as the commenter has noted, the carriage of HAZMAT is controlled by Department of Transportation’s Pipeline and Hazardous Materials Safety Administration (PHMSA) with FAA Flight Standards oversight. The applicable regulations are beyond the scope of this rulemaking.

No.	Comment	Requested Change	Disposition
Commenter: Shannon Lennon, ANM-100B, (425) 917-6436			
1	Section 5.6 discusses fire containment covers (FCC) and fire resistance covers (FRC). Please provide a definition of these terms for clarity.	Please consider including a definition paragraph that fully defines FCC and FRC.	We agree. When the draft AC was written, industry was in the process of developing standards/requirements (i.e., SAE International, and somewhat later, the FAA was developing Technical Standard Order TSO-C203C, which is reflected in the lack of the appearance of these references in the current EASA AMC on this subject. We believe that while the addition of the reference material results in a deviation from the EASA AMC, the additional material provides further clarification of the requirements for use of FCCs. We have revised that

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			<p>section (now 6.3.3) to include additional information.</p> <p>The FAA is aware that SAE has developed a draft standard for FRCs. This draft standard, AS6278, specifies the requirements/minimum design and performance criteria and testing methods of FRCs for carriage of cargo on the main deck of transport category airplanes. While we would like to include reference to the draft ISO and SAE standards on FRCs, we cannot until they are formally issued, and we have completed our review</p>
2	Section 6.3.1.3.3 discusses the expectation that coordination with the responsible aircraft certification office will be coordinated with then it is expected that FCC or FRC qualification will occur.	Please consider the following editorial comments. Consider revising the first sentence to say, "It is recommended that the responsible aircraft certification office (ACO) be contacted for concurrence on any proposed approach when FCC or FRC qualification is envisaged." Please consider revising the last sentence to say, "In this situation the ACO should coordinate any proposed compliance approach with the Transport Airplane Directorate."	<p>The FAA agrees with the commenter and the following paragraph will replace section 6.3.1.3.3:</p> <p><i>The applicant should contact the responsible aircraft certification office (ACO) for concurrence on any proposed approach when FCC or FRC qualification is envisaged. Full-scale or high fidelity model fire testing may be necessary to ensure that the FCC, FRC, or other means can contain a fire for the longest flight time (diversion) required in service.</i></p>

No.	Comment	Requested Change	Disposition
Commenter: L.B. Taylor, ACE-100			
1	Page 12, Paragraph 7.2 refers to Class B and F compartments. Second sentence says limitations and procedures should include FCCs.	Change second sentence of Paragraph 7.2 to say "...and the use of the FCCs and FRCs."	The FAA partially agrees. We agree that FRCs should be added to the sentence. In addition, we added guidance to ensure that FCCs and FRCs are used in Class F cargo compartments only. Historically, Class B cargo compartments are typically seen on smaller airplanes (a.k.a., business jets/bizjets) used to carry

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			passengers and their baggage. The requirements defining a Class B ensure that a trained crewmember be able to reach the contents within the compartment to extinguish a fire. The use of FCCs or FRCs or other devices in a Class B may not enable a single crewmember to have the access to the contents. We have revised this paragraph in the final version of the AC.

No.	Comment	Requested Change	Disposition
Commenter: J. Lee, ANE-150			
1	Page 2, Para 3.3 As this AC pertains to TC, ATC, STCs, for the approval of Class B or F cargo compartments, additional Orders that would be related would be 8110.4C, 8110.115.	Additional type certification Orders should be added to paragraph 3.3. Include Order 8110.4C and 8110.115.	The FAA agrees. We added Order 8110.4C and 8110.115 to the references.
2	Page 2, Para 3.3 The listing of FAA Order 8150.4 (Active ULDs) would not apply to this AC. The later sections of the AC do not refer or utilizes any of the requirements from 8150.4 that would lead needing reference back to the Active ULD Order.	Remove reference to Order 8150.4 since the requirements for approval of a Class B or F cargo compartment discussed requires any Active ULD certification.	The FAA disagrees. While we do not envision AULDs being used in Class B cargo compartments as these compartments are for the use of the carriage of passenger baggage and not for general cargo, AULDs may be used to carry cargo in Class F cargo compartments. Therefore, reference to Order 8150.4 addressing AULDs is appropriate and will remain in this AC.
3	Page 6, Para 6.2.1.2 An AC is written for applicants and relay FAA expectations. There is no need to reiterate what the FAA expects to happen, just need to indicate what the applicant is already expected	Change: "... exceeds the criteria included in this AC, the FAA will expect the applicant to perform..." to "...exceeds the criteria included in this AC, the applicant is expected to perform full scale fire	The FAA disagrees. This AC is written for applicant and FAA type-certification engineers and their designees, as stated in Applicability paragraph 2.1. The Transport Airplane Directorate is brought into discussions with ACOs and applicants to discuss

