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11 July 1968

Superseding
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25 October 1956

MILITARY SPECIFICATION

ACOUSTICAL NOISE LEVEL IN AIRCRAFT, GENERAL SPECIFICATION FOR

This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force.

1. SCOPE

1.1 This specification covers the general requirements for the control of acoustical noise in occupied spaces of aircraft, including the acceptable noise levels and the testing requirements for determining conformance to these levels.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

SPECIFICATIONS

Military

MIL-S-3151	Sound-Level-Measuring Equipment
MIL-S-6144	Soundproofing for Aircraft; General Specification for Installation of
MIL-I-7171	Insulation Blanket, Thermal-Acoustical

(When requesting specifications, refer to both title and symbol. Copies of specifications may be obtained upon application to the Commanding Officer, Naval Supply Depot, 5801 Tabor Avenue, Philadelphia, Pennsylvania, 19120, Attention: Code 105).

FSC 1500

3. REQUIREMENTS

3.1 Acoustical noise levels --

3.1.1 Maximum continuous power - The acoustical noise level in any part of the aircraft (see 6.2.2) intended for occupancy by the crew or other personnel shall not exceed the values specified in Table IA (preferred) or Table IB during conditions of MAXIMUM CONTINUOUS POWER.

TABLE I. - Maximum acceptable noise level at maximum continuous power

I A.			I B.	
Frequency (cps)		Max. acceptable noise level (db)	Frequency bands (cps)	Max. acceptable noise level (db)
Band	Center			
Overall		113	Overall	113
22.4 - 45	31.5	111		
45 - 90	63	111	37.5 - 75	111
90 - 180	125	111	75 - 150	111
180 - 355	250	111	150 - 300	111
355 - 710	500	105	300 - 600	105
710 - 1400	1000	99	600 - 1200	99
1400 - 2800	2000	93	1200 - 2400	93
2800 - 5600	4000	87	2400 - 4800	87
5600 - 11200	8000	87	4800 - 9600	87

3.1.2 Short duration conditions - For takeoff, afterburner operation and other conditions normally not exceeding 5 minutes continuous duration the acoustical noise level in any part of the aircraft (see 6.2.2) intended for occupancy by the crew or other personnel shall not exceed the values specified in Table II A (preferred) or Table II B.

TABLE II. - Maximum acceptable noise level under short duration conditions

II A.			II B.	
Frequency (cps)		Max. acceptable noise level (db)	Frequency bands (cps)	Max. acceptable noise level (db)
Band	Center			
Overall		120	Overall	120
22.4 - 45	31.5	118		
45 - 90	63	118	37.5 - 75	118
90 - 180	125	118	75 - 150	118
180 - 355	250	118	150 - 300	118
355 - 710	500	112	300 - 600	112
710 - 1400	1000	106	600 - 1200	106
1400 - 2800	2000	100	1200 - 2400	100
2800 - 5600	4000	94	2400 - 4800	94
5800 - 11200	8000	94	4800 - 9600	94

3.1.3. Protective helmets - In aircraft in which personnel must necessarily wear helmets at all times and communicate by electronic means (e.g., single place fighter aircraft), the acoustical noise level (see 6.2.2) shall not exceed the values specified in Table III A (preferred) or Table III B during conditions of MAXIMUM CONTINUOUS POWER.

TABLE III. - Maximum acceptable noise level with protective helmets or devices

III A.			III B.	
Frequency (cps)		Max. acceptable noise level (db)	Frequency bands (cps)	Max. acceptable noise level (db)
Band	Center			
Overall		113	Overall	113
22.4 - 45	31.5	111		
45 - 90	63	111	37.5 - 75	111
90 - 180	125	111	75 - 150	111
180 - 355	250	111	150 - 300	111
355 - 710	500	109	300 - 600	109
710 - 1400	1000	106	600 - 1200	106
1400 - 2800	2000	100	1200 - 2400	100
2800 - 5600	4000	94	2400 - 4800	94
5600 - 11200	8000	94	4800 - 9600	94

3.1.4 Normal cruise power - The acoustical noise level in any part of the aircraft (see 6.2.2) intended for occupancy by the crew or other personnel shall not exceed the values specified in Table IV A (preferred) or Table IV B, during conditions of NORMAL CRUISE POWER. Tables IV A and IV B are applicable to all Naval aircraft procurement; and to Air Force and Army aircraft procurement when so stated in the aircraft detail specification.

TABLE IV. - Maximum acceptable noise level at normal cruise power

IV A.			IV B.	
Frequency (cps)		Max. acceptable noise level (db)	Frequency bands (cps)	Max. acceptable noise level (db)
Band	Center			
Overall		106	Overall	106
22.4 - 45	31.5	104		
45 - 90	63	104	37.5 - 75	104
90 - 180	125	104	75 - 150	104
180 - 355	250	104	150 - 300	104
355 - 710	500	96	300 - 600	96
710 - 1400	1000	90	600 - 1200	90
1400 - 2800	2000	86	1200 - 2400	86
2800 - 5600	4000	75	2400 - 4800	75
5600 - 11200	8000	75	4800 - 9600	75

3.1.5 Auxiliary systems - The auxiliary systems which normally operate for longer than 5 minutes shall not produce an increase in noise levels in occupied compartments above the tables herein. Short duration noise levels shall not exceed levels in Table IIA or Table IIB unless specifically approved.

3.1.6 Special missions - For special missions such as Anti-Submarine Warfare (ASW), Aircraft Early Warning (AEW), and Electronic Counter Measures (ECM) which may require noise levels lower than those required by this specification, the requirements will be so stated in the detail specification.

