

CS-23 AMENDMENT 4 — CHANGE INFORMATION

The Agency publishes amendments to Certification Specifications as consolidated documents. These documents are used for establishing the certification basis for applications made after the date of entry into force of the amendment.

Consequently, except for a note '[Amdt No: 23/4]' under the amended paragraph, the consolidated text of CS-23 does not allow readers to see the detailed changes introduced by the new amendment. To allow readers to also see these detailed changes, this document has been created. The same format as for publication of Notices of Proposed Amendments (NPAs) has been used to show the changes:

- (a) deleted text is marked with ~~strike through~~;
- (b) new or amended text is highlighted in grey;
- (c) an ellipsis (...) indicates that the remaining text is unchanged in front of or following the reflected amendment.

Book 1

SUBPART F — EQUIPMENT

Create CS 23.1306 as follows:

CS 23.1306 Electrical and electronic system lightning protection

(See AMC 20-136)

- (a) Each electrical and electronic system that performs a function for which failure would prevent the continued safe flight and landing of the aeroplane must be designed and installed so that:
 - (1) the function is not adversely affected during and after the time the aeroplane is exposed to lightning; and
 - (2) the system automatically recovers normal operation of that function in a timely manner after the aeroplane is exposed to lightning, unless the system's recovery conflicts with other operational or functional requirements of the system that would prevent continued safe flight and landing of the aeroplane.
- (b) For aeroplanes approved for instrument flight rules operation, each electrical and electronic system that performs a function for which failure would reduce the capability of the aeroplane or the ability of the flight crew to respond to an adverse operating condition, must be designed and installed so that the function recovers normal operation in a timely manner after the aeroplane is exposed to lightning.

Create CS 23.1308 as follows:

CS 23.1308 High-Intensity Radiated Fields (HIRF) protection

(See AMC 20-158)

- (a) Each electrical and electronic system that performs a function whose failure would prevent the continued safe flight and landing of the aeroplane must be designed and installed so that:
- (1) the function is not adversely affected during and after the time the aeroplane is exposed to HIRF environment I, as described in Appendix K;
 - (2) the system automatically recovers normal operation of that function in a timely manner after the aeroplane is exposed to HIRF environment I, as described in Appendix K, unless the system's recovery conflicts with other operational or functional requirements of the system that would prevent continued safe flight and landing of the aeroplane; and
 - (3) the system is not adversely affected during and after the time the aeroplane is exposed to HIRF environment II, as described in Appendix K.
- (b) Each electrical and electronic system that performs a function whose failure would significantly reduce the capability of the aeroplane or the ability of the flight crew to respond to an adverse operating condition must be designed and installed so that the system is not adversely affected when the equipment providing the function is exposed to equipment HIRF test level 1 or 2, as described in Appendix K.
- (c) Each electrical and electronic system that performs a function whose failure would reduce the capability of the aeroplane or the ability of the flight crew to respond to an adverse operating condition must be designed and installed so that the system is not adversely affected when the equipment providing the function is exposed to equipment HIRF test level 3, as described in Appendix K.

Amend CS 23.1309 as follows:

CS 23.1309 Equipment, ~~S~~systems and installations

...

- (e) In ~~showing~~ demonstrating compliance with this paragraph with regard to the electrical power system and to equipment design and installation, critical environmental and atmospheric conditions, ~~including radio frequency energy and the effects (both direct and indirect) of lightning strikes,~~ must be considered. For electrical generation, distribution, and utilisation equipment required by or used in complying with this subpart, the ability to provide continuous, safe service under foreseeable environmental conditions may be shown by environmental tests, design analysis, or reference to previous comparable service experience on other aeroplanes.

...

Create CS-23 Appendix K as follows:

Appendix K — HIRF environments and equipment HIRF test levels

This appendix specifies the HIRF environments and equipment HIRF test levels for electrical and electronic systems under CS 23.1308. The field strength values for the HIRF environments and

equipment HIRF test levels are expressed in root-mean-square units measured during the peak of the modulation cycle.

