

## DISPOSITION OF INTERDIRECTORATE COMMENTS

Policy No. PS-ANM-25-13, Electromagnetic Compatibility Demonstration for Airplane Wireless Radio Frequency Networks  
Nazih Khaouly, ANM-111

No.	Comment	Requested Change	Disposition
<b>Commenter:</b> Lee Nguyen, AIR-130			
1	5 <sup>th</sup> sentence of the Summary states “The airplane EMC tests result in data that may be provided to airplane operators so that the operators can accept use of portable electronic devices that communicate with the installed wireless RF system.” However, the Policy section does not address the issue.	Suggest add a subsection in the Policy section to address the What and How for this issue.	We agree that this is outside the scope of this policy; therefore the referenced sentence will be deleted. Acceptance of use is the responsibility of Flight Standards.
2	Need to specify versions of all referenced RTCA/DO-160 for equipment EMI qualification.	Change all referenced RTCA/DO-160 with RTCA/DO-160 versions D (including Changes 1, 2, and 3), E, F, or G.	Published guidance AC 21-16, which refers to applicable sections of DO-160 (versions D, E, F, and G), will be incorporated to this policy.
3	2 <sup>nd</sup> sentence of 2 <sup>nd</sup> paragraph in Relevant Past Practice should mention access point since they’re part of the installed system certified for EMC.	Revise the sentence as: Aircraft operators, including commercial air carriers, have installed wireless RF systems on board aircraft to provide e-mail and internet access for passengers and crewmembers <b>through access points.</b>	The term “access points” refers only to Wi-Fi technology. This policy addresses <i>all</i> wireless technologies.
4	Need to specify title of all referenced DO-307, and add Change 1.	Specify RTCA/DO-307, <i>Aircraft Design and Certification for Portable Electronic Device (PED) Tolerance</i> , and add “include Change 1.”	Title added to the first reference of RTCA/DO-307 in the description of AC 20-164, which includes guidance for the use of RTCA/DO-307, both the original document and Change 1.
5	Need to specify version C, and title of all referenced DO-294.	Specify RTCA/DO-294C, <i>Guidance on Allowing Transmitting Portable Electronic Devices (T-PEDs) on Aircraft.</i>	Version C and title added to references of DO-294.
6	Need to specify title of all referenced AC 20-164.	Specify AC 20-164, <i>Designing and Demonstrating Aircraft Tolerance to</i>	Title added to AC 20-164 references.

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		<i>Portable Electronic Devices.</i>	
7	Need to specify title of referenced AC 91.21-1B in Current Regulatory and Advisory Material section.	Specify AC 91.21-1B, <i>Use of Portable Electronic Devices Aboard Aircraft.</i>	Title added to AC 91.21-1B references.
8	Need to specify <i>maximum anticipated</i> number of transmitting PEDs in the 3rd sentence of paragraph 2.d in the Policy section to ensure the installed wireless RF system operating at high capacity for showing airplane compatibility is demonstrated when the installed wireless RF system is operating.	Revise the sentence as: The <b>maximum anticipated</b> number of transmitting PEDs should be selected to cause the system to operate at high capacity.	The intent of this sentence is to demonstrate compatibility of the installed wireless system with other installed airplane systems. It is not intended to demonstrate that the airplane is PED tolerant.

No.	Comment	Requested Change	Disposition
	<b>Commenter:</b> ANM-130S		
1	Summary Section: The intent of the policy statement (PS) is not clearly/sufficiently defined. In the first paragraph of the <b>Summary</b> section it addresses wireless RF transmitters/receivers permanently installed on the airplane and portable RF transmitters/receivers used by passengers or crew members. It further states: “This PS defines acceptable airplane EMC tests to demonstrate compliance ... for installed wireless RF systems.” <i>(I) Airplane systems, required by regulation or performing functions</i>	Provide a definition of a wireless RF system. Some RF transmitters and receivers may be included in the wireless RF system.	We agree, and the summary will be revised accordingly.  <i>(I) We believe the commenter is referring to the wireless smoke detector system installation.</i>

