

INCH-POUND

MIL-DTL-5898E
 4 AUGUST 2000
 SUPERSEDING
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DETAIL SPECIFICATION

CORDS, ELECTRICAL
 (WF-5/U, WF-14/U, WD-34/U, WM-53/U, WM-85/U)

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

1. SCOPE

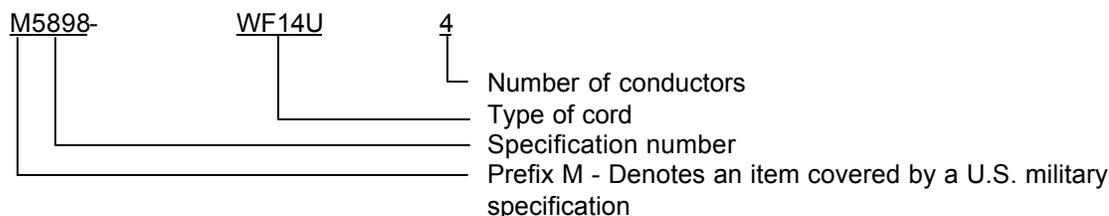
1.1 Scope. This specification covers conductor-insulated, jacketed, electrical cords used to fabricate combination headset-microphone extension cords and microphone extension cords for installation in military aircraft equipped with intercommunication sets.

1.2 Classification. Cords are of the types specified in table I.

TABLE I. Types of cords.

| Type | Number of conductors |
|---------|----------------------|
| WF-5/U | 4 |
| WF-14/U | 4 |
| WD-34/U | 2 |
| WM-53/U | 5 |
| WM-85/U | 5 |

1.2.1 Part or identifying number (PIN). The PIN consists of the following form:



Beneficial comments (recommendations, additions, deletions) and any pertinent data that may be of use in improving this document should be addressed to: Defense Logistics Agency, Defense Supply Center, Columbus (ATTN: DSCC-VAI), P.O. Box 3990, Columbus, OH 43216-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 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 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications and standards. The following specifications and standards 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 6.3).

SPECIFICATIONS

DEPARTMENT OF DEFENSE

MIL-C-572 - Cord, Yarns and Monofilaments Organic Synthetic Fiber

STANDARDS

FEDERAL

FED-STD-228 - Cable and Wire, Insulated; Methods of Testing

DEPARTMENT OF DEFENSE

MIL-STD-104 - Limits for Electrical Insulation Color
MIL-STD-130 - Identification Marking of U.S. Military Property

(Unless otherwise indicated, copies of the above specifications and standards are available from the Document Automation and Production Service, DODSSP, Building 4/D, 700 Robbins Avenue, 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, the issues of the documents that are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.3).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B33 - Standard Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes (DoD adopted)
ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi (DoD adopted)

(Application for copies should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

NATIONAL CONFERENCE OF STANDARDS LABORATORIES (NCSL)

ANSI/NCSL Z540-1 - Calibration Laboratories and Measuring and Test Equipment, General Requirements (DoD adopted)

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(Application for copies should be addressed to the National Conference of Standards Laboratories, 1800 - 30th Street, Suite 305B, Boulder, Colorado 80301-1032.)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA WC 7 - Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission of Electrical Energy (DoD adopted)

(Application for copies should be addressed to the National Electrical Manufacturers Association, 1300 North 17th Street, Suite 1847, Rosslyn, VA 22209.)

UNDERWRITERS LABORATORIES, INCORPORATED (UL)

UL 1581 - Reference Standard for Electrical Wires, Cables, and Flexible Cords (DoD adopted)

(Application for copies should be addressed to Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, PA 15096-0001).

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, 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. First article. When specified, a sample of electrical cord shall be subjected to first article inspection (see 4.4 and 6.3).

3.2 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable 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.

3.3 Materials. Materials shall be as specified herein. When a material is not specified, a material shall be used that enables the insulated wire to meet the performance requirements of this specification.

3.4 Insulated conductors.

3.4.1 Individual strands. The individual strands shall be American Wire Gauge (AWG) 40 cadmium copper (cadmium bronze) wire and shall be tinned in accordance with ASTM B33 before bunching. The minimum tensile strength of the strands after tinning shall be 90,000 pounds per square inch and shall be of at least 80 percent conductivity grade.

