METRIC

NOTICE OF CHANGE

MIL-STD-1474C
NOTICE 1
30 July 1993

MILITARY STANDARD

NOISE LIMITS FOR MILITARY MATERIEL (METRIC)

TO ALL HOLDERS OF MIL-STD-1474C:

1. THE FOLLOWING PAGES OF MIL-STD-1474C HAVE BEEN REVISED AND SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
1	8 March 1991	1	REPRINTED WITHOUT CHANGE
2	30 July 1993	2	8 March 1991
5	30 July 1993	5	8 March 1991
6	30 July 1993	6	8 March 1991
17	8 March 1991	18	REPRINTED WITHOUT CHANGE
18	30 July 1993	17	8 March 1991

2. MAKE THE FOLLOWING PEN AND INK CHANGE

Page 3, para 2.2, ANSI listing: Delete "ANSI S1.1 Acoustical Terminology"

3. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

4. Holders of MIL-STD-1474C will verify that page changes and additions indicated above have been entered. The notice pages will be retained as a check sheet. This issuance, together with appended pages, is a separate publication. Each notice is to be retained by stocking points until the Military Standard is completely revised or cancelled.

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(Project HFAC-0068)

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1. SCOPE

1.1 Scope. This standard establishes acoustical noise limits and prescribes testing requirements and measurement techniques for determining conformance to the noise limits specified herein.

1.2 Applicability. This standard applies to the acquisition and product improvement of all designed, or purchased (non-developmental items) ground systems, subsystems, equipment, and facilities that emit acoustic noise. This standard is intended to address noise levels emitted during the full range of typical operational conditions.

1.3 Purpose. This standard provides criteria for designing materiel having noise levels that:

a. Minimize noise induced hearing loss.

b. Achieve acceptable speech communication in a noisy environment.

c. Minimize aural detection by an enemy.

d. Minimize community annoyance.

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2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

STANDARDS

MILITARY

MIL-STD-1472	Human Engineering Design Criteria for Military Systems, Equipment and Facilities
MIL-STD-1473	Standard General Requirements for Color and Marking of Army Materiel
MIL-STD-1908	Definitions of Human Factors Terms

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from Naval Publications and Forms Center, Standardization Documents Order desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are cited in the solicitation.

29 CFR 1910.145	Specification for Accident Prevention, Signs and Tags
40 CFR 204	Noise Emission Standards for Construction Equipment

(Copies of specifications, standards, and other publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

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3. DEFINITIONS

NOTE: Acoustical terms not appearing below are defined in accordance with MIL-STD-1908.

3.1 Aural nondetectability distance. The distance at which, for given conditions, the one-third octave-band pressure levels of a noise source at a listener's location are below both the sound level of a quiet environment (see Table V) and average hearing in all one-third octave bands.

3.1.1 Average hearing. The binaural free-field hearing threshold of normal ears for steady-state noise, given in ISO Recommendation R-226.

3.2 dB(A). The unit used to express sound level measured through the A-weighting network of a sound level meter.

3.3 dB(C). The unit used to express sound level measured through the C-weighting network of a sound level meter.

3.4 Time-weighted average level (L_{avg}). The time-weighted sound level dBA that is derived from the actual varying sound level of the source during a given sample time (T). Implicit in this derivation is an exchange between sound level and time of Q dB per doubling of time. The criterion level is 85 dBA for a duration of 8 hours.

$$L_{avg} = \frac{Q}{\log_{10} 2} \log_{10} \left\{ \frac{1}{T} \int_0^T 2^{L(t)/Q} dt \right\}$$

where: T = total time in hours
t = varying time
L(t) = the time varying A-weighted sound pressure level
Q = exchange rate, usually 3, 4, 5, or 6 dB.

The L_{avg} value can be calculated from the following alternate expression when the sound level takes on a sequence of N constant levels, L_i, each lasting for a time period of C_i hours:

$$L_{avg} = 85 + \frac{Q}{\log_{10} 2} \log_{10} \left(\frac{8D}{T} \right)$$

where: $D = \sum_{i=1}^{N} \frac{C_i}{T_i}$

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T_i = Limiting exposure time at each A-weighted sound pressure level = $\frac{8}{2^{(Li-85)/Q}}$

L_i = i^{th} A-weighted sound pressure level.

The exchange rate must be specified when referring to L_{avg}.

3.5 Hearing conservation criteria. Noise exposure limits that, when exceeded, indicate the need for hearing conservation measures.

3.6 Hearing damage-risk criteria (DRC). Comprehensive statements about the relation between various descriptive parameters of the noise exposure (i.e., sound pressure level, exposure time, etc.) and the probability of temporary or permanent hearing loss.

3.7 Hearing protectors. Devices designed primarily to reduce the noise reaching the auditory system. They may be of any type, i.e., earplugs, noise muffs (circumaural), or attenuating helmets or headsets. For satisfying the requirements of this document they must be on the list approved by the appropriate military Surgeon General.

3.7.1 Attenuating helmets or headsets. Hearing protectors that provide the wearer with electronic communications.

3.8 Impulse noise. A short burst of acoustic energy consisting of either a single impulse or a series of impulses. The pressure history of a single impulse includes a rapid rise to a peak pressure, followed by a somewhat slower decay of the pressure envelope to ambient pressure, both occurring within 1 second. A series of impulses may last longer than 1 second.

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(6) An experimental procedure known as "window analysis" shall be used in steps (1) through (5). The procedure involves measuring the noise level while eliminating all noise sources and paths except the single one of interest. For example, one type of engine noise source determination could be made by running the engine under load with and without the engine fan being driven.

(7) The window analysis procedure shall be repeated for each of the combinations identified (see (1) to (3) above).

d. Only if the maximum noise limit(s) required has been documented as being clearly beyond the state-of-the-art, may the procuring activity expressly grant written permission to exceed the specified limit(s). Any decision to grant permission to exceed the specified limits shall consider health hazard assessments and the operational impact of the hazards associated with exceeding the limits.

5.1.2 Test requirements.

5.1.2.1 General.

5.1.2.1.1 Acceptance criteria. Noise at locations designated by 5.1.2.1.2 shall meet the specified limit.

5.1.2.1.2 Measurement location. Noise measurements shall be made at:

a. Each operator or crew position.

b. Representative positions where one or more individuals (e.g., passengers) will be located.

c. Occasionally occupied positions (e.g., positions that are likely to be occasionally occupied such as the space in and around a generator set, pump, or arc welder, etc.) during typical operation or maintenance of the item/system.

NOTE: Where the operator, crew, or passenger station(s) is not clearly defined or where unattended use of equipment is intended (e.g., some mobile electric power, pumps, etc.), the noise measurement position(s) shall be designated by the procuring activity.

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5.1.2.1.3 Recording. The data recorded and reported shall include the following: A-weighted , C-weighted, and octave-band sound pressure levels, and when appropriate, speech interference levels.

5.1.2.1.4 Noise contours. Where the steady-state noise level of stationary equipment is 85 dB(A) or greater, the distances and directions from the noise source at which the sound level is equal to 85 dB(A) shall be determined. The 85 dB(A) contours shall also be determined for mobile equipment which could, at times, be stationary. The 85 dB(A) contour shall be determined from measurements made at positions around the noise source at angular increments not greater than 45 degrees, and at the noisiest angle. The maximum distance at which 85dB(A) is obtained shall be indicated on the noise hazard sign in 4.3.

5.1.2.1.5 Equipment openings. All windows, vents, and access openings shall be in the normal operation position as defined by the procuring activity. If it is possible to operate with these in either the open or closed positions, both configurations shall be tested.

5.1.2.1.6 Test schedule. During development, sound level measurements shall be made, as a minimum, when the test item is first undergoing testing. Measurement of the final system configuration shall be made as early as possible before first article acceptance.

5.1.2.1.7 Typical duty cycle testing. If typical duty cycle testing is specified by the procuring activity, the time-weighted average level (L_{avg}) shall be determined (see 3.4). Duty cycles shall be as short as practical and the noise exposure of sufficient cycles shall be measured for a minimum duration of 1 hour at rated capacity. When the L_{avg} does not change over ±2.0 dB(A) from cycle to cycle, one cycle shall be adequate. The equipment shall be operated at a test site typical of the environment in which the equipment is to be used, as specified by the procuring activity.

5.1.2.1.8 Sample size. Materiel acceptance shall be based on an adequate test sample, the quantity to be determined by the procuring activity.

5.1.2.2 Operating conditions for system testing. Systems shall be operated as required to accomplish their intended missions or functions. All subsystems and auxiliary equipment normally in use shall be operated. Heaters and air conditioners shall be operated in accordance with 5.1.2.3.1.3.

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