

INCH-POUND

MIL-DTL-3883B  
18 April 2003  
SUPERSEDING  
MIL-C-3883A  
25 September 1970

DETAIL SPECIFICATION  
CORD, ELECTRICAL, SHIELDED  
(AUDIO FREQUENCY)

Inactive for new design after 16 June 1997

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

1. SCOPE

1.1 Scope. This specification covers electrical cords composed of 1 to 7 conductors, 20 AWG, Styrene butadiene rubber insulated and jacketed, with a shield beneath the jacket. These cords are intended for use in audio frequency applications, at temperatures down to -55°C (see 3.2 for individual types).

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 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).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Logistics Agency, Defense Supply Center, Columbus (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.

AMSC N/A  
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FSC 6145

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SPECIFICATIONS

FEDERAL

A-A-59551 - Wire, Electrical, Copper (Uninsulated).

DEPARTMENT OF DEFENSE

MIL-C-572 - Cords, Yarn and Monofilaments, Organic Synthetic Fiber.  
MIL-I-631 - Insulation, Electrical, Synthetic-Resin Composition, Non-rigid.  
MIL-I-3930 - Insulating and Jacketing Compounds, Electrical  
(For Cables, Cords, and Wires).

STANDARDS

FEDERAL

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

DEPARTMENT OF DEFENSE

MIL-STD-104 - Limits for Electrical Insulation Color.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following document forms 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 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI-Z540.1 - Laboratories, Calibration and Measuring and Test Equipment.

(Application for copies should be addressed to the American National Standards Institute, 25 West 43<sup>rd</sup> Street, 4<sup>th</sup> Fl., New York, NY 20036.)

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 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.

3.2 General. The cord types covered by this specification, including cord dimensions and electrical requirements, shall be as specified in table I.

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TABLE I. Cord types, dimensions and electrical requirements.

Cord types	Number of conductors	Insulation thickness minimum (Inch)	Jacket thickness minimum (Inch)	Outside diameter of cord, maximum (Inch)	Dielectric withstanding voltage (rms)	Insulation resistance at 15.6°C, minimum (megohms 1,000 ft.)	Capacitance Maximum (Pf/ft.)
WSL-1(20)	1	.015	.015	.165	1,000	500	85
*WSL-1H(20)	1	.040	.025	.255	2,000	1,000	45
WSL-2(20)	2	.015	.032	.290	1,500	500	70
WSL-3(20)	3	.015	.032	.300	1,500	500	80
WSL-4(20)	4	.020	.035	.330	1,500	500	95
WSL-5(20)	5	.020	.040	.390	1,500	500	95
WSL-6(20)	6	.020	.040	.420	1,500	500	95
WSL-7(20)	7	.020	.068	.440	1,500	500	95

\*Heavy duty, high voltage application.

3.3 Construction (see 4.5.1). Cords shall be constructed in the following manner. Each conductor shall be 20 AWG stranded, tinned-coated, copper wire covered with a separator and insulated with styrene butadiene rubber. (The separator may be omitted if a free-stripping insulating compound is used). The insulated conductors shall be wound in a left-hand direction using fillers, if necessary, to form a compact round core. The lay shall be 10 to 16 times the pitch diameter of the cabled conductors. A closely woven binder or serving shall be applied over the cabled conductors, and a tinned-coated copper shield applied over the binder or serving. A separator shall be closely wound over the shield and a black styrene butadiene rubber jacket applied over the separator. The cord ends shall be sealed.

3.4 Materials (see 4.5.1). The materials used in the fabrication of cords shall be as specified herein.

3.4.1 Conductors (see 4.5.1). Conductors shall be 20 AWG, stranded, soft or drawn-and-annealed tinned-coated copper wire conforming to A-A-59551, type B, class M.

3.4.2 Yarn (see 4.5.1). All yarn used for separators, servings, binders or fillers shall be synthetic fiber conforming to MIL-C-572, type P or CTA, or polyester yarn. The yarn used shall be clean, dry, and substantially free from all foreign particles, knots, lumps, or any substance that might impair the insulation of the wire.

3.4.3 Tape (see 4.5.1). Tape used for separators shall be polyester conforming to MIL-I-631, type G, form T<sub>f</sub>.

3.4.4 Insulation (see 4.5.1). A styrene butadiene rubber insulating compound conforming to MIL-I-3930, type IS-L, shall be applied over the conductor or separator, when present, to a minimum thickness as specified in table I. The insulation shall be applied over the conductor or separator, when present, to a minimum thickness as specified in table I. The insulation shall be capable of being readily stripped from the conductor by standard methods, leaving the conductor clean for soldering. Insulated conductors shall be readily separable from each other.

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3.4.5 Color coding (see 4.5.1). The conductors within the cord shall be clearly distinguishable by the color of the insulation. The coloring shall be solid, and may either extend through the thickness of the insulation or consist of a thin layer of colored compound applied over the insulation. In the latter case, the colored layer shall adhere firmly to the insulation wall. The color limits shall conform to MIL-STD-104, class 2. The color coding of the conductor insulation shall be in accordance with table II.

TABLE II. Color coding of conductor insulation.

Number of conductors	Color coding
1	Black
2	Black and white
3	Black, white and red
4	Black, white, red, green
5	Black, white, red, green, orange
6	Black, white, red, green, orange and blue
7	Black, white, red, green, orange, blue, and brown

3.4.6 Shield (see 4.5.1). The shield shall be a closely woven braid of 34 AWG tinned-coated copper strands conforming to A-A-59551, and shall be applied to provide coverage of not less than 85 percent of the construction underneath.

3.4.7 Jacket (see 4.5.1). A black styrene butadiene rubber jacket conforming to MIL-I-3930, type JS-L, shall be applied over the shield and separator to a minimum thickness as specified in table I.

3.4.8 Outside diameter (see 4.5.1). The outside diameter of the completed cord shall not exceed the maximum dimension specified in table I.

3.5 Electrical requirements.

3.5.1 Dielectric withstanding voltage. The finished cord shall withstand for one minute the voltage specified in table I when tested in accordance with 4.5.2.1, and shall show no evidence of breakdown.

3.5.2 Insulation resistance. The insulation resistance shall be not less than the value specified in table I when tested in accordance with 4.5.2.2.

3.5.3 Conductor resistance. The DC resