INCH-POUND

MIL-PRF-25670B
w/AMENDMENT 3
12 September 2014
SUPERSEDING
MIL-PRF-25670B
w/AMENDMENT 2
6 March 2006

PERFORMANCE SPECIFICATION

EARPHONE ELEMENTS, GENERAL SPECIFICATION FOR

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the general requirements for earphone elements. These are products, which have screw type terminals and are used in communications headsets for applications requiring communication within high-noise conditions at either ground-level or altitude. These parts meet established United States Air Force safety standards (see 6.1) for signal-generating equipment mounted in close-proximity to the human ear.

1.2 Classification. Earphone elements are of the following types, as specified (see 6.2).

1.2.1 Types. The types of earphone elements are as follows:

MIL-PRF-25670/1	Medium Impedance (22 ohms)	- (H-136/AIC), Ground Level
MIL-PRF-25670/2	Low Impedance (19 ohms)	- (H-143/AIC), High- and Low-Altitude - (H-143A/AIC), Low-Altitude, Immersible
MIL-PRF-25670/5	High Impedance (1,000 ohms)	- (M25670/5-01), Ground-Level, Immersible. NOTE: Used on Next Higher Assemblies: H-251A/U and H-161F/GR Headsets.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

Comments, suggestions, or questions on this document should be addressed to: DLA Land and Maritime, Attn: DSCC-VAI, 3990 East Broad Street, Columbus, Ohio 43218-3990 or emailed to Sound@dscc.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.dla.mil.

2.2 Government documents.

2.2.1 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 cited in the solicitation or contract.

FEDERAL STANDARDS

FED-STD-H28	-	Screw-thread Standards for Federal Services.

COMMERCIAL ITEM DESCRIPTIONS

A-A-52024	-	Compass, Magnetic: Surveyor's and Transit, Pocket; With Optional Ball and Socket or Ball and Socket Head, and Jacob's Staff.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-14072	-	Finishes for Ground Based Electronic Equipment
MIL-PRF-87819	-	Headset-Microphone, (Hearing Protection Type, High and Moderate Ambient Noise Levels), General Specification for

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-202	-	Electronic and Electrical Component Parts, Test Methods for
MIL-STD-810	-	Environmental Test Methods and Engineering Guidelines
MIL-STD-1285	-	Marking of Electrical and Electronic Parts

(Copies of these documents are available online at http://quicksearch.dla.mil or from the Document Automation and Production Service (DAPS) Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, these issues of the documents are those cited in the solicitation or contract.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI S1.15	–	Measurement Microphones – Part 2: Primary Method for Pressure Calibration of Laboratory Standard Microphones by the Reciprocity Technique.
ANSI S3.2	-	Method for Measuring Intelligibility of Speech Over Communication Systems
ANSI S3.7	-	Method for the Coupler Calibration of Earphones

(Copies of these documents are available online from http://www.ansi.org or from the American National Standard Institute, 25 West 43 Street, 4th Floor, New York, NY 10036.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein (except for related associated specifications, specification sheets, or MS sheets), the text of this document takes precedence. Nothing

in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheets. In the event of any conflict between the requirements of this specification and the specification sheets, the latter shall govern.

3.2 Qualification. Earphones furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.3 and 6.3).

3.3 Materials. All materials shall enable the parts to meet the requirements of this specification. Materials, which have measurable changes in property due to aging, shall not be used, such as natural rubber-based products or ferrite-based magnets. All metal surfaces shall be corrosion-resistant. Cementing compounds (adhesives), which are water-soluble, shall not be used.

3.3.1 Insulating and impregnating compounds. Such compounds applied shall not in any way degrade the performance of conductor insulations, to which they are applied. Neither shall they corrode or otherwise cause the deterioration of adjacent materials (metals, plastics, etc.).

3.3.2 Diaphragm material. The diaphragm material shall be Mylar, or a material having equivalent or superior flexibility, stability and durability under specified conditions, as approved by the qualifying activity.

3.3.3 Pure tin. The use of pure tin, as an underplate or final finish, is prohibited both internally and externally. Tin content of earphone components and solder shall not exceed 97 percent, by mass. Tin shall be alloyed with a minimum of 3 percent lead, by mass (see 6.7).

3.3.4 Recycled, recovered, environmentally preferable, or biobased materials. Recycled, recovered, environmentally preferable, or biobased materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.4 Interface.

3.4.1 Interface requirements. Earphone elements shall be designed in accordance with the applicable specification sheet and the general requirements specified herein.

3.4.2 Transformers. If a transformer is used, it shall be located inside the earphone element case, to ensure low-profile and smooth installation in headset earcups.

3.4.3 Threaded parts. All threaded parts shall be in accordance with FED-STD-H28, to ensure interchangeability of spare parts.