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	to do.	extinguishing tests.”	<p>regulatory interpretation; or when the applicant’s design includes new features not previously approved; or when an applicant proposes an alternate means of compliance not addressed in regulatory guidance. This paragraph, which is now 6.2.3) provides all parties with the FAA’s expectation and has merit.</p> <p>In addition, the sentence is structured using active voice rather than passive voice, as the commenter suggested, to comply with FAA’s plain language policy.</p>
4	<p>Page 7, Para 6.3, 6.3.1</p> <p>As “suppress” can have a different meaning than “control”, its usage should be changed to reflect the regulation language of “control”</p> <p>The Class F definition indicates to have means to control or extinguish a fire.</p>	<p>For consistency, change “suppress” to match the 25.857 language of “control.”</p>	<p>The FAA agrees with the commenter’s intent to be consistent within the text in 6.3.1 (now 6.3). However, we have historically used the terms “fire extinguishing” and “fire suppression” when addressing the use of fire extinguishers (i.e., used in the flight deck, cabin, or lavatory where crew observation can be made to determine that the fire is extinguished). Fire suppression systems are used in non-accessible cargo compartments where the crew has no direct means of observation of the resultant fire to determine if it has been extinguished. The FAA uses the term “control” in § 25.857(f) as a means to permit the use of other than active fire extinguishing/suppression, e.g., FCCs, FRCs, etc. These other means exercise a measure of control over a fire until the airplane can safely land at the nearest available airport. We will ensure the appropriate terms are used in the AC.</p>
5	<p>Page 8, Para 6.3.1.3, 6.3.1.3.2</p> <p>As the FAA has issued TSO C203 for FCCs, these would be the appropriate standards the FCCs should meet instead of just the areas listed in this AC.</p>	<p>Change references to part III of appendix F to part 25 for FCCs to denote the performance standards in TSO C203.</p>	<p>The FAA agrees and has proposed additional clarification to this TSO and to SAE standards as recommended by this commenter and others.</p>

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6	<p>Page 9, Para 6.3.1.3.3 Based on TSO C203's requirement to determine fire containment time, any TSO approved FCC would not need to be tested again since it should be data acceptable for compliance based on the TSO requirement</p>	<p>Add: Usage of any TSO C203 FCC will already provide the substantiated protection time (e.g. "Minimum protection duration 6 hours"). If a diversion flight time is needed that is beyond the stated protection duration of the TSO'd FCC, additional full scale fire testing is necessary.</p>	<p>We disagree. Use of an FCC as approved under TSO-C203 may provide substantiation of the protection afforded by an FCC if the type of fire load used in the compliance demonstration is representative of the fire threat of the intended use of the FCC in the applicant's design. It is the responsibility of the airplane manufacturer and airline operator to collaborate on the intended fire threat. If the intended fire threat is addressed by testing compliant with TSO-C203, then no further testing may be required. If the intended fire threat is not represented by testing compliant with TSO-C203, then the FAA may require additional fire testing be conducted to demonstrate compliance to the regulations.</p> <p>For example, if the applicant intends to use an FCC to provide fire protection for the carriage of primary lithium batteries, meeting TSO-C203 is not adequate as testing conducted at the Technical Center has shown such material can be penetrated by molten droplets of lithium metal during a fire.</p>
7	<p>Page 9, Para 6.3.1.3.4 The Tech Centers suggested change presented in http://www.fire.tc.faa.gov/pdf/systems/May14Meeting/Blake-0514-FCC-FRC.pdf regarding FCC/FRCs standards goes away from affects by external temperature readings at some distance to evaluation of flame penetration. As this was in a 2014 presentation, the Tech Center may have new data to change the requirements listed in this paragraph.</p>	<p>Check with Tech Center. They may have data indicating temperature measurements at various locations near the FCC are no longer needed.</p>	<p>We agree with the intent of the comment. While the current EASA AMC contains guidance that an FCC should meet the oil burner test requirements of part III of appendix F, and the FAA strives for harmonization, this comment reflects the latest update to SAE ARP6453. However, this allowance is not reflected in the current version of TSO-C203, which retains the appendix F, subpart III requirements. We agree to use this as an example of our statement that:</p> <p><i>However, based on full-scale qualification testing, some</i></p>

