

**Disposition of Public Comments
AC 25.795-4X
Passenger Cabin Smoke Evacuation**

Comment	Requested Change	Disposition
Boeing		
<p>Various paragraphs. The term “fresh air” may be misleading</p>	<p>Recommend using the term “outside air” rather than “fresh air” to make sure that no additional qualities are implied.</p>	<p>We agree that the term “outside air” is more descriptive. There is no intent to speak to the purity of the air, only that it comes from outside the airplane. Thus we have substituted the term “outside air” for “fresh air.”</p>
Transport Canada		
<p>The title of the AC and the corresponding rule don’t match.</p>	<p>The rule refers to “smoke protection” whereas the AC refers to “smoke evacuation.” We suggest that the title of the AC match that of the rule.</p>	<p>We agree and have changed the title of the AC, accordingly.</p>
<p>Paragraph 1 assumes that the device is located in a passenger compartment, but it may be somewhere else.</p>	<p>Request clarification on the procedures necessary to deal with a device in an inaccessible area.</p>	<p>The assumption is that the smoke and toxic gases that result from a device are in the passenger cabin. The device itself may have been somewhere else, but the byproducts are assumed to have entered the passenger cabin. This is the only practical way to address the requirement and is the most critical case, assuming that the fire is out. If the fire is not out, the AC is not applicable anyway.</p>

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<p>Link Paragraph 5. to Paragraph 6., regarding the assumptions made to show compliance.</p>	<p>Recommend that paragraph 6. refer to paragraph 5., since many of the items discussed in paragraph 5. have a bearing on the validity of the assumptions made in paragraph 6.</p>	<p>We agree that the two are closely related and have modified paragraph 6. to refer to the discussion in paragraph 5.</p>
<p>Paragraph 5. Make reference to AC-120-80, “In-Flight Fires”</p>	<p>Recommend referring to AC 120-80, which concerns procedures for dealing with in-flight fires.</p>	<p>While AC 120-80 is certainly useful and does address a related subject, the purpose of AC25.795-3 is to define type certification criteria, irrespective of a particular scenario or procedure. Reference to AC 120-80 in this section would not clarify the guidance in this AC.</p>
<p>Paragraph 5.a.(2). Include the same information in ACs 25.795-3 and -5</p>	<p>Recommend that the discussion of effects of an incendiary or explosive device be included in ACs 25.795-3 and -5 because it is relevant.</p>	<p>As above, there are related elements to all the 25.795-X ACs. However, this discussion on smoke quantity is really germane only when discussing smoke evacuation where the quantity of smoke is a key consideration. The other ACs don’t utilize a quantity of smoke in their methods of compliance. Therefore, the same discussion in the other ACs, while not wrong, does not add to the guidance.</p>

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Move paragraph 5.c.(2).	Recommend moving paragraph 5.c.(2) to paragraph 7.	While there are probably many different ways to organize the content, the current location of this paragraph is suitable “discussion’ material,” as the title of paragraph 5. indicates.
Bombardier		
<p>Paragraph 5.c.(2). The assumption about the amount of material that could burn in the event of a fire may not be valid, considering the testing to demonstrate compliance with §§ 25.856(a) and (b).</p>	<p>It now seems that the assumption concerning the amount of material that could burn in the event of a fire may be reduced, considering the testing to demonstrate compliance with § 25.856(a) and (b). The FAA has mandated that §§ 25.856(a) and (b) apply not only to all new airplanes but also to any rework or retrofit that is carried out on existing airplanes.</p> <p>However the assumption in this AC is that</p> <p>"The amount of material available to a fire can be expected to increase with the size of the airplane (i.e., the volume of the cabin), which in turn will increase the amount of smoke and gases generated. This relationship ties the quantity of smoke to</p>	<p>Sections 25.856(a) and (b) apply only to thermal/acoustic insulation materials. The fire scenario referred to in this AC is a surface burning fire in the cabin, so thermal/acoustic insulation materials are a small portion of the total material available to burn. Therefore, improvements in thermal/acoustic insulation materials do not affect the basic assumption in paragraph 5.c.(2).</p> <p>In general, while reduced flammability of certain materials may reduce the total amount of fuel for a fire or delay its propagation, the relationship of airplane size to material available to burn still holds. The larger the airplane, the more material there is.</p>

¹ International Coordinating Council of Aerospace Industries Association

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	<p>the volume of the cabin."</p> <p>This assumption is not in-line with the effort now being given to compliance with §§ 25.856(a) and (b).</p>	
Boeing		
<p>Paragraph 6.a. Note that the functionality of systems is after the event.</p>	<p>Propose adding the words, “after the incident” in the first sentence of paragraph 6.a.</p>	<p>We agree but rather than “after the incident,” we use the term “after the event,” as in AC 25.795-3.</p>
Boeing and Transport Canada		
<p>Paragraph 6.b. describes various operating exceptions when compliance would not be required but needs clarification.</p>	<p>Both commenters had extensive comments on changing paragraph 6.b. to better explain when the capability to limit smoke penetration was required.</p> <p>Boeing suggested specific ways to add conditions that were excluded, whereas Transport Canada discussed various operating conditions already mentioned in the AC in terms of why they should not be excluded.</p>	<p>As with AC 25.795-3, this subject was referred to ARAC for a recommendation because it was clear there was a lack of common understanding, and the current language was insufficiently descriptive to provide adequate guidance. As a result, this paragraph has been extensively rewritten in accordance with the ARAC recommendation. The new language clarifies the fact that there is an emergency procedure associated with this requirement and that some time may be needed to configure the airplane to satisfy the requirement. The AC now discusses this procedure in detail and provides a time for reconfiguration under certain conditions to</p>

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		ensure that the intent of the requirement is met. To the extent possible, the language is identical to that in AC 25.795-3.
<p>Paragraphs 6.a. and b.</p> <p>1. Explicitly exclude MMEL dispatch conditions.</p> <p>2. Add additional limitations to cover other conditions where the airflow may be reduced for short term transients.</p>	<p>Boeing stated that dispatch relief for MMEL should not be included in the compliance demonstration. Transport Canada noted that the AC does not address dispatch relief, although AC 25-9A does.</p> <p>Both commenters discussed various settings for the environmental control system and suggested additions or modifications to address them.</p>	<p>This suggestion was referred to ARAC. Its conclusion was that—while the AC can only offer a recommendation—that recommendation would be that dispatch relief need not be considered. However, the MMEL configuration is not controlled in type certification.</p> <p>These comments were also included in the task referred to ARAC and its recommendation forms the basis of the revised guidance. Paragraph 6.b. has been revised to clarify and define the conditions under which the airflow capability is necessary.</p>
Boeing		
<p>Paragraph 7.a. is ambiguous as to the rate of air change required.</p>	<p>The wording in the proposed AC is not clear and could be misinterpreted. The requirement, as worded, states that the outside air change rate must be at a five minute interval but does not state whether a rate of change of outside air of less than or more than a five-minute interval would be allowed.</p>	<p>We agree with the comment and have revised the wording to refer to an air change rate of <i>at least</i> once every five minutes. This makes it clear that a rate of more than once every five minutes is acceptable but less than once every five minutes is not.</p>

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	<p>We suggest that the text be modified to read as follows:</p> <p><i>“7.a. The FAA has determined that an <u>outside air change rate of once every five minutes or less</u> for at least a 30-minute continuous period meets the compliance requirement and is sufficient to prevent hazardous levels of smoke from becoming incapacitating.”</i></p>	
Transport Canada		
<p>Paragraph 7.a. Include reference to full-scale fire test data used.</p>	<p>Suggest reference to full-scale data used in developing the recommended methods of compliance.</p>	<p>There are several reports and some raw data supporting the recommended methods of compliance. There is no concise reference to cite, and in many cases these data were used by FAA fire safety experts to reach conclusions, but do not themselves state the conclusion. Therefore, we have not changed the AC.</p>
<p>Paragraph 7.a.(1) implies that analysis alone is acceptable to demonstrate smoke evacuation from the passenger cabin.</p>	<p>Recommend that the AC state that a combination of test and analysis is acceptable because, in commenter’s experience, analysis alone is not sufficient to detect small differential pressures between areas of the airplane.</p>	<p>In this case, the analysis would address the rate of change of outside air, not differential pressure. For this application, analysis alone may be sufficient since the methods of calculating the rate of air change are more straightforward.</p>