3.4.4 Finish. Final finish shall withstand the conditions cited in MIL-DTL-14072, Type I (Exposed).

3.4.5 Coil clearance. The voice coil shall not rub against adjacent parts after assembly. Irregularities of the voice coil surface, resulting from fabrication processes, are considered to be a part of the voice coil.

3.4.6 Diaphragm. The earphone elements shall be constructed to have equalization of pressure on

both sides of the diaphragm, when subjected to changes in ambient pressure as low as 3.4 inches of mercury (1.67 pounds per square inch).

3.4.7 Weight. Weight shall be as specified (see 3.1).

3.4.8 Color. Color shall be as specified (see 3.1).

3.5 Performance.

3.5.1 Frequency response (see 4.5.2). The frequency response at ground level shall be within the limits specified in the frequency response range (see 3.1). The frequency response at simulated altitude, when specified (see 3.1), shall be performed for qualification and in group C only and shall be within the limits specified in the frequency response range.

3.5.1.1 Smoothness of frequency response curve. The response in the 1,000 to 5,000 Hz range shall not vary by more than ± 3 dB, within any 500 Hz increment.

3.5.2 Sensitivity (see 4.5.3). The sensitivity shall be as specified (see 3.1).

3.5.3 Impedance (see 4.5.4). The impedance at 1,000 Hz, measured at 20 degrees C, and between 100 Hz and 3,000 Hz, shall be within the specified limits (see 3.1).

3.5.4 Harmonic distortion (see 4.5.5). The harmonic distortion shall not exceed the specified percent (see 3.1).

3.5.5 Dielectric withstanding voltage (see 4.5.6). There shall be no arcing or breakdown between the points of contact.

3.5.6 Stray magnetic field (see 4.5.7). The stray magnetic field of the earphone element shall cause no more than the specified deflection (see 3.1) of a magnetic compass at the distance as specified (see 3.1).

3.5.7 Effect of stray magnetic field on the earphone element (see 4.5.8). The earphone element shall suppress noise due to a stray magnetic field, by not generating a discernible signal.

3.5.8 Speech intelligibility (see 4.5.9). The intelligibility scores shall meet or exceed 95 percent, for an ambient sound pressure noise level not exceeding 75 dB overall sound pressure level. The elements shall be installed in standard headsets meeting MIL-PRF-87819, and tested in a representative operating Intercommunication Set AN/AIC-250, or equivalent.

3.5.9 Endurance (see 4.5.10). The frequency response and sensitivity shall not vary more than ± 3 dB from the initial readings recorded in accordance with 3.5.1 and 3.5.2, respectively. Following the test, the harmonic distortion shall be as specified (see 3.5.4).

3.5.10 Moisture resistance (see 4.5.11). The product shall resist degradation in performance due to moisture penetration, and the frequency response, sensitivity, harmonic distortion, and dielectric withstanding voltage shall be as specified in 3.5.1, 3.5.2, 3.5.4, and 3.5.5, respectively. There shall be no loosening or deformation of parts or other damage due to exposure to moisture.

3.5.11 Barometric pressure (reduced) (see 4.5.12). The product shall resist degradation in performance due to barometric pressure, and the frequency response and sensitivity shall not vary more than ± 3 dB from the initial readings recorded in accordance with 3.5.1 and 3.5.2, respectively.

3.5.12 Thermal shock (see 4.5.13). The product shall resist degradation in performance, when exposed to alternating temperature extremes. The frequency response and sensitivity shall not vary more than ± 3 dB from the initial readings recorded in accordance with 3.5.1 and 3.5.2, respectively.

3.5.13 Vibration, high frequency (see 4.5.14). The product shall resist degradation in performance due to high frequency vibration, exhibiting no structural failure or other defects as a result, and the frequency response and sensitivity shall not vary more than ± 3 dB from the initial readings recorded in accordance with 3.5.1 and 3.5.2, respectively.

3.5.14 Shock (specified pulse) (see 4.5.15). The product shall resist degradation in performance due to shock, exhibiting no evidence of breaking, cracks, deformation or loosening of parts, which would cause the product to fail. Minor dents and scratches, which do not impair acoustic performance, shall be ignored. Following the test, the frequency response and sensitivity shall not vary more than ± 3 dB from the initial readings recorded in accordance with 3.5.1 and 3.5.2, respectively.

3.5.15 Salt atmosphere (corrosion) (see 4.5.16). The product shall resist degradation in performance due to salt-fog and shall meet the specified frequency response envelope (see 3.5.1) as specified (see 3.1), sensitivity (see 3.5.2) and dielectric withstanding voltage (see 3.5.5) requirements.

3.5.16 Fungus resistant (see 4.5.17). The product shall be constructed of fungus-inert materials, and shall show no evidence of fungus or other corrosion, which may cause a mechanical failure. The frequency response and sensitivity shall not degrade due to fungus and shall be in accordance with 3.5.1 and 3.5.2, respectively.

3.6 Marking. Earphone elements shall be marked in accordance with MIL-STD-1285, with the type designation, date code, and the manufacturer's Contractor and Government Entity (CAGE) code, as specified (see 3.1).

3.7 Workmanship. Earphone elements shall be processed in such a manner, as to be uniform in quality. They shall be free from loose parts, excess solder, sharp edges, burrs, flaking, scratches, peeling, metal chips, and other foreign material. Soldering, impregnation of coils, plating, staking, riveting, and machine screw assemblage shall be neat and thorough. The coil shall be properly centered; void of foreign objects in the air gap and shall not drag on the frame or magnet. There shall be no foreign material present in the air gap, when viewed through a microscope having a minimum magnification of 15.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

a. Qualification inspection (see 4.3).

b. Conformance inspection (see 4.4).

4.2 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified below.

a. Temperature - Room ambient, +15 degrees C to +35 degrees C.
b. Pressure - Normal atmospheric.
c. Humidity - Room ambient up to 90 percent relative humidity.

All acoustical measurements shall be made above a reference level of 20 micro-Pascal (µPa). All acoustical testing shall be made in a free-field environment. A "free-field environment" is one, which simulates free-field conditions to the extent that the inverse-pressure versus distance law or inverse-square law (sound level drops 6 dB for every doubling of the distance from the source) should hold within ± 1 dB at all frequencies, for which measurements are made. If the 2 (two) distances in question are $d_1$and d_2, then the decibel difference ΔD is:

$$\Delta D = 20 \log (d_1/d_2).$$

Ambient noise shall not change the measurements more than ± 1 dB.

4.3 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the qualifying activity (see 6.3) on sample units produced with equipment and procedures normally used in production.

4.3.1 Sample size. Six (6) earphone elements shall be subjected to qualification inspection.

4.3.2 Inspection routine. The sample shall be subjected to the inspections specified in table I, in the order shown. All sample units shall be subjected to the inspections of group I. The sample shall then be divided equally into two sets of three units each, and subjected to the inspections for groups II and III.

TABLE I. Qualification inspection.

Inspection	Requirement paragraph	Test method paragraph
Group I Visual and mechanical examination	3.3, 3.4, 3.6, and 3.7	4.5.1
Frequency response	3.5.1	4.5.2
Sensitivity	3.5.2	4.5.3
Impedance	3.5.3	4.5.4
Harmonic distortion	3.5.4	4.5.5
Dielectric withstanding voltage	3.5.5	4.5.6
Stray magnetic field	3.5.6	4.5.7
Effect of stray magnetic field on the earphone element	3.5.7	4.5.8
Speech intelligibility	3.5.8	4.5.9
Endurance	3.5.9	4.5.10
Group II Moisture resistance	3.5.10	4.5.11
Group III Barometric pressure (reduced)	3.5.11	4.5.12
Thermal shock	3.5.12	4.5.13
Vibration, high frequency	3.5.13	4.5.14
Shock (specified pulse)	3.5.14	4.5.15
Salt atmosphere (corrosion)	3.5.15	4.5.16
Fungus 1/	3.5.16	4.5.17

1/ Test is to be performed if certification is not provided (see 4.5.17).

4.3.3 Failures. One or more failures shall be cause for refusal to grant qualification approval.

4.3.4 Verification of qualification. To retain qualification, the manufacturer shall forward a report at 12-month intervals to the qualifying activity. The qualifying activity will establish the initial reporting date. The report shall consist of:

a. A summary of the results of the tests performed for inspection of product for delivery, groups A and B, indicating as a minimum the number of lots that have passed and the number that have failed. The results of tests of all reworked lots shall be identified and an explanation provided for any failures, how the underlying problem was removed, and subsequent test results.

b. A summary of the results of tests performed for periodic inspection; group C, including the number and mode of failures. The summary shall include results of all periodic inspection tests performed and completed during the 12-month period. If the summary of the test results indicates nonconformance with specification requirements and corrective action acceptable to the qualifying activity has not been taken, action may be taken to remove the failing product from the Qualified Products List (QPL).

Failure to submit the report within 30 days after the end of each 12-month period may result in loss of qualification for the product. In addition to the periodic submission of inspection data, the manufacturer shall immediately notify the qualifying activity at any time during the 12-month period that the inspection data indicates failure of the qualified product to meet the requirements of this specification. In the event that no production occurred during the reporting period, a report shall be submitted certifying that the manufacturer still has the capabilities and facilities necessary to produce the item. If during two consecutive reporting periods there has been no production, the manufacturer may be required, at the discretion of the qualifying activity, to submit earphone elements for testing in accordance with the qualification inspection requirements.

4.4 Conformance inspection.

4.4.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A and group B inspections.

4.4.1.1 Inspection lot. An inspection lot shall consist of all earphone elements covered by a single specification sheet produced under essentially the same conditions, and offered for inspection at one time.

4.4.1.2 Group A inspection. Group A inspection shall consist of the inspections specified in table II, in the order shown.

4.4.1.2.1 Sampling plan. A sample of parts shall be randomly selected, as specified in table III. If one or more defects are found, the lot shall be re-screened and defects removed. After screening and removal of defects, a new sample of parts shall be randomly selected, as specified in table III. If one or more defects are found in the second sample, the lot shall be rejected and shall not be supplied to this specification. Re-inspected lots shall be clearly identified.

TABLE II. Group A inspection.

Inspection	Requirement paragraph	Test method paragraph
Visual and mechanical examination	3.3, 3.4, 3.6, and 3.7	4.5.7
Frequency response 1/	3.5.1	4.5.2
Sensitivity	3.5.2	4.5.3
Impedance	3.5.3	4.5.4
Harmonic distortion	3.5.4	4.5.5

1/ Frequency response requirement and test is ground level only.

TABLE III. Group A, zero defect sampling plan.

Lot size	Sample size
2 to 8	100 percent
9 to 150	13
151 to 280	20
281 to 500	29
501 to 1,200	34
1,201 to 3,200	42
Over 3,200	50

4.4.1.3 Group B inspection. Group B inspection shall consist of the examinations and tests specified in table IV in the order shown, and shall be made on sample units, which have been subjected to and have passed the group A inspection.

4.4.1.3.1 Sampling plan. A sample of parts shall be randomly selected, as specified in table V. If one or more defects are found, the lot shall be re-screened and defects removed. After screening and removal of defects, a new sample of parts shall be randomly selected, as specified in table V. If one or more defects are found in the second sample, the lot shall be rejected and shall not be supplied to this specification. Re-inspected lots shall be clearly identified.

TABLE IV. Group B Inspection.

Inspection	Requirements Paragraph	Test method Paragraph
Dielectric withstanding voltage	3.5.5	4.5.6
Stray magnetic field	3.5.6	4.5.7

TABLE V. Group B, zero defect sampling plan.

Lot size	Sample size
2 to 50	5
51 to 90	7
91 to 150	11
151 to 280	13
281 to 500	16
501 to 1,200	19
1,201 to 3,200	23
Over 3,200	29

4.4.1.3.2 Disposition of sample units. Sample units, which have passed all the group B inspections, may be delivered on the contract or purchase order, if the lot has been accepted and the sample units remain within specified electrical tolerances.

4.4.2 Periodic inspection. Periodic inspection shall consist of group C inspection. Except where the results of these inspections show noncompliance with the applicable requirements (see 4.4.2.1.3), delivery of products which have passed groups A and B shall not be delayed pending the results of these periodic inspections.

4.4.2.1 Group C inspection. Group C inspection shall consist of the inspections specified in table VI, in the order shown. Group C inspection shall be made on sample units selected from inspection lots, which have passed the groups A and B inspections.

4.4.2.1.1 Sampling plan. Group C inspection shall be performed once each 12 months of production or each 1,000 units (whichever occurs first, after date of qualification) on 4 (four) sample units selected at random without regard to their quality from units produced during the period. When a contractor has successfully (with no failures) completed group C inspection over a period of 4 (four) months of continuous production, the qualifying activity may authorize suspension of the “1,000 units” portion of the group C inspection requirement. The group C inspection requirement would then default to once each 12 months of production. If the design, material, construction, or processing of the part is changed, or if there are any quality problems or failures, the qualifying activity may require resumption of the original group C inspection frequency (see table VI).

TABLE VI. Group C Inspection.

Inspection	Requirements paragraph	Test method paragraph	Number of sample units to be tested
Subgroup 1			
Frequency response	3.5.1	4.5.2	2
Endurance	3.5.9	4.5.10	2
Subgroup 2			
Moisture resistance	3.5.10	4.5.11	2
Fungus 1/	3.5.6	4.5.17	2
Visual and mechanical	3.3, 3.4, 3.6 and 3.7	4.5.1	2

1/ Test is to be performed if certification is not provided (see 4.5.17).

4.4.2.1.2 Failures. If one or more sample units fail to pass group C inspection, the sample shall be considered to have failed.

4.4.2.1.3 Noncompliance. If a sample fails to pass group C inspection, the manufacturer shall notify the qualifying activity and the responsible inspection activity of such failure and take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which were manufactured under essentially the same materials and processes, and which are considered subject to the same failure. Acceptance of the product shall be discontinued until corrective action, acceptable to the qualifying activity, has been taken. After the corrective action has been taken, group C inspection shall be repeated on additional sample units (all inspections, or the inspection which the original sample failed, at the option of the qualifying activity). Group A and group B inspections may be reinstituted; however, final acceptance and shipment shall be withheld until the group C inspection has shown that the corrective action was successful. In the event of failure after re-inspection, information concerning the failure shall be furnished to the responsible inspection activity and the qualifying activity.

4.4.2.1.4 Disposition of sample units. Sample units, which have been subjected to group C inspection, shall not be delivered on the contract.

4.5 Methods of examination and test.

4.5.1 Visual and mechanical examination. Earphone elements shall be examined to verify that the design, physical dimensions, weight, marking, and workmanship are in accordance with the applicable requirements (see 3.3, 3.4, 3.6, and 3.7).

4.5.2 Frequency response (see 3.5.1). The earphone element under test (EEUT) shall be mounted, as shown in the test circuit on figure 1 . Adjust the output from the audio oscillator to provide 1 milliwatt (mW) at 1 kHz across the EEUT (see last sentence of 4.5.3), measured as V_B by the electronic voltmeter (voltmeter No. 1) and Ammeter (A). Measure the frequency response over the specified range (see 3.1). The output signal shall be recorded in the dB value, above 20 µPa.

4.5.2.1 Automatic recorder. If the acoustic output is recorded on an electro-mechanical graph recorder, the minimum writing speed shall be 10 inches per second, the maximum chart speed shall be 30 inches per minute, and the writing speed and chart speed shall be noted on the graph paper.

4.5.3 Sensitivity (see 3.5.2). The earphone element shall be mounted, as shown in the test circuit on figure 1. Adjust the output from the audio oscillator to provide 1 mW at 1 kHz across the EEUT, as measured by the electronic voltmeter (voltmeter No. 1) and Ammeter (A). The sensitivity shall be observed at 1 kHz at ground level and, when specified (see 3.1), at 25,000 feet. NOTE: The voltage, V_B, to supply 1 mW across the EEUT is determined by first measuring the impedance, Z_B (impedance of EEUT) (see 4.5.4), at 1 kHz and using the following expression (see 6.6.1 for derivation).

$$V_B = \text{square root } (Z_B \times 0.001).$$

4.5.4 Impedance (see 3.5.3). The earphone element shall be mounted in the coupler, as shown on figure 1. Power of 1 mW shall be applied across the terminals, and the impedance measured over the frequency response range specified (see 3.1). The impedance shall be measured by either the voltage method, or the resistance-substitution method. Recordings may be either the point-to-point or the automatic recorder method.

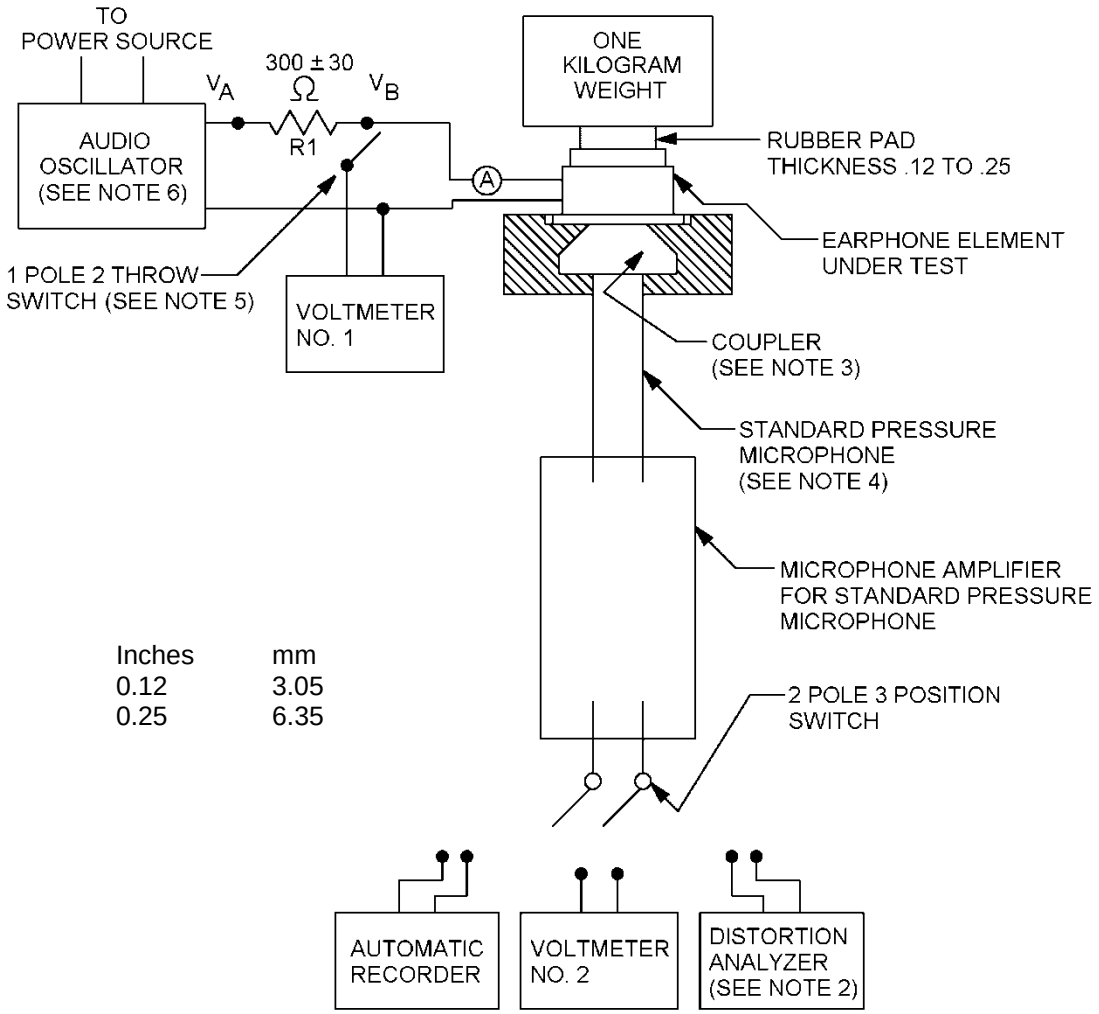
4.5.4.1 Automatic recorder. If the impedance is recorded on an electro-mechanical graph recorder, the minimum writing speed shall be 10 inches per second, the maximum chart speed shall be 30 inches per minute, and the writing speed and chart speed shall be noted on the graph paper. The output signal shall be recorded in the dB value above 20 µPa.