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			<p><i>alternative materials not fully in compliance with appendix F, part III might also be acceptable for FCC side and top portions, as long as they are successfully tested and meet the intent of the rule.</i></p> <p>Paragraph 6.3.1.3.2 (now 6.3.3.2) now includes a statement that for FCCs, in lieu of the peak temperature limit of 400 °F measured 4 inches above the upper surface, the requirement is no external flaming may be acceptable to the FAA.</p>
8	<p>Page 9, Para 6.3.1.3.5 As there has already been a design that invoked Class F cargo compartment requirements, the FAA is already aware of other detection measures that can be used beyond IR Cameras. As indicted in Exemption 10296 http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgEX.nsf/0/057462454dacba2a862578be00617a75/\$FILE/10296.pdf , use of an approved smoke detector (TSO C1) would also ensure adequate fire detection.</p>	<p>Add smoke detectors within the FCC to ensure adequate detection times within one minute from fire start as per 25.858 as an option. This may also be needed if the FCC used is not TSO C203 approved providing flammability time limits.</p>	<p>We disagree with the commenter. A specific requirement that smoke detector(s) be located within the FCC for all designs would be overly restrictive. We require that Class F cargo compartments include a means to detect a fire. These means may include a conventional smoke detector or other fire detector incorporated into the airplane design or smoke/fire detection within the means for cargo carriage (e.g., ULD, FCC, FRC, enhanced ULD). The FAA prefers to have the applicant propose the specific means of compliance that may be optimum for their design. Furthermore, recent test data from the FAA’s Technical Center has shown that certain cargo may release volatile gases, which can quickly ignite creating a dangerous overpressure. A conventional smoke detector may not detect this type of fire threat.</p> <p>In summary, we prefer to have the applicant determine the specific means for fire detection, as they have the ultimate responsibility to ensure safe carriage of the intended cargo. The current guidance should offer industry the flexibility to tailor the means of detecting a fire to the specific design for the particular type of cargo</p>

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9	Page 10, Para 6.3.1.4 As indicated in Exemption 10296, the use of restraint nets should be installed over the FCCs to help ensure the cargo stays completely surrounded by the FCC in any flight condition.	Add: Cargo restraint nets should be installed over the FCCs.	<p>envisioned to be carried.</p> <p>We partially agree. TSO-C90, TSO-C203, and industry guidance include a discussion on the use of net and pallet with FCCs and provide additional details on cargo restraint. However, the focus of the guidance contained in AC 25.857-X is on fire safety. We do agree that adding clarifying information (that typically cargo using FCCs includes pallet and net) is of value. We have done so in paragraphs 6.3.3.2 and 6.3.3.7.</p> <p>However, we do not want to provide overly restrictive guidance regarding the means to provide cargo restraint in this AC. In addition, information obtained from industry sources indicate that future FCC design may incorporate net or other attachment features as an integral part of the FCC. Also, Exemption No. 10296 provided specific limitations for a specific airplane configuration and operation. Those limitations might not be applicable for other configurations and operations.</p>
10	Page 12, Para 8 Based on the previous mentions of AFM content in para 7.2 and 7.3, this information should also be included in Para 8 as this section is strictly “AFM considerations.”	Add AFM consideration topics to cover any operational limitations or procedures necessary to ensure effectiveness of the fire protection system. Also include any time limits related to combating a fire in the compartment.	<p>We agree with the intent of the comment. However, section 7 and 8 already include general statements regarding potential limitations or procedures and airplane flight manual (AFM) considerations. For example, section 7.3 states, “<i>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.</i>”</p> <p>The use of FCCs, FRCs, enhanced ULDs, or other means for improved fire protection features for carriage</p>

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Commenter: J. Lee, ANE-150			
			of cargo is occurring at the time this AC is written. Specific limitations and AFM considerations will need to be developed on a case-by-case basis. The FAA has approved the use of FCCs (as part of limitations/conditions for exemptions) and supplemental type certificate (STC) approval for an enhanced ULD is in progress. Additional guidance may be added after the FAA has approved FRCs and enhanced ULDs.