3.4.2 Conductors. The conductors shall be bunch stranded and the lay of the strands shall be approximately one-half inch. The nominal area of each conductor shall be 442 circular mils and the minimum area shall be 430 circular mils.

3.4.3 Wrap. Wrapping material shall conform to MIL-C-572. The yarn may be omitted provided the conductors in the finished cords are free stripping and free from any detrimental effects that will interfere with normal soldering of the strands of the conductors in the finished cord.

3.4.4 Insulation. The insulation compound for the individual conductors shall be formulated to provide a material that meets the electrical, air-aging, and bending requirements specified herein.

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3.4.4.1 Physical requirements. The insulation shall show no evidence of cracking or other damage, and the insulated conductor shall be flexible and resilient throughout the temperature range from -55 °C to 85 °C. The thickness of the insulation at any point along the conductor shall be not less than .010 inch.

3.4.4.2 Outside diameter of insulated conductor. The outside diameter of the insulated conductor shall be .060 inch nominal.

3.4.5 Insulation color. The insulation of individual conductors shall be colored in accordance with table II. The colors shall be class 1, nominal chip, conforming to MIL-STD-104.

TABLE II. Insulation color of individual conductors.

| Conductor number | Color | | | | |
|------------------|--------|---------|---------|---------|---------|
| | WF-5/U | WF-14/U | WD-34/U | WM-53/U | WM-85/U |
| 1 | White | Red | Red | White | Red |
| 2 | Red | Green | Green | Red | Green |
| 3 | Green | White | - | Green | White |
| 4 | Black | Black | - | Black | Black |
| 5 | - | - | - | Yellow | Yellow |

3.5 Copper braid. Copper braid, where used, shall be fabric cored and shall be composed of eight carriers of AWG 36 tinned copper wire, three ends per carrier, having a height of spiral of $.200 \pm .020$ inch. The tinned copper wire shall be in accordance with ASTM B33. The fabric core shall be fungus-resistant cotton, and the finished braid shall be capable of 2,000 flexing cycles without causing electrical discontinuity.

3.6 Staycord. Staycord shall be braided of fungus-resistant cotton threads. The staycord for all cords except type WD-34 shall have a diameter of $.052 \pm .010$ inch and shall have a breaking strength of not less than 30 pounds. The staycord for cord type WD-34 shall have a maximum diameter of .055 inch and shall have a breaking strength of not less than 15 pounds. The staycord shall not damage the insulation of the conductors when the cord is bent or stretched.

3.7 Cabling.

3.7.1 Cabling of WF-14/U cord.

- a. The red and green conductors shall be twisted together with a left-hand lay of approximately .750 inch. The white and black conductors shall be twisted together with a left-hand lay of approximately 1.250 inches.
- b. A close wind consisting of a minimum of 32 ends of conducting cotton shall be applied over each twisted pair. The conducting-cotton wind shall be constructed of fungus-resistant number 60, 2-ply yarn having a maximum resistance of 1.2 megohms per inch. The maximum resistance of the wind in the completed cord shall be 1.5 megohms per foot.
- c. The two conducting-cotton-wrapped pairs shall be twisted together with a right-hand lay of approximately 1.500 inches with a copper braid in one interstice and a staycord in the other interstice. Fungus-resistant cotton filler shall be used in each interstice to give the cord a reasonably circular cross section. The two pairs and the copper braid shall be twisted in such a manner as to assure contact between the braid and both conducting-cotton wraps.

3.7.2 Cabling of WM-85/U cord. The cabling of cord WM-85/U shall be as specified in 3.7.1a through 3.7.1c, except that a yellow conductor shall be used in the interstice with the staycord.

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3.7.3 Cabling of WM-53/U cord. Five conductors in the order specified in table II shall be spiraled around a central core with a lay of approximately .531 inch. The central core shall contain a staycord. The conductors shall be wrapped around the central core in such a manner as to provide relatively free movement of the conductors over the staycord when the finished cord is bent or stretched.

3.7.4 Cabling of WF-5/U cord. The cabling of cord WF-5/U shall be as specified in 3.7.3, except the yellow conductor shall not be used.

3.7.5 Cabling of WD-34/U cord.

- a. The two conductors as specified in table II shall be twisted together with two staycords with approximately .500 inch left-hand lay.
- b. A close wrap of fine fungus-resistant cotton shall be applied with a right-hand lay over the cabled assembly.

3.8 Jacket. After cabling, the assembly shall be covered overall and shall be centered in a jacketing compound formulated so as to fulfill the requirements specified herein. The jacketing material shall not adhere to the conductor insulation. Optionally, a thin fungus-resistant, cotton wrapping may be applied over the assembly before the jacket is applied, provided flexibility is maintained in the finished cord. After jacketing, the cord shall be reasonably smooth, firmly bound, tough, elastic, and a homogeneous mass.

3.8.1 Jacketing compound. The jacketing compound shall be a low-temperature polychloroprene, crosslinked polyolefin, or polyurethane, and shall meet the material and physical property requirements of table III and the operating temperature range and cold bend requirements specified herein.

TABLE III. Physical property requirements for jacketing compounds of finished cord.

| Jacket wall thickness (inch) | Less than .020 | .020 to .030 | Greater than .030 |
|--|----------------|--------------|-------------------|
| Unaged: | | | |
| Tensile strength, minimum, lbf/in ² | 1200 | 1500 | 1800 |
| Elongation, minimum, percent | 250 | 250 | 300 |
| Set, maximum, inch | - | - | .375 |
| After 166 hours of air-aging at 70 °C: | | | |
| Tensile strength, minimum, percent of original | 75 | 75 | 75 |
| Elongation, minimum, percent of original | 75 | 75 | 75 |
| After oil immersion: | | | |
| Tensile strength, minimum, percent of original | 50 | 50 | 50 |
| Elongation, minimum, percent of original | 50 | 50 | 50 |

3.8.2 Jacket wall thickness. The minimum wall thickness of the jacket shall be as specified in table IV.

3.9 Outside diameter of cord. The outside diameter of the finished cord shall be as specified in table IV.

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TABLE IV. Jacket wall thickness and cord outside diameter.

| Cord type: | WF-5/U | WF-14/U | WD-34/U | WM-53/U | WM-85/U |
|--|--------|---------|---------|---------|---------|
| Jacket minimum thickness, inch | .025 | .025 | .012 | .025 | .025 |
| Cord outside diameter, \pm .010 inch | .280 | .300 | .160 | .280 | .305 |

3.10 Flexing. The finished cord shall be capable of withstanding at least 25,000 flexing cycles without showing evidence of serious damage to the jacket such as splits or ruptures, damage to the insulation of the individual conductors, or electrical discontinuity or short circuit.

3.11 Fungus-resistance. Materials used that are not fungus-inert shall be treated so as to render the material fungus-resistant. The fungicide used shall have no detrimental effects on the finished cord.

3.12 Electrical requirements of finished cord.

3.12.1 Dielectric strength. The insulation on conductors shall withstand the application of 500 V ac at 60 Hz for 5 seconds without flashover or breakdown.

3.12.2 Insulation resistance. The insulation resistance shall be not less than 100 megohms per 1,000 feet at 15.6 °C.

3.12.3 Conductor resistance. The resistance per conductor per 100 feet shall not exceed 4.0 ohms.

3.12.4 Isolation. The minimum isolation of cords WF-14/U and WM-85/U shall be in accordance with table V.

TABLE V. Isolation.

| Frequency (Hz) | Electrostatic | | Electromagnetic | |
|----------------|---------------|---------|-----------------|---------|
| | WF-14/U | WM-85/U | WF-14/U | WM-85/U |
| | (dB minimum) | | (dB minimum) | |
| 20,000 | 62.0 | 60.0 | 48.0 | 45.0 |
| 15,000 | 63.0 | 60.5 | 49.0 | 45.0 |
| 10,000 | 64.0 | 61.0 | 50.0 | 45.0 |
| 5,000 | 65.0 | 61.5 | 51.0 | 45.0 |
| 1,000 | 66.0 | 62.0 | 51.0 | 46.0 |

3.13 Identification. The cord shall be marked for identification in accordance with MIL-STD-130 on the jacket at 12 to 24 inch intervals throughout the entire length. The identification marking shall read lengthwise along the cord as specified in table VI.

3.14 Insulation shrinkage. When tinning the wire of the finished cord, the insulation shall not shrink more than .031 inch lengthwise and shall not expand outward from the wire.

3.15 Ozone resistance. The finished cord shall be ozone-resistant.

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TABLE VI. Markings for identification.

| Cord type | PIN | Military specification no. | Manufacturer name or CAGE Code |
|-----------|--------------|----------------------------|--------------------------------|
| WF-5/U | M5898-WF5U4 | MIL-DTL-5898 | * |
| WF-14/U | M5898-WF14U4 | MIL-DTL-5898 | * |
| WD-34/U | M5898-WD34U2 | MIL-DTL-5898 | * |
| WM-53/U | M5898-WM53U5 | MIL-DTL-5898 | * |
| WM-85/U | M5898-WM85U5 | MIL-DTL-5898 | * |

* Applicable information to be supplied by the manufacturer.

3.16 Flammability. When subjected to an open flame, insulation shall not burn for more than the specified time nor release flaming particles, and the flame shall not travel more than the distance specified in the VW-1 flame test of UL 1581.

3.17 Cold bend. The cord shall show no evidence of cracked jacket or conductor insulation when subjected to cold bending at -55+0, -5 °C.

3.18 Workmanship. Cords shall be uniform in shape and free of kinks, splints, cuts, cracks, abrasions, peeled surfaces, and any imperfections that can affect performance.

4. VERIFICATION

4.1 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality, and quantity to permit performance of the required inspections shall be used. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with ANSI/NCSL Z540-1 or equivalent.

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

- a. First article inspection (see 4.4).
- b. Conformance inspection (see 4.5).

4.3 Test conditions. Unless otherwise specified in the applicable test method, inspections shall be conducted under the following environmental conditions.

- a. Temperature: 15 °C to 35 °C.
- b. Pressure: Normal atmospheric.
- c. Humidity: Prevailing ambient (25 to 90 percent relative).

4.4 First article inspection. When required (see 6.3), first article inspection shall consist of the tests specified in table VII.

4.5 Conformance inspection. Conformance inspection shall consist of Group A (see 4.5.2) and Group B (see 4.5.3) inspections, and shall be performed on every lot of cord procured under this specification.

4.5.1 Lot. Unless otherwise specified (see 6.3), a lot shall consist of all cord of the same PIN, produced under essentially the same conditions, and presented for inspection at one time.

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TABLE VII. First article inspection.

| Inspection | Requirement | Verification paragraph |
|---------------------------------|---------------------|------------------------|
| Conductor: | 3.4 | - |
| Strands, conductors, wrap | 3.4.1, 3.4.2, 3.4.3 | 4.6.1 |
| Insulation | 3.4.4 | 4.6.1 |
| Material | 3.3, 3.4.1, 3.4.3 | 4.6.1 |
| Physical requirements | 3.4.4.1 | 4.6.1 and 4.6.12 |
| Insulation thickness | 3.4.4.1 | 4.6.1 |
| Outside diameter | 3.4.4.2 | 4.6.1 |
| Color | 3.4.5 | 4.6.1 |
| Copper braid | 3.5 | 4.6.1 and 4.6.7.3 |
| Staycord: | 3.6 | - |
| Material | | 4.6.1 |
| Breaking strength | | 4.6.8 |
| Dimensions | | 4.6.1 |
| Conducting cotton | 3.7.1b | 4.6.1 |
| Cabling: | 3.7.1 through 3.7.5 | 4.6.1 |
| Conductors | | |
| Lay | | |
| Filler | | |
| Wrap | | |
| Jacket | 3.8 | 4.6.1 |
| Jacketing compound | 3.8.1 | 4.6.1 and 4.6.12 |
| Jacket wall thickness | 3.8.2 | 4.6.1 |
| Cord: | - | - |
| Outside diameter | 3.9 | 4.6.1 |
| Identification | 3.13 | 4.6.1 |
| Wrap | 3.4.3 | 4.6.1 |
| Environmental | - | - |
| Tensile strength/elongation/set | | |
| Unaged | 3.8.1 | 4.6.4.1 |
| Air-aged | 3.8.1 | 4.6.4.2 |
| Oil immersion | 3.8.1 | 4.6.4.3 |
| Flammability | 3.16 | 4.6.5 |
| Ozone resistance ^{1/} | 3.15 | 4.6.11 |
| Flexing, cord | 3.10 | 4.6.7.2 |
| Flexing, braid | 3.5 | 4.6.7.3 |
| Fungus resistance | 3.11 | 4.6.3 |
| Insulation shrinkage | 3.14 | 4.6.10 |
| Cold bend | 3.17 | 4.6.12 |
| Electrical; cord: | 3.12 | - |
| Conductor resistance | 3.12.3 | 4.6.6.1 |
| Insulation resistance | 3.12.2 | 4.6.6.3 |
| Dielectric strength | 3.12.1 | 4.6.6.2 |
| Isolation | 3.12.4 | 4.6.9 |
| Workmanship | 3.18 | 4.6.1 |