4.5.4.2 Point-to-point. Measure and record the impedance in ohms at increments of 100 Hz from 100 to 1,000 Hz and at increments of 250 Hz from 1,000 to 3,000 Hz. The graph shall show the impedance on the ordinate scale and the Hz value on the abscissa scale, recording from 100 to 10,000 Hz.

4.5.4.3 Voltage method. At the option of the manufacturer, the impedance may be calculated by using a voltmeter. Using a circuit similar to that shown on figure 1, the earphone element impedance (Z_B) is determined, by the value of the R1 resistor in ohms (300), the voltage across the EEUT (V_B), and the voltage across the R1 resistor ($V_A - V_B$) in the following expression (see 6.6.2 for derivation).

$$Z_B = \frac{300 \times V_B}{V_A - V_B}$$

4.5.4.4 Resistance-substitution method. The impedance shall be measured by substituting a variable resistor in series with the element and adjusting for a 6 dB drop in acoustical output. Measuring the value of the variable resistor provides the earphone impedance.



NOTES:

1. Dimensions are in inches. Unless otherwise specified, tolerance is ± .010 (0.25 mm). Metric equivalents are given for information only.
2. See 4.5.5.2 for type and requirement for distortion analyzer.
3. Coupler in accordance with ANSI S3.7, type I.
4. Standard pressure microphone, in accordance with ANSI S1.15.
5. Use switch position B for paragraph 4.5.3, and position A for all other paragraphs requiring electrical tests.
6. Audio oscillator output shall have characteristic output impedance of 600 ohms.
7. “Off” position on switches is optional.
8. Either voltmeter method or voltmeter-ammeter method is acceptable.
9. The contractor may use an equivalent alternate circuit when so approved by the Qualifying Activity.

FIGURE 1. Test circuit.

4.5.5 Harmonic distortion (see 3.5.4). The earphone element shall be preconditioned, as specified in 4.5.5.1. The earphone element shall be mounted in the coupler, as shown on figure 1, and tested as follows. Power of 1 mW shall be applied to the earphone element (see last sentence of 4.5.3), and distortion measured at minimum 1/3 (one third) - octave intervals over the specified frequency response range (see 3.1).

4.5.5.1 Preconditioning. A power of 100 mW (milliwatt) shall be applied to the earphone element continuously across the frequency response range as specified (see 3.1), two times. NOTE: The voltage, V_B, to supply 100 mW shall be determined by first measuring the impedance, Z_B (impedance of EEUT) (see 4.5.4), at 1 kHz and using the following expression (see 6.6.1 for derivation).

$$V_B = \text{square root } (Z_B \times 0.1).$$

4.5.5.2 Distortion analyzer. The total harmonic distortion shall be determined by a distortion analyzer having the following minimum requirements:

a. Frequency range	-	Fundamental frequency from 20 to 20,000 Hz.
b. Frequency calibration	-	± 2 percent from 20 to 20,000 Hz.
c. Harmonic measurement	-	± 3 percent of full scale value for distortion levels as low as 0.5 percent.

4.5.6 Dielectric withstanding voltage (see 3.5.5). The earphone element shall be tested in accordance with method 301 of MIL-STD-202. The following details shall apply:

a. Test voltage	-	500 volts.
b. Nature of potential	-	60 Hz.
c. Points of application	-	Between one of the terminals and the metallic case, or other metallic surface, which is not covered by a non-conducting coating.

4.5.7 Stray magnetic field (see 3.5.6). Stray magnetic field measurements shall be made in a shielded room or in an area free from appreciable magnetic disturbances. The earphone element shall be placed with its geometric center at a distance as specified (see 3.1) from the pivot point of a compass needle, and in the perpendicular bisector of the needle in the plane of rotation of the needle. The earphone element shall be moved and rotated in a circular manner around the compass at the distance specified, and the maximum deflection of the compass observed. The compass shall meet the requirements of A-A-52024 Type II or equivalent as approved by the qualifying activity.

4.5.8 Effect of stray magnetic field on the earphone element (see 3.5.7). The earphone element shall be firmly pressed against the ear and the listener shall listen for 400 Hz pickup, when the earphone element is oriented for maximum signal 1 foot away from a 400 Hz power line carrying a current of 30 amperes. The return line shall be at least 15 feet away from the line used for the test. This test shall be conducted in an ambient acoustic noise level of not more than 65 dB, with the earphone element terminals open, and short-circuited, respectively.

4.5.9 Speech intelligibility (see 3.5.8). The intelligibility test shall be performed using the modified rhyme test under the guidelines of the American National Standards Institute, Method for Measuring Intelligibility of Speech over Communications Systems, ANSI S3.2. Both the talker and the listener are to be in an ambient noise level not exceeding 75 dB overall sound pressure level. The minimum performance level (in percentage correct) shall be checked for compliance with the requirements of 3.5.8.

4.5.10 Endurance (see 3.5.9). Audio power of 300 mW (rms) at 1k Hz shall be applied continuously to each earphone element under test for 8 hours. At the end of the 8 hours, the frequency response, sensitivity, and distortion shall be tested, as specified in 4.5.2, 4.5.3, and 4.5.5, with the exception that the distortion test shall not include preconditioning. NOTE: The voltage, V_B, to generate 300 mW is determined by measuring the element impedance, Z_B (see 4.5.4), and using the following expression (see 6.6.1 for derivation).

$$V_B = \text{square root } (Z_B \times 0.3).$$

4.5.11 Moisture resistance (see 3.5.10). The earphone element shall be tested in accordance with method 106 of MIL-STD-202. The following details and exceptions shall apply:

a. Initial measurements	-	Not applicable.
b. Mounting	-	Any convenient mounting with the front face of the earphone element exposed and parallel with the vertical plane.
c. Loading voltage	-	Not applicable.
d. Final measurements	-	At the completion of the tenth cycle and following a 24-hour period at 25 degrees ± 5 degrees C and 50 percent (%) ± 5 percent relative humidity, the earphone element shall be tested for frequency response, sensitivity, harmonic distortion, and dielectric withstanding voltage in accordance with 4.5.2, 4.5.3, 4.5.5, and 4.5.6, respectively, and examined for loose or deformed parts and other damage.

4.5.12 Barometric pressure (reduced) (see 3.5.11). Earphone elements shall be tested in accordance with method 105 of MIL-STD-202. The following details shall apply:

a. Method of mounting	-	Not applicable.
b. Test condition letter	-	B.
c. Tests during subjection to reduced pressure	-	None required.
d. Tests after subjection to reduced pressure	-	Frequency response and sensitivity, in accordance with 4.5.2 and 4.5.3.
e. Exposure time prior to measurements	-	10 minutes.

4.5.13 Thermal shock (see 3.5.12). Earphone elements shall be tested in accordance with method 107 of MIL-STD-202. The following details shall apply:

a. Test condition letter	-	A.
b. Measurement after cycling	-	Frequency response and sensitivity in accordance with 4.5.2 and 4.5.3.

4.5.14 Vibration, high frequency (see 3.5.13). Earphone elements shall be tested in accordance with method 204 of MIL-STD-202. The following details shall apply:

a. Mounting specimens	-	Diaphragm of the earphone element shall be in a vertical plane on the vibrating machine.
b. Electrical load conditions	-	60 milliwatts (rms) at 1k Hz applied to the earphone elements.
c. Test condition letter	-	A.
d. Measurement after vibration	-	Frequency response and sensitivity in accordance with 4.5.2 and 4.5.3.

4.5.15 Shock (specified pulse) (see 3.5.14). Earphone elements shall be tested in accordance with method 213 of MIL-STD-202. The following details shall apply:

a. Mounting method	-	The earphone element shall be rigidly attached to an auxiliary mounting plate. The auxiliary mounting plate shall then be rigidly attached to the anvil plate of the shock machine.
b. Test condition letter	-	G.
c. Measurement after shock	-	Frequency response and sensitivity in accordance with 4.5.2 and 4.5.3.