No.	Comment	Requested Change	Disposition
Commenter: C. Alfano ANE-171			
1	Para 6.3.1.1 “For Halon 1301 fire extinguishing agent, a minimum 5-percent concentration by volume at all points in the compartment is considered adequate for initial knockdown of a fire, and a 3-percent concentration by volume at all points in the compartment is considered the minimum for controlling a fire after it is knocked down .”	Recommend providing technical definition of term: “ initial knockdown ” and “ knocked down ”.	We agree that additional clarification is warranted. We added the following to paragraph 6.3.1.1 (now 6.3.1): <i>For Halon 1301 fire extinguishing agent, a minimum 5-percent concentration by volume at all points in the compartment is considered adequate for initial knockdown of a fire (i.e., flames are no longer visible from the source of the fire), and a 3-percent concentration by volume at all points in the compartment is considered the minimum for controlling a fire after it is knocked down (i.e., the removal of flames from the fire source).</i>
2	Para 6.2.1 Class B. “In determining access, it would not be acceptable for there to be a need to pull baggage or cargo onto the floor of the passenger compartment to gain access to the seat of the fire ”	Recommend rewording “ the seat of the fire ” to “ the main area of the fire ”.	We partially agree. We agree that additional clarification should be added to this sentence but believe the correct wording would be as follows: <i>In determining access, it would not be acceptable for there to be a need to pull baggage or cargo onto the</i>

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Commenter: C. Alfano ANE-171			
			<i>floor of the passenger compartment to gain access to the source of the fire.”</i>
3	Para 6.3.1.1 “For certification purposes, the extinguishing agent concentration should be measured in flight”	Recommend defining “ flight ” to include a range of altitude and other required conditions.	We do not agree with adding specific altitude, duration of concentration tests, etc., to this AC. These are specific to a particular airplane configuration and intended use. Additional guidance is provided in draft AC 25.851-X, and in AC 25-7, AC 25-9, and AC 25-22 that describes the acceptable means of compliance for fire extinguishing agents. We believe those references provide sufficient information addressing certification of a fire suppression system.

No.	Comment	Requested Change	Disposition
Commenter: Joan Hughson, AIR-133, 202-267-1608			
1	<p>Paragraph 5.6: Class F compartments that include a built-in fire extinguisher/suppression system or require the use of acceptable fire containment covers (FCCs) or fire resistant containers (FRCs) may meet these requirements if the FCCs or FRCs meet certain requirements.</p> <p>Comment: “...may meet these requirements if the FCCs or FRCs meet certain requirements.” What are “these requirements”? Is it “the requirement to control or extinguish a fire without requiring a crew member to enter the compartment”? There are multiple requirements identified; only one can be satisfied by the FCCs/FRCs as I understand</p>	Clarify what is meant by “the requirements.”	<p>The FAA agrees. When the draft AC was written, industry was in the process of developing standards/requirements (i.e., SAE) as reflected in the EASA AMC on this subject. In addition, the FAA has recently issued TSO-C203C, which includes additional flammability requirements for FCCs. The FAA believes that while the addition of the reference material results in a deviation from the EASA AMC, we have added additional material in paragraphs 5.6 and 5.6.2, with reference to 6.3.3, to provide further clarification.</p> <p>FAA is aware that SAE has developed a draft standard for FRCs. This draft standard, AS6278 specifies the requirements/minimum design and performance criteria and testing methods of FRCs for carriage of cargo on the main deck of transport category airplanes. While we</p>

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	things. The use of the plural (“requirements”) throws things off. Even if my interpretation is wrong, I think it would benefit from some clarification.		would like to include reference to the draft ISO and SAE standards on FRCs, we cannot until they are formally issued, and we have completed our review.
2	<p>Paragraph 5.6: a Class F cargo compartment where FCCs or FRCs meet the liner requirements (i.e., part 25, appendix F, part III flame penetration resistant means) would be acceptable.</p> <p>Comment: There are other flammability requirements required of the FCCs (and are being established for the FRCs). Attached is a table of requirements for FCC (TSO-C203), existing TSO-C90 components (pallets, containers, and nets whose requirements are not compatible with FCCs) and future requirements compatible with FCCs that will go in a revision to TSO-C90</p>	Please review the attached table of performance requirements for FCC, nets, pallets and determine if any additional performance requirements should be included.	We agree. When the draft AC was written, TSO-C203 had not been completed and, in the interest of retaining similarity between the FAA draft AC and the EASA AMC, it was not included. However, FAA believes that inclusion of this information does provide necessary clarification. We have added additional material in 6.3.3 and referenced this paragraph in 5.6.
3	<p>Paragraph 6.3.1.3: Some FCCs have already been developed and are typically constructed of woven fiberglass-based materials that will pass the oil burner test requirements in part 25, appendix F, part III.</p> <p>Comment: TSO-C203 has additional flammability requirements. See attachment.</p>	Please review the attached table of performance requirements for FCC, nets, pallets and determine if any additional performance requirements should be included.	We agree and have incorporated this material in our response to the commenter’s No. 2 comment above and in our subsequent response to commenter’s No 7 comment.
4	Paragraph 6.3.1.3.1 Using FRCs or FCCs shown to be capable of containing a fire in complying with Class F cargo compartment fire protection requirements	Please review the attached table of performance requirements for FCC, nets, pallets and determine if any additional performance requirements should be included.	We agree and have incorporated this material in our response to the commenter’s No 2 comment above and in our subsequent response to commenter’s No 7 comment.