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	<p>affecting the safety of the aircraft, operating in this wireless RF environment are not being addressed.</p> <p>(2) The PS needs restructuring to be consistent with issue papers SE-8 (TPEDs) and SA-13 (Wireless LAN) and supported by the applicable RTCA Documents.</p>		<p>This policy does not differentiate between required system and safety EMC testing, which is equally required for these installations.</p> <p>(2) The SE-8 issue paper was developed in 2005 prior to the issuance of AC 20-164. Since then the policy has evolved. AC 20-164 was released to provide means of compliance methods for certification.</p>
2	<p>Summary Section: Second paragraph in <b>Summary</b> section needs clarification. The “installed airplane radio systems...” referred to in this paragraph, are they to be excluded from airplane EMC ground/flight tests addressed in this policy?</p> <p>Unclear.</p>	Clarify.	This policy does not affect EMC tests on the types of radio systems referenced in paragraph 2.
3	<p><b>Definition of Key Terms</b> Section: Paragraphs “<b>Portable wireless transmitters and receivers</b>” and “<b>Installed wireless RF transmitters and receivers</b>” need further definition.</p> <p>Add additional information for clarity.</p>	The PS should be revised to further define the wireless RF transmitters in terms of “intentional” and “unintentional” transmitters.	The term “intentional” will be added as applicable.
4	Paragraph 3.a. This paragraph does not specify which systems/equipment, that have not demonstrated tolerance to RF TPEDs, require specific tests. Please clarify.	Correct what we think is a typo. The applicant should use tests and criteria described in paragraph <i>1c</i> not <i>2c</i> .	Correction made.

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5	<p>Paragraphs 4.a and 4.b. These paragraphs appear to be contradictory. Paragraph 4a states that, "...wireless RF systems that communicate with low power wireless TPEDs are not required to demonstrate tolerance to TPEDs as described in section 2 and ...." Then paragraph 4b states that, "The applicant should use tests and criteria described in paragraph 2c to demonstrate EMC."</p> <p>Please clarify.</p>	<p>Correct the same error sited in comment 16 above. We think the intended paragraph is <i>1c</i> not <i>2c</i>.</p>	<p>Correction made.</p>

No.	Comment	Requested Change	Disposition
<b>Commenter:</b> Shohreh Safarian, ANM-100L			
1	<p>From safety perspectives, please add 25.1309 for failure effects through an RF and electro-magnetic interference (EMI).</p>	<p>The failure effect that leads to ability of on-board equipment communication with ground. This could result in high power transmission (unacceptable adverse interference effects to aircraft systems).</p>	<p>Reference to 25.1309(a) will be added.</p>

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<b>Commenter:</b> Tom Phan, ANM-100B, (562) 627-5342			
1		Add §§ 25.1301, 25.1309 (b), (d), (f) whereas applicable in the policy statement.	References to 25.1301(a)(4) and 25.1309(a) will be added.

No.	Comment	Requested Change	Disposition
<b>Commenter:</b> Andy Shaw, ASW-100			
1	For the evaluation of the installed wireless devices communicating with other installed onboard equipment, i.e., smoke detectors, there is no mention of evaluating its signal being interfered with by other aircraft or carry-on systems or devices. As smoke detectors are required equipment, they need to perform their function while not interfering with other systems but also not being interfered with as well. In other words, these kinds of systems should be evaluated as both sources and victims of interference.		No change requested. However this was clarified by the correction made in response to ANM-130S comment number 4.

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<b>Commenter:</b> James Brady, ACE-111			
1	The top line on page 3, "...demonstrates	Delete "model."	This section is about relevant past practice.

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<p>that the airplane <b>model</b> is tolerant to the specific type...” <i>(last sentence of first paragraph)</i></p>	<p>The operator needs to demonstrate that the specific airplane is tolerant, not the airplane model.</p>	<p>Typically, operators perform the demonstration on a single airplane of that model.</p>
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<b>Commenter:</b> Ricky Chitwood, AFS-240			
1	<p>Page 1, Paragraph: Summary, sentence reading: “4, Code of Federal Regulation (14 CFR) part 25”</p> <p>Should this be “part 25.1309(a), 1353(a), 1431(c)?</p>		<p>The Summary is an overview. The specific sections are identified in the Current Regulatory and Advisory Material section and in the policy itself.</p>
2	<p>Page 1, Paragraph: Summary, sentence reading:</p> <p>“The airplane EMC tests result in data that may be provided to airplane operators so that the operators can accept use of portable electronic devices that communicate with the installed wireless RF system.”</p> <p>The Summary mentions this issue. However, the Policy does not address it. Suggest add a subsection in the Policy to address the What and How for this issue.</p> <p><b>Will this be extended to Part 23?</b></p>		<p>Agreed. Sentence will be deleted; see AIR-130 comment #1 above.</p> <p>Part 23 is out of the scope of discussion on this policy statement.</p>

