

DISPOSITION OF PUBLIC COMMENTS AC 25.899, ELECTRICAL BONDING AND PROTECTION AGAINST STATIC ELECTRICITY			
Commenter	Comment	Requested Change	Disposition
Boeing and AIA/GAMA	Boeing and AIA/GAMA note that the title of proposed AC 25.899-1 and the parallel regulation is <i>Electrical Bonding and Protection against Static Electricity</i> . However, the AC discusses lightning protection in many places (for example: paragraph 4.b. on primary bonding path; and paragraph 4.d.(1) on lightning protection). Boeing and AIA/GAMA recommend that the FAA eliminate all references to lightning strike and lightning protection from this guidance material.	Boeing recommends that the FAA eliminate all references to lightning strike and lightning protection from this guidance material.	Because the discussion is about the “Bonding” not about the Lightning Protection, the wording will remain as proposed.
Boeing and AIA/GAMA	Boeing and AIA/GAMA note that the third bullet in paragraph 4.a.(1): applies the bonding requirement to “essential equipment,” while proposed §25.899(a)(3) mandates bonding to prevent interference with “installed electrical/electronic equipment.” Boeing and AIA/GAMA request that the FAA ensure that the regulation and the advisory material match in terminology and requirement.	Change this AC language – (1) General. All items that may cause a danger of <ul style="list-style-type: none"> • electrical shock, • ignition of flammable vapors, or • interference with essential equipment (e.g. radio communicatio 	The FAA concurs with the comment and the wording will be changed as suggested.

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		<p>ns and navigational aids) as a result of accumulation and discharge of static charges should be adequately bonded to the main grounding systems.</p> <p>To this –</p> <p>(1) General. All items that may cause a danger of</p> <ul style="list-style-type: none"> • electrical shock, • ignition of flammable vapors, or • interference with installed electrical/electronic equipment (e.g. radio communications and navigational aids) as a result of 	

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		<p>accumulation and discharge of static charges should be adequately bonded to the main grounding systems. Boeing requests that the FAA ensure that the regulations and the advisory material match in terminology and requirement.</p>	
Boeing and AIA/GAMA	Boeing and AIA/GAMA point out that paragraph 4.a.(3) discusses high pressure refueling and fuel transfer, and recommends that the applicant consult	Boeing and AIA/GAMA request that paragraph 4.a.(3) be removed from this advisory circular and be directed to	<p>The FAA agrees, in part. See the changes below.</p> <p>4.a.(3) <u>High pressure refueling and fuel transfer.</u></p>

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	<p>with the fuel manufacturers. However, the commenters state, this material relates not to the fuel manufacturer, but to the <u>refueling equipment</u>. Applicants for type design and changes to type design have no control over ground refueling equipment design. Boeing and AIA/GAMA request that paragraph 4.a.(3) be removed from this advisory circular and be directed to appropriate people responsible for the design of ground refueling equipment.</p>	<p>appropriate people responsible for the design of ground refueling equipment. 4.a.(3) <u>High pressure refueling and fuel transfer.</u> High pressure refueling and/or high rates of fuel transfer must not induce dangerously high voltages within the fuel system. Prevention of such an occurrence should be established by test or by consultation with the appropriate fuel manufacturers. If compliance with this requirement involves any restriction on the types of fuel to be used or on the use of additives, this should be established.</p> <p>(a) With standard refueling equipment and standard aircraft turbine fuels, voltages high enough to cause sparking may be induced between the surface of the fuel and the metal parts of the tank at</p>	<p>High pressure refueling and/or high rates of fuel transfer must not induce dangerously high voltages within the fuel system. Prevention of such an occurrence should be established by test or by consultation with the appropriate fuel and refueling equipment manufacturers. If compliance with this requirement involves any restriction on the types of fuel to be used or on the use of additives, this should be established</p>

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		<p>refueling flow velocities above approximately 7 meters/second (23 feet/second). These induced voltages may be increased by –</p> <ul style="list-style-type: none"> • The presence of additives and contaminants (e.g. anti-corrosion inhibitors, lubricating oil, free water). • Splashing or spraying of the fuel in the tank. <p>(b) The static charge can be reduced by –</p>	
Boeing and AIA/GAMA	<p>Boeing and AIA/GAMA comment that the first bullet in Paragraph 4.b(1) states “impedance” should be as low as practicable. Impedance measurement is difficult to accomplish; it is common practice to specify and design bond paths with resistance only. Boeing and AIA/GAMA suggest that the FAA revise the sentence to specify <u>resistance</u> instead of impedance.</p>	<p>Change this - Primary bonding paths are those paths that are required to carry lightning discharge currents. These paths should be of as low an electrical impedance as is practicable.</p> <p>To this –</p> <p>Primary bonding paths are</p>	<p>The FAA concurs with the comment and the wording will be changed as suggested.</p>

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		those paths that are required to carry lightning discharge currents. These paths should be of as low an electrical resistance as is practicable.	
Boeing and AIA/GAMA	Boeing and AIA/GAMA comment that paragraph 4.c.(2) indicates that the resistance measurement should be made from ground paths back to the “main airplane ground.” Boeing and AIA/GAMA state that it isn’t clear what this term refers to. The commenters suggest that the FAA revise the guidance material to define what constitutes a “main airplane ground.”	<p>Define “main airplane ground.”</p> <p>(2) <u>Secondary bonding paths.</u></p> <p>(a) Metallic parts normally in contact with flammable fluids and the main airplane ground (aircraft main structure or ground path).</p> <p>(b) Isolated conducting parts subject to appreciable electrostatic charging and the main airplane ground (aircraft main structure or ground path).</p> <p>(c) Electrical panels and other equipment accessible to the occupants of the airplane and the main airplane ground (aircraft main structure or ground path).</p>	The FAA agrees, in part. See the changes in the previous column.

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		<p>(d) Ground connections that normally carry the main electrical supply and the main airplane ground (aircraft main structure or ground path). The test on these connections should ensure that the connections can carry, without risk of fire or damage to the bond or excessive volt drop, such continuous normal currents and intermittent fault currents as are applicable.</p> <p>(e) Electrical and electronic equipment and the airplane main ground (aircraft main structure or ground path), where applicable, and as specified by the airplane manufacturer.</p> <p>(f) Static discharger wicks and the main airplane structure.</p>	
Boeing and AIA/GAMA	Boeing and AIA/GAMA point out that in Appendix A, the reference to §25.899 shows the title to be “ <i>Electrical appliances, motors, and transformers.</i> ” This is inconsistent with the title of the	Correct error in Appendix showing rule. Change - § 25.899 Electrical appliances, motors, and	The FAA concurs with the comment and the wording will be changed as suggested.

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	proposed rule §25.899, which is <i>"Electrical bonding and protection against static electricity."</i> The FAA should correct this title in the AC to match the rule.	transformers. To – § 25.899 Electrical bonding and protection against static electricity.	