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<p>Paragraph 7.a.(1)(a)(ii) seems to focus on only single aisle, single deck airplanes.</p>	<p>Recommend that the complexities of multiple aisle, multiple deck airplanes be addressed or at least mentioned in the AC.</p>	<p>The AC is written generically, but Figure 1 shows a single aisle, single deck airplane. It's not clear how more than one aisle would affect the discussion; however, more than one deck might not be as straightforward as a single deck. We have revised the AC to note this possibility.</p>
Boeing		
<p>Paragraph 7.a.(1)(a)(ii) should include allowance for passenger seats in establishing cabin volume.</p>	<p>Suggest that the cabin volume can be reduced by a minimum number of passenger seats.</p>	<p>Because seats can vary in number and type and contain both impermeable and porous materials, trying to include a reasonable representation for seats would be very complex and would likely then warrant reconsideration of some of the other considerations of the volume measurement. The Harmonization Working Group developed the cabin volume calculation shown in this AC as a simplified, standardized, conservative means of compliance. The means of compliance described in this AC is one means but not the only means. Any applicant may propose an alternate means of compliance through standard certification processes. We have made no change to the AC.</p>

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<p>Paragraph 7.a.(2) doesn't agree with AC 25-9A regarding allowable smoke.</p>	<p>AC25-9A, paragraph 11.3.(4)(i), refers to “wisps of smoke that enter and then immediately exit,” whereas this AC states that small amounts of smoke are allowed to remain in parts of the passenger cabin.</p>	<p>The paragraph referred to is actually addressing smoke penetration <i>into</i> an occupied area from a smoke source in a cargo compartment. For this AC, the smoke is presumed to start out in the occupied compartment and then be evacuated. This is very different from trying to keep the smoke out of the occupied area in the first place, and there are different problems related to mixing and airflow within the cabin. For this case, it is possible that small areas of the cabin will not see the same degree of mixing as the cabin as a whole and that some small quantities of smoke could linger. However, as noted in the AC, the intent is for the smoke to be essentially evacuated from the airplane.</p>
Boeing		
<p>Paragraph 7.a.(2). Refers to a provision in AC 25-9A that doesn't exist.</p>	<p>There is no “cabin smoke removal procedure” in AC 25-9A, so this AC needs to be revised.</p>	<p>We agree that AC 25-9A does not address cabin smoke removal and have changed the language in the AC accordingly. AC 25-9A does address smoke evacuation tests, however, and—although the location of the smoke is the flightdeck—some of the procedures and equipment are relevant.</p>

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		We have revised the AC to reflect this distinction.
Transport Canada		
Paragraph 7.b.(1) doesn't speak to whether protective equipment is remotely stowed or automatically presented.	A system that is automatically presented may require a reliability assessment under § 25.1309, whereas a remotely-stowed system may not require the same level of assessment.	We agree, although this is true for all systems and not specific to a system that is installed to meet this rule. And there will, undoubtedly, be other regulations that apply as well. Since the AC is only discussing <i>approaches</i> that may be acceptable, a detailed listing of other regulations that might apply is not needed.
Paragraph 7.b.(2) needs clarification if any credit is given to existing passenger oxygen masks.	This paragraph implies some credit for oxygen masks in delaying the effects of smoke and toxic, but the commenter has never given any credit for oxygen masks in that application.	We changed this paragraph of the AC to refer to "protective breathing equipment" rather than "oxygen masks" to match the Fractional Effective Dose curve in Appendix 1. The FAA agrees that existing passenger oxygen masks do not provide protection from smoke and toxic fumes and would not give credit.
ICCAIA		
Paragraph 7.d. should refer to paragraphs b. and c., rather than to a. and b.	States that the reference for combi airplanes in paragraph 7.d. should be to sub-paragraphs b. and c., because paragraph a. refers to the air change method.	Actually, the intention was to explain that the air change method given in the AC <i>can</i> be used for combi airplanes as well. So the reference is correct.