- (a) HIRF environment I is specified in the following table:

Table I — HIRF environment I

FREQUENCY	FIELD STRENGTH (V/m)	
	PEAK	AVERAGE
10 kHz – 2 MHz	50	50
2 MHz – 30 MHz	100	100
30 MHz – 100 MHz	50	50
100 MHz – 400 MHz	100	100
400 MHz – 700 MHz	700	50
700 MHz – 1 GHz	700	100
1 GHz – 2 GHz	2 000	200
2 GHz – 6 GHz	3 000	200
6 GHz – 8 GHz	1 000	200
8 GHz – 12 GHz	3 000	300
12 GHz – 18 GHz	2 000	200
18 GHz – 40 GHz	600	200

In this table, the higher field strength applies at the frequency band edges.

- (b) HIRF environment II is specified in the following table:

Table II — HIRF environment II

FREQUENCY	FIELD STRENGTH (V/m)	
	PEAK	AVERAGE
10 kHz – 500 kHz	20	20
500 kHz – 2 MHz	30	30
2 MHz – 30 MHz	100	100
30 MHz – 100 MHz	10	10
100 MHz – 200 MHz	30	10
200 MHz – 400 MHz	10	10
400 MHz – 1 GHz	700	40
1 GHz – 2 GHz	1 300	160
2 GHz – 4 GHz	3 000	120

4 GHz – 6 GHz	3 000	160
6 GHz – 8 GHz	400	170
8 GHz – 12 GHz	1 230	230
12 GHz – 18 GHz	730	190
18 GHz – 40 GHz	600	150

In this table, the higher field strength applies at the frequency band edges.

(c) Equipment HIRF test level 1.

- (1) From 10 kilohertz (kHz) to 400 megahertz (MHz), use conducted susceptibility tests with continuous wave (CW) and 1 kHz square wave modulation with 90 per cent depth or greater. The conducted susceptibility current must start at a minimum of 0.6 milliamperes (mA) at 10 kHz, increasing 20 decibels (dB) per frequency decade to a minimum of 30 mA at 500 kHz.
- (2) From 500 kHz to 40 MHz, the conducted susceptibility current must be at least 30 mA.
- (3) From 40 MHz to 400 MHz, use conducted susceptibility tests, starting at a minimum of 30 mA at 40 MHz, decreasing 20 dB per frequency decade to a minimum of 3 mA at 400 MHz.
- (4) From 100 MHz to 400 MHz, use radiated susceptibility tests at a minimum of 20 volts per meter (V/m) peak with CW and 1 kHz square wave modulation with 90 per cent depth or greater.
- (5) From 400 MHz to 8 gigahertz (GHz), use radiated susceptibility tests at a minimum of 150 V/m peak with pulse modulation of 4 per cent duty cycle with a 1 kHz pulse repetition frequency. This signal must be switched on and off at a rate of 1 Hz with a duty cycle of 50 per cent.

(d) *Equipment HIRF test level 2.* Equipment HIRF test level 2 is HIRF environment II in Table II of this appendix reduced by acceptable aircraft transfer function and attenuation curves. Testing must cover the frequency band of 10 kHz to 8 GHz.

(e) *Equipment HIRF test level 3.*

- (1) From 10 kHz to 400 MHz, use conducted susceptibility tests, starting at a minimum of 0.15 mA at 10 kHz, increasing 20 dB per frequency decade to a minimum of 7.5 mA at 500 kHz.
- (2) From 500 kHz to 40 MHz, use conducted susceptibility tests at a minimum of 7.5 mA.
- (3) From 40 MHz to 400 MHz, use conducted susceptibility tests, starting at a minimum of 7.5 mA at 40 MHz, decreasing 20 dB per frequency decade to a minimum of 0.75 mA at 400 MHz.
- (4) From 100 MHz to 8 GHz, use radiated susceptibility tests at a minimum of 5 V/m.