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3	<p>Page 2, Paragraph: Current Regulatory and Advisory Material: Paragraph reading:</p> <p>“This AC refers to RTCA document DO-307) “</p> <p><b>“RTCA” should be replaced with “RTCA, Inc., (previously Radio Technical Commission for Aeronautics).”</b></p>	<p>“RTCA” should be replaced with “RTCA, Inc., (previously Radio Technical Commission for Aeronautics)”</p> <p>Sentence should read:</p> <p>“This AC refers to RTCA, Inc., (previously Radio Technical Commission for Aeronautics) document DO-307.”</p>	<p>“Inc.” will be added to the referenced sentence about AC 20-164.</p>
4	<p>Page 2, Paragraph: Current Regulatory and Advisory Material: Paragraph reading:</p> <p>“This AC refers to RTCA, Inc., (previously Radio Technical Commission for Aeronautics) document DO-307 for standard procedures that demonstrate an aircraft is tolerant to potential electromagnetic effects from PEDs, including portable wireless RF devices.”</p> <p><b>What about AC 20-168 and RTCA DO-294C and DO-313?</b></p>		<p>Advisory Circular 20-168 will be added because it provides some guidance for the installation of non-essential, non-required equipment, and it references RTCA/DO-313. RTCA DO-294 is limited to operational acceptance and will not be referenced.</p>
5	<p>Page 3, Paragraph: Relevant Past Practice: Sentence reading:</p> <p>“Aircraft operators, including commercial air carriers, have installed wireless RF systems on board aircraft to provide e-mail and internet access for passengers and crewmembers through access points.”</p>		<p>The term “access points” refers only to Wi-Fi technology. This policy addresses <i>all</i> wireless technologies.</p>

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	<b>Should mention access point since they're part of the installed system certified for EMC.</b>		
6	<p>Page 3, Paragraph: Relevant Past Practice: Sentence reading:</p> <p>“The Transport Airplane Directorate developed issue papers to define acceptable means of demonstrating electromagnetic compatibility for the installed wireless networks and the portable wireless RF devices that can access these networks.”</p>	<p>Add “compliance for”</p> <p>Sentence should read:</p> <p>“The Transport Airplane Directorate developed issue papers to define acceptable means of <i>compliance for</i> demonstrating electromagnetic compatibility for the installed wireless networks and the portable wireless RF devices that can access these networks.”</p>	We agree and will make the suggested addition.
7	<p>Page 3, Paragraph: Policy. Subparagraph 1 b Sentence that reads</p> <p>“b. The applicant should use RTCA/DO-160 laboratory EMC tests to qualify the installed wireless RF system equipment.”</p>	<p>Consider rephrasing statements within the PS when making reference to RTCA or AC’s as follows:</p> <p>The applicant should refer to the current edition of RTCA/DO-160 laboratory EMC tests to qualify the installed wireless RF system equipment</p>	Same as AIR-130 comment #2. Published guidance AC 21-16, which refers to applicable sections of DO-160 (versions D, E, F, and G), will be incorporated to this policy.
8	<p>Page 3, Paragraph: Policy. Subparagraph 1 b Sentence that reads</p> <p>“b. The applicant should use RTCA/DO-160.”</p>	What about adding after 160 “versions D (including Changes 1, 2, and 3), E, F, or G”?	Agreed. Reference made to AC-21-16, which references the applicable versions.
9	<p>Page 4, Paragraph: Policy. Subparagraph 2 C Sentence that reads</p>	What about adding after 160 “versions D (including Changes 1, 2, and 3), E, F,	Agreed. Reference made to AC-21-16, which references the applicable versions.

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	“c. The applicant should use RTCA/DO-160 laboratory EMC tests to qualify the installed wireless RF system equipment.”	or G”?	
10	Page 4, Paragraph: Policy. Subparagraph 2 D Sentence 3, that reads:  “The number of transmitting PEDs should be selected to cause the system to operate at high capacity. The transmitting PEDs should be operated in all areas of the airplane that passengers or crewmembers can occupy.”	Add “maximum anticipated”  Sentence should read:  “The <i>maximum anticipated</i> number of transmitting PEDs should be selected to cause the system to operate at high capacity.”	Same as AIR-130 comment #8. The intent of this sentence is to demonstrate compatibility of the installed wireless system with other installed airplane systems. It is not intended to demonstrate that the airplane is PED tolerant.

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	<b>Commenter:</b> Tim Shaver, AFS-360		
1	Para’s 2(d)3(d) currently states, “The areas (locations) should include the passenger cabin, aisles, galleys, toilets, flight deck, and crew rest areas.”  Recommend removal of flight deck from the locations for this list. The uncontrolled use of PEDs does not extend to the flight deck. Devices brought on board by the pilots are strictly controlled operationally and new rulemaking is underway to		Although operationally restricted, electromagnetic compatibility of PEDs should still be tested in the flight deck. A clarifying note will be included in both paragraphs.

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<p>prohibit the use of personal devices. The use of TPEDs as EFBs or other crew device is checked and approved operationally as part of the issuance of the OPS spec.</p> <p>Alternate action would be to add a clause, “Electromagnet compatibility for use of EFBs or other operationally approved portable electronic devices is handled separately as part of that approval.</p>		
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