NOTES:

^{1/} The ozone-resistance test is not required if polyurethane or a crosslinked-polyolefin material is used for the jacketing compound.

4.5.1.1 Unit of product. The unit of product shall be a continuous length of cord, not to exceed 550 feet in length.

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4.5.2 Group A inspection. Group A inspection shall consist of the inspections specified below. Group A inspection may be performed at an appropriate stage of the manufacturing operation rather than on the finished cord.

- a. Conductor resistance.
- b. Dielectric strength.
- c. Insulation resistance.
- d. Workmanship.

4.5.3 Group B inspection. Group B inspection shall consist of the inspections in table VIII conducted on a sampling basis.

Table VIII. Group B inspection.

| Inspection | Requirement | Verification |
|-------------------------------|-------------|--------------|
| Identification | 3.13 | 4.6.1 |
| Outside diameter of conductor | 3.4.4.2 | 4.6.1 |
| Outside diameter of cord | 3.9 | 4.6.1 |
| Staycord, diameter | 3.6 | 4.6.1 |
| Staycord, breaking strength | 3.6 | 4.6.8 |
| Isolation | 3.12.4 | 4.6.9 |

4.5.3.1 Sampling. A random sample shall be selected from each lot. The sample size shall be based on the lot size from which the sample was selected. Sampling inspection shall be in accordance with table IX.

TABLE IX. Inspection sample.

| Lot size ^{1/} | Accept on zero sample size |
|------------------------|----------------------------|
| 1 to 8 | 2 |
| 9 to 90 | 3 |
| 91 to 150 | 12 |
| 151 to 280 | 19 |
| 281 to 500 | 21 |
| 501 to 1,200 | 27 |
| 1,201 to 3,200 | 36 |
| 3,201 to 10,000 | 38 |
| 10,001 to 35,000 | 46 |

NOTES:

^{1/} Lot size is based on the number of units of product (see 4.5.1.1).

4.5.3.2 Specimen length. Unless otherwise specified herein, the specimen shall be of the length specified in the applicable test method.

4.5.4 Rejected lot. Failure of a lot to pass any test or inspection constitutes failure of the lot and the lot shall be rejected. If an inspection lot is rejected, the contractor may rework the lot to correct the

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defects, or screen out the defective units and resubmit the lot for re-inspection. Such lots shall be separated from new lots and shall be identified as re-inspected lots.

4.5.5 Non compliance. If a sample fails to pass Group B inspection (see 4.5.3), the contractor shall notify the cognizant inspection activity of such failure and take corrective action on the materials or processes, or both, as warranted, on all units of the product. Acceptance and shipment of the product shall be discontinued until corrective action has been taken. After the corrective action has been taken, sampling inspection shall be repeated on replacement articles. (This includes all tests and examinations, or only the test that the original sample failed, at the option of the cognizant inspection activity.) Final acceptance and shipment will be withheld until Group B inspection has shown that the corrective action was successful. In the event of failure after re-inspection, information concerning the failure shall be provided to the cognizant inspection activity.

4.6 Methods of inspection.

4.6.1 Visual and dimensional inspection. The finished cords shall be given a visual and dimensional inspection for:

- a. Color of conductors.
- b. Identification.
- c. Workmanship.
- d. Outside diameter of insulated conductors.
- e. Thickness of conductor insulation.
- f. Minimum wall thickness of jacketing material.
- g. Outside diameter of finished cords.
- h. Staycord diameter and material.
- i. Wrap.
- j. Cabling (conductors, lay, filler, wrap, and conducting cotton).
- k. Braid.
- l. Insulated conductors (strands, conductors, and insulation).

4.6.2 Air-aging and bending. A specimen of insulated conductor shall be selected from each 20,000 feet of cord or one month's production, whichever is less, and shall be air-aged in an oven and tested in accordance with NEMA WC 7, except that the aging period and temperature shall be as specified in table III. After aging, the specimen shall be wrapped five times around a .156-inch diameter mandrel.

4.6.3 Fungus resistance. A cord specimen shall be selected from each 250,000 feet of cord or six months' production, whichever is less, and shall be subjected to a fungus test in accordance with ASTM G21.

4.6.4 Jacket tensile strength, elongation, and set.

4.6.4.1 Unaged. An unaged jacket shall be tested for tensile strength using method 3021 of FED-STD-228 and for elongation using method 3031 of FED-STD-228. Set, when required, shall be tested using method 3161 of FED-STD-228.

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4.6.4.2 Air-aged. A sample of the jacket shall be air-aged for 166 hours at 70 °C and then tested for tensile strength and elongation using the methods listed in 4.6.4.1.

4.6.4.3 Oil immersion. The jacket shall be subjected to the oil immersion test in accordance with method 4223 of FED-STD-228.

4.6.5 Flammability. Insulation flammability testing shall be performed in accordance with the VW-1 flame test method of UL 1581.

4.6.6 Electrical tests.

4.6.6.1 Conductor resistance. The resistance of each conductor of the cord shall be measured in a bridge circuit. The arithmetical average of the measured values shall be used to calculate the conductor resistance.

4.6.6.2 Dielectric strength. An alternating potential as specified in 3.12.1 shall be applied between two terminals, one being each conductor in turn and the other terminal being all the remaining conductors tied together. The voltage source shall have a capacity of not less than 3 kVA.

4.6.6.3 Insulation resistance. Immediately after successfully passing the dielectric strength test, the insulation resistance shall be measured using a galvanometer with shunts and a dc voltage source of not less than 125 V dc. The connections shall be as specified in 4.6.6.2. The test may be terminated when the galvanometer indicates a steady insulation resistance value has been obtained. The measured insulation resistance values shall be corrected to 15.6 °C if measurements are made at temperature other than 15.6 °C.

4.6.7 Flexing test. Sample lengths of cord shall be selected from each 100,000 feet or one month's production, whichever is less, and subjected to the following:

4.6.7.1 Preparation. Five specimens, each approximately 1.5 feet long, shall be clamped and suspended through holes in a rectangular (.500 by .625 inch) metal bar. The diameter of the .625-inch through holes shall be .005 inch to .010 inch greater than the diameter of the cord undergoing the test. The through holes shall incorporate a .125-inch radius at the end from which the cords emerge (bending point). The cords shall be clamped in such a manner that they will not turn in the holes during flexing. The clamping points shall be immediately above the metal bar and cord clamps shall rest on top of the metal bar. A knot shall be tied near the free end of each cord and a 3-pound weight shall be suspended from each knot, except for type WD-34/U, which shall have a 1-pound weight suspended from each knot. The metal bar, supported horizontally, shall be positioned in a test jig that will enable oscillation about its longitudinal axis through an angle or 120° (60°each side of vertical).

4.6.7.2 Cord flexing life. The conductors of each specimen shall be connected in series with a 6-volt lamp and a suitable power supply to indicate electrical continuity. The metal bar shall then be oscillated at approximately 85 cycles per minute until electrical discontinuity occurs. The cord flexing life shall be calculated by summing the total number of flexing cycles for each specimen and dividing by the total number of specimens.

4.6.7.3 Braid flexing life. Where used, the copper braid of each specimen shall be connected in series with the circuit described in 4.6.7.2. The metal bar shall be oscillated at approximately 85 cycles per minute until electrical discontinuity occurs. The arithmetical average of the number of flexing cycles per specimen shall be taken as the braid flexing life.

4.6.8 Staycord strength. A suitable device shall be used to determine the breaking strength of the staycord.

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4.6.9 Isolation tests. A specimen of 55 feet ± 2 inches shall be tested in the appropriate circuit as shown on figure 1 for both electrostatic and electromagnetic isolation. Calculations shall be as shown on figure 1.

4.6.10 Insulation shrinkage. The outer jacket shall be stripped approximately 3 inches and each individual wire stripped approximately .250 inch. The bare wires shall be twisted by hand and remain at its minimum diameter in five twists or less and shall not spread or fray at the end. The wires shall be tinned and soldered in accordance with FED-STD-228, method 8231.