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	<p>Comment: In the absence of a standard for FRC, the liner requirements make sense. The FCC, however, should meet the requirements of TSO-C203.</p>		
5	<p>Paragraph 6.3.1.3.2 If FCCs or FRCs are proposed as a means of compliance for the new Class F compartment, they must meet these standards (i.e., part III of appendix F to part 25 for the sides and top and part I of appendix F for the bottom).</p> <p>Comment: Same comments as previous about FCC meeting requirements of TSO-C203.</p>	<p>Please review the attached table of performance requirements for FCC, nets, pallets and determine if any additional performance requirements should be included.</p>	<p>We agree and have incorporated this material in our response to the commenter's No 2 comment above and in our subsequent response to commenter's No 7 comment.</p>
6	<p>Paragraph 6.3.1.3.4 If FCCs are used as the sole means of compliance, they should completely surround all cargo, including underneath the cargo</p> <p>Comment: The FCCs are not meant to surround the cargo. As part of the net and pallet assembly to be used with the FCC, the pallet must demonstrate adequate fire performance.</p>	<p>See requirements for the next revision of TSO-C90 (attached).</p> <p>Revise text to read: If FCCs are used as the sole means of compliance; they should <u>be used with a pallet that demonstrates adequate fire performance so that the cargo is surrounded by fire protection equivalent to that of the FCC.</u> [or however you want to describe it based on attached table.</p>	<p>We agree with the intent of the comment. We are aware that some operators do not use a pallet when placing bulk cargo in their airplane. In those circumstances, the FAA has required that the FCC completely enclose the bulk cargo. However, we agree (for bulk cargo shipped with an approved pallet) that the FCC should meet requirements as the commenter describes. We revised this paragraph (now 6.3.3.4) to read as follows:</p> <p><i>If FCCs are used as the sole means of compliance, they should be used with a pallet that demonstrates adequate fire performance so that the cargo is surrounded by fire protection equivalent to that of the FCC. If no pallet is used, then the FCC should completely surround all cargo, including underneath the cargo except for obviously nonflammable items, such as metal stock, machinery, and nonflammable fluids without flammable packaging.</i></p>

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7	<p>Paragraph 6.3.1.3.4 These FCCs would need to meet part III of appendix F to part 25</p> <p>Comment: TSO-C203 has additional requirements</p>	<p>Please review the attached table of performance requirements for FCC, nets, pallets and determine if any additional performance requirements should be included.</p>	<p>The FAA agrees and will revise this paragraph, now 6.3.3.5, by adding the following material to provide further clarification:</p> <p><i>6.3.3.6 FCCs (when used in conjunction with a pallet) should meet, at a minimum, the flammability requirements as described above in paragraph Error! Reference source not found. of this AC.</i></p> <p><i>6.3.3.6 The pallet used in conjunction with an FCC should meet, at a minimum, the flammability requirements of part 25, appendix F, part I, paragraphs (a)(1)(ii) and (a)(2)(iii); i.e., be self-extinguishing when tested vertically in accordance with part I, paragraph (b)(4), and have no flame penetration during application of the specified flame source when subjected to the 45-degree angle test defined in part I, paragraph (b)(6).</i></p> <p><i>6.3.3.7 The net used in conjunction with an FCC should meet, at a minimum, the requirements of TSO-C90 and flammability requirements of part 25 appendix F, part I, paragraph (a)(1)(ii); i.e., be self-extinguishing when tested vertically in accordance with part I paragraph (b)(4).</i></p>
8	<p>Paragraph 6.3.1.3.4 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</p>	<p>Check that the requirements of TSO-C203 and this are not in conflict.</p>	<p>FAA has reviewed TSO-C203 and SAE AS6453 and believes that the material added for the final version of AC 25.857-X does not create any conflict.</p>