4.5.16 Salt atmosphere (corrosion) (see 3.5.15). Earphone elements shall be tested in accordance with method 101 of MIL-STD-202. The following details and exceptions shall apply:

a. Applicable salt solution	-	5%.
b. Test condition letter	-	A.
c. Additional conditioning	-	Earphone elements shall be cleaned as prescribed, and dried for 48 hours in a chamber having an ambient temperature of 16 degrees to 32 degrees C and a maximum relative humidity of 30%.
d. Additional measurements	-	Within 3 hours after the drying period, the earphone elements shall be tested for frequency response, sensitivity, and dielectric withstanding voltage in accordance with 4.5.2, 4.5.3, and 4.5.6, respectively.

4.5.17 Fungus (see 3.5.16). At the option of the contractor, the contractor shall certify that the materials are fungus resistant materials, or test method 508 of MIL-STD-810 shall be performed. Following the test, the frequency response and sensitivity shall be tested, as specified in 4.5.2 and 4.5.3.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD or in-house contactor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Intended use. These earphone elements are the moving coil type, which are components of various headband and helmet-type headsets (and, where applicable, telephone handsets), which are a part of the Intercommunication Set AN/AIC-1 OQ. They provide communication for both ground-level and altitude applications as specified (see 3.1).

MIL-PRF-25670/5 (PIN M25670/5-01) has no material numbers [NSN's] assigned. However it is used on:

a. The Next Higher Assembly H-251A/U Headset, MN 5965-01-182-3384 and

b. The Next Higher Assembly H-161F/GR Headset, MN 5965-01-148-3396

All of the earphone elements specified under MIL-PRF-25670 should meet United States Air Force safety and hearing-protective standards for such equipment, and have been approved by:

"Air Force Research Laboratory –
711th Human Performance Wing –
Battlespace Acoustics Branch –
AFRL/711HPW/RHCB, Wright-Patterson AFB, OH
(Phone: 937-255-2203)

{Formerly identified as: Air Force Materiel Command, Human Systems Center, Armstrong Laboratory, Bioacoustics and Bio communications branch (AL/CFBA)}.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of this specification.

b. Title, number, and date of the applicable specification sheet and the applicable type number (see 1.2.1 and 3.1).

c. Packaging requirements (see 5.1).

6.3 Qualification (see 3.2). With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in the applicable Qualified Products List QPL-25670, whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from the DLA Land and Maritime (Attn: VQP), 3990 East Broad Street, Columbus, Ohio 43218-3990 or vqp.do@dla.mil. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at https://assist.dla.mil.

6.4 Subject term (key word) listing.

Transducer
Moving-coil
Communications-headset

6.5 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification. As of the dating of this document, the U.S. Environmental Protection Agency (EPA) is focusing efforts on reducing 31 priority chemicals. The list of chemicals and additional information is available on their website http://www.epa.gov/osw/hazard/wastemin/priority.htm. Included in the EPA list of 31 priority chemicals are cadmium, lead, and mercury. Use of these materials should be minimized or eliminated unless needed to meet the requirements specified herein (see 3.2).

6.6 Derivations.

6.6.1 Adjustment of audio oscillator (see 4.5.3). Power applied to earphone element is set by the voltage across the EEUT (V_B), on figure 1.

$$P_{\text{(Power in watts)}} = [V_{\text{(Volts)}}]^2 / [Z_{\text{(Impedance)}}], \quad (V_B)^2 = Z_B \times P_B, \quad V_B = \text{square root } (Z_B \times P_B)$$

6.6.2 Voltage Method of Impedance Measurement (see 4.5.4.3). The same current flows through the earphone element under test and the 300 ohm resistor (R1), on figure 1. Where: Z_B=Impedance, V_B=Voltage, and I_B=current.

$$Z_B = \frac{V_B}{I_B} = \frac{V_B}{(V_{(A-B)} / 300)} = \frac{300}{\cancel{300}} \times \frac{(V_B)}{[V_{(A-B)} / \cancel{300}]} = \frac{300 \times (V_B)}{(V_{(A-B)})} = \frac{300 \times V_B}{V_A - V_B}$$

(Current through earphone) (Current through R1) (The 300's cancel out each other)

6.7 Tin whisker growth. The use of alloys with tin content greater than 97 percent, by mass, may exhibit tin whisker growth problems after manufacture. Tin whiskers may occur anytime from a day to years after manufacture, and can develop under typical operating conditions on products that use such materials. Conformal coatings applied over top of a whisker-prone surface will not prevent the formation of tin whiskers. Alloys of 3 percent lead have shown to inhibit the growth of tin whiskers (see 3.3.3). For additional information on this matter, refer to ASTM-B545 (Standard Specification for Electrodeposited Coatings of Tin). Copies of this document are available online at http://www.astm.org or from the ASTM International, P.O. Box C700, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

6.8 Amendment notations. The margins of this specification are marked with vertical lines to indicate modifications generated by this amendment. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations.

CONCLUDING MATERIAL

Custodians:
Army - CR
Air Force -85
DLA – CC

Preparing activity:
DLA – CC

(Project 5965-2013-017)

Review activities:
Air Force – 99

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at https://assist.dla.mil.