4.6.11 Ozone resistance. The cord shall be wrapped around a mandrel that is four times the outside diameter of the specimen in such a manner that the cord is kept taut throughout the test. The mandrels and specimens shall be kept at room temperature for 2 days, after which these items shall be placed in an atmosphere containing 25 ± 5 parts of ozone per one-hundred million parts of air. A temperature of 50°C shall be maintained and the test continued for a period of 7 days. After the test has been completed, the jacket of the specimen shall be inspected for cracking through a magnifying glass of at least three diameters magnification.

4.6.12 Cold bend. The cord shall be attached to the proper size mandrel as specified in table X and suspended vertically with the lower ends weighted sufficiently to keep the cord taut and to permit bending without handling. The cord and mandrel shall be placed in a chamber at $-55 \pm 0, -5^\circ\text{C}$ for a minimum of 20 hours. While maintaining the cord at -55°C , the cord shall be bent for 5 close turns around the mandrel at the rate of approximately 15 turns per minute. The jacket shall then be examined for cracks using a magnifying glass of at least 3 diameters magnification. After examination of the jacket, the jacket shall be removed and the conductor insulation examined for cracks using the same magnifying glass.

TABLE X. Mandrel size for cold bend test.

| Cord type | Maximum mandrel size |
|------------------------------|----------------------|
| WF-5/U WD-34/U WM-53/U | 1 times cord OD |
| WF-14/U WM-85/U | 3 times cord OD |

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.3). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point packaging activity within the Military Department or Defense Agency, or within the Military Department's Systems Command. Packaging data retrieval is available from the managing Military Department or Defense Agency 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 that may be helpful, but is not mandatory.)

6.1 Intended use. The cords covered by this specification are used to make up combination headset-microphone extension cords and microphone cords for installation in specific military aircraft with

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intercommunication sets. These cords are military unique because they are configured for use only in military aircraft.

- a. WM-85/U is used with plug connector U-94()U to make up combination headset-microphone extension cords with portable microphone switch.
- b. WD-34/U is used as a microphone cord with the M-3A/A, M-32()AIC, and M-33()AIC microphones.
- c. WF-5/U is used with jack U-61/U to make up headset-microphone extension cords.
- d. WM-53/U is used with jack U-82/U to make up combination headset-microphone extension cords with a portable microphone switch.
- e. WF-14/U is used with jack U-92()U to make up combination headset-microphone extension cords.

6.2 Material handling and disposal. Caution should be taken during handling and disposal of all insulation and jacket materials in accordance with ASTM C930 and FED-STD-313.

6.3 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Type designation and PIN (see 1.2 and 1.2.1).
- c. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1 and 2.3).
- d. Whether first article inspection is required (see 3.1 and 4.4). Invitations for bids should provide that the government reserves the right to waive the requirement for samples for first article inspection for those bidders offering a product that has been previously acquired or tested by the government, and that bidders offering such products who wish to rely on such production or test must furnish evidence with the bid that prior government approval is presently appropriate for the pending contract.
- e. Packaging requirements (see 5.1). The cords should be furnished on spools, in spool or reel-type packages, or on reels. Each spool, package, or reel should contain not less than 450 feet and not more than 550 feet. The maximum number of continuous lengths per spool, package, or reel should be 3. The length of any one piece thereof should not be less than 50 feet.

6.4 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue, due to the extent of the changes.