3.2 Noise control methods -

3.2.1 During the design and development stages of the aircraft, the contractor shall include in the design and, where pertinent, demonstrate the performance of, those design features necessary to insure compliance with required noise levels. Such design features may include but are not limited to prop phasing, jet noise suppressors, separation of occupied areas from noise sources, relative placement of engines and fuselage, and related items.

3.2.2 Acoustical treatment - Where applicable, soundproofing conforming to Specification MIL-I-7171 shall be installed in accordance with Specification MIL-S-6144 to effect the specified levels. Acoustic treatments including other than flexible blankets shall be of approved types.

3.3 Reports required -

3.3.1 Engineering report on noise control measures - The contractor shall furnish an engineering report for approval by the procuring activity prior to fabrication of the prototype or major modification of an aircraft which shall include the following material:

(a) Engineering estimates of the noise to be developed inside the aircraft and the engineering basis (pertinent structural data, tests, calculations, etc) for such estimates.

(b) Sketches and tables showing the type, total and unit weight, total area, construction , location, and method of fastening of all soundproofing to be installed to reduce noise to the levels heretofore required.

(c) Estimates or measurements of noise levels generated by auxiliary systems.

3.3.2 Flight test noise level report - The contractor shall furnish a noise level measurement report prior to acceptance of the aircraft, which shall include the following material:

(a) A brief description of the noise level measuring equipment used, (including microphones).

(b) Location of the microphones.

(c) The recorded data in tabular or graphical form.

(d) Test conditions under which the recording was made.

(e) A brief description of the soundproofing installed in the test aircraft.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling - Acoustic noise level measurements shall be made on each experimental aircraft, and on an early model of each production aircraft or modification thereof.

4.2 Test conditions - Acoustical noise level measurements shall be made under the following conditions:

4.2.1 Test Equipment - Measurements shall be obtained with noise level measuring equipment demonstrated to be substantially in accordance with the performance requirements of Specification MIL-S-3151. The test equipment including the microphone, shall be calibrated throughout the frequency range of use. The calibration shall be applied in reporting the results in each octave band.

4.2.2 Stations - Measurements shall be made near the head levels of all crew stations and of a representative number of passenger stations. The stations selected for measurements shall be subject to the approval of the procuring activity; additional stations may be required if considered necessary. Measurements shall be made for a sufficient period of time to permit a sampling of minimum and maximum levels by octave band.

4.2.3 Altitude - Except as specified in 3.1.2, measurements shall be obtained with the aircraft in level forward flight at the lowest altitude sufficient to insure the maximum pressure differential between the cabin and the external atmospheric pressure.

(a) For combat aircraft, measurements shall be made at both normal and combat pressure differentials.

(b) If the aircraft is not pressurized, the altitude shall be the highest at which maximum control power can be obtained, provided this altitude does not exceed 12,000 ft.

4.2.4 Power conditions -

(a) In order to determine compliance with 3.1.1 and 3.1.3, the aircraft shall be operated at maximum continuous power with all auxiliary systems, which normally operate for more than 5 minutes, in full operation.

(b) In order to determine compliance with 3.1.4, the aircraft shall be operated at normal cruise power with all auxiliary systems, which normally operate for more than 5 minutes, in full operation.

(c) In order to determine compliance with 3.1.2, the aircraft shall be operated under the appropriate flight conditions which maximize the resulting acoustical noise.

5. PREPARATION FOR DELIVERY

5.1 This section is not applicable to this specification.

6. NOTES

6.1 Intended use - This specification defines the general requirements for the control of acoustical noise in occupied spaces of aircraft, including the acceptable noise levels, and the testing requirements for determining conformance to these levels.

6.2 Definitions -

6.2.1 Acoustic reference level - The reference sound pressure level for measurements made in accordance with this specification will be the level produced by a sound pressure of 0.0002 dyne/cm^2.

6.2.2 Acoustical noise level - The acoustical noise level of the aircraft shall be considered to be the numerical average of the measured minimum and

maximum levels, provided this average is not less than 3 db below the maximum. In the latter case the reported level shall be the maximum less 3 db.

6.2.3 Overall acoustical noise level - The term overall acoustical noise level will be interpreted as including all noise within the frequency range from 22.4 to 11200 cycles per second.

6.2.4 Maximum continuous power - Maximum continuous power is the maximum power that the engine can develop for continuous operation in level flight at the altitude where measurements are to be taken.

6.2.5 Normal cruise power - Normal cruise power is the power the engine can develop for maximum range in level flight at the altitude where measurements are to be taken.

6.2.6 Auxiliary systems - An auxiliary system is any mechanism or structure other than the airframe or power plant which performs a function at some time during the operation of the aircraft, e.g., heat and vent, pressurization, defrost and defog, inverters, pumps, Auxiliary Power Unit (APU), etc.

6.3 The noise level tables were developed from consideration of damage to hearing, speech communication requirements, and effects on crew performance. It is recognized that these levels represent a compromise between those desired and those considered attainable within the state of the art of noise control in aircraft. This compromise considers the noise characteristics of present turbojet, turboprop, and piston-driven aircraft.

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Review/user information is current as of the date of this document. For future coordination of changes to this document, draft circulation should be based on the information in the current DODISS.

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 119-R004

INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the nature of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity (as indicated on address label).

SPECIFICATION: MIL-A-8806A - Acoustical Noise Level In Aircraft, General Specification for

ORGANIZATION (Of submitter)	CITY AND STATE

CONTRACT NO.	CONTRACT TYPE PROCURED	DOLLAR AMOUNT
		$

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCY.

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

☐ YES ☐ NO IF "YES", IN WHAT WAY?

4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)

SUBMITTED BY (Printed or typed name and activity)	DATE

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