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	<p>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.</p> <p>Comment: This part of the performance testing defined in TSO-C203</p>		
9	<p>Paragraph 6.3.1.4 Class F cargo compartment designs that rely on fire containment (e.g., fire hardened containers/pallets, FRCs and/or FCCs placed over palletized loads or non-fire hardened containers) should be considered with regard to the possibility of incorrect usage or cargo loading errors.</p> <p>Comment: NOTE ONLY: There seems to be a need for additional guidance to be developed in this area. TSO-C203 has some marking requirements, but an additional effort is desirable.</p>		<p>We acknowledge the concerns of the commenter and support further clarification on this issue to be provided in TSO-C203 or other regulatory guidance.</p>
10	<p>Paragraph 6.3.1.5 All practicable means to prevent the carriage of cargo in standard containers or pallets (if special pallets are required) and/or the omission of FCCs or FRCs should be incorporated. Means may include, but not be limited to...</p>	<p>Separate requirements for FCC/FRC used with a lined compartment (optional FCC/FRC) vs an unlined compartment (mandatory FCC/FRC).</p>	<p>We agree with the intent of the commenter. While we believe the guidance provided in section 7 PROCEDURES AND LIMITATIONS and in section 8 AFM CONSIDERATIONS adequately address loading cargo, further clarification may be added to ensure compliance. Therefore, we have revised section 8.4 to</p>

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Commenter: Joan Hughson, AIR-133, 202-267-1608			
	<p>Comment: If the Class F compartment relies on FCCs or FRCs in place of a liner, then it should be mandatory that the cargo in an F compartment with no liner should have FCCs or FRCs. How would that be managed?</p> <p>If the compartment has a liner, then the FCC or FRC may be recommended, but optional. The FCC/FRC are identified as a CAST Safety Enhancement (SE). It was agreed between the FAA and industry that the Safety Enhancements developed as part of CAST would not be mandatory.</p>		<p>read:</p> <p>8.4 Any loading restrictions associated with access to cargo or baggage or special containers, including the use of FCCs and FRCs in Class F cargo compartments, should be clearly identified in the AFM.</p>
11	<p>Paragraph 6.3.1.5.1 Physical features at the container/pallet to cargo compartment floor interface</p> <p>Comment: This would be acceptable for a cargo compartment with no liner. This would force use of FCC/FRC even if their use was not required which is not desirable. Also the features may be costly to procure, install and certify making it a hardship on the industry.</p>	<p>Separate the requirements for lined and unlined requirements.</p>	<p>We agree with the commenter and have revised this paragraph, which is now 6.3.3.10, to appropriately indicate these recommended options, as follows:</p> <ul style="list-style-type: none"> • <i>Physical features at the container/pallet to cargo compartment floor interface; or</i> • <i>Operational procedures, such as requiring airplane crew verification of cargo loading before every flight; or</i> • <i>A suitable detection system that would warn the crew in the event a non-authorized cargo configuration has been loaded.</i> <p>In addition, the revised guidance agrees with the language contained in EASA AMC 25.857, which industry has successfully followed since it was issued. The FAA does not believe that the revised guidance represents a hardship to industry.</p>

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12	<p>Paragraph 6.3.1.5.2 Operational procedures, such as requiring airplane crew verification of cargo loading before every flight</p> <p>Comment: Would this be feasible?</p>	<p>NOTE: Recommend this be verified with AFS that this is feasible.</p>	<p>We agree with the intent of the comment. As reported in the response to this commenter’s comment # 10, we believe that the guidance provided in section 7, <i>Procedures and Limitations</i>, and section 8, <i>AFM Considerations</i>, adequately addresses loading cargo; however, further clarification may be added to ensure compliance. Therefore, we have revised section 8.4 to read:</p> <p><i>8.4 Any loading restrictions associated with access to cargo or baggage or special containers, including the use of FCCs and FRCs in Class F cargo compartments, should be clearly identified in the AFM.</i></p>
13	<p>Paragraph 6.3.1.5.3 A suitable detection system that would warn the crew in the event a non-authorized cargo configuration has been loaded.</p> <p>Comment: The detection system may be costly to procure, install and certify making it a hardship on the industry.</p>	<p>NOTE: Is this feasible or cost effective?</p>	<p>We agree with the intent of the comment. However, as stated in the AC, this is one option that could be used to address the issue. As reported in the response to this commenter’s comment 11, this guidance agrees with the language contained in EASA AMC 25.857, which industry has successfully followed since it was issued.</p>