6.5 Subject term (key word) listing.

Flexible cord
Headset cord
Microphone cord

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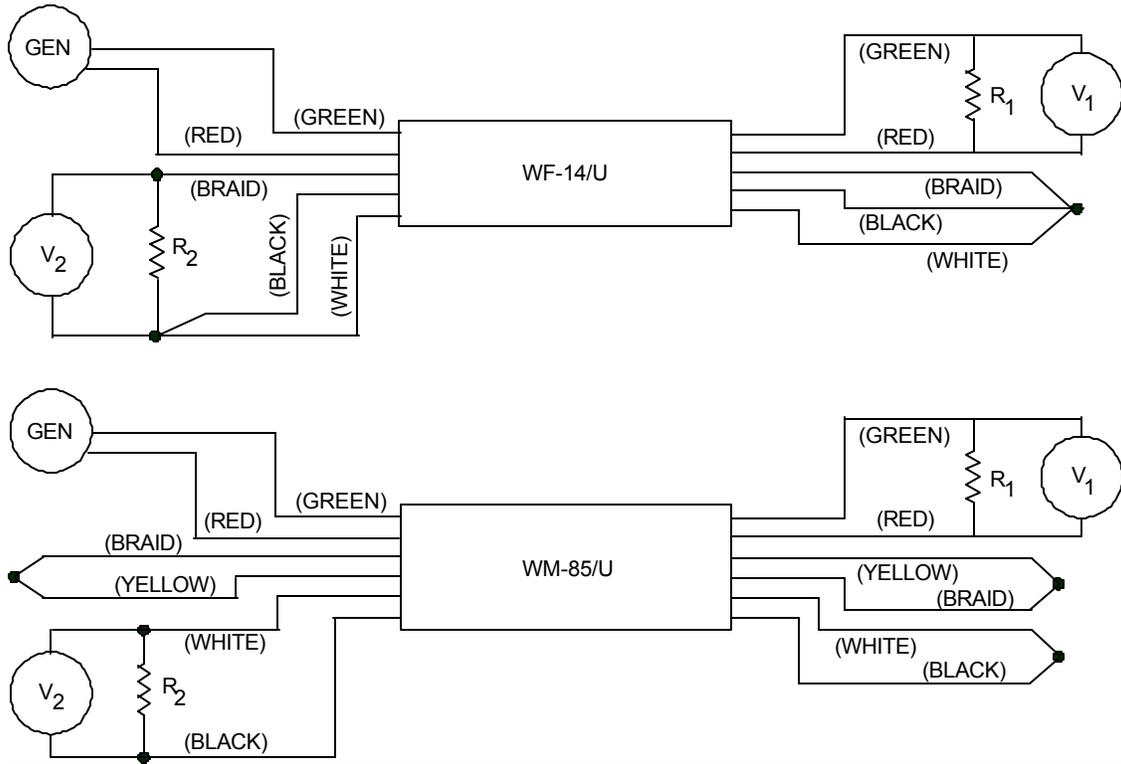
CONCLUDING MATERIAL

Custodians:
Air Force - 11
DLA - CC

Preparing activity:
DLA - CC

(Project 6145-2233)

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Calculations: $\text{dB} = \text{dBm reading of } V_1 - \text{dBm reading of } V_2$

NOTES:

- 1/ For electrostatic tests: $R_1 = R_2 = 1 \text{ megohm} \pm 5\%$.
- 2/ For electromagnetic tests: $R_1 = 4.5 \text{ ohms} \pm 1\%$.
 $R_2 = 1 \text{ megohm} \pm 5\%$.
- 3/ The waveform shall be sinusoidal, 15 volts rms minimum.

FIGURE 1. Isolation tests

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7, and send to preparing activity.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

| | | |
|---|---|--|
| I RECOMMEND A CHANGE: | 1. DOCUMENT NUMBER MIL-DTL-5898E | 2. DOCUMENT DATE (YYYYMMDD) 20000804 |
| 3. DOCUMENT TITLE Cords, Electrical (WF-5/U, WF-14/U, WD-34/U, WM-53/U, WM-85/U) | | |
| 4. NATURE OF CHANGE (<i>Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.</i>) | | |
| 5. REASON FOR RECOMMENDATION | | |
| 6. SUBMITTER | | |
| a. NAME (<i>Last, First, Middle Initial</i>) | | b. ORGANIZATION |
| c. ADDRESS (<i>Include zip code</i>) | d. TELEPHONE (<i>Include Area Code</i>) (1) Commercial: (2) DSN: (<i>if applicable</i>) | 7. DATE SUBMITTED (YYYYMMDD) |
| 8. PREPARING ACTIVITY | | |
| a. NAME Defense Logistics Agency Defense Supply Center, Columbus | | b. TELEPHONE (<i>Include Area Code</i>) Commercial: 614-692-0538 DSN: 850-0538 |
| c. ADDRESS (<i>Include Zip Code</i>) DSCC-VAI P.O. Box 3990 Columbus, Ohio 43216-5000 | | IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman Road, Suite 2533 Fort Belvoir, Virginia 22060-6621 Telephone: 703-767-6888 DSN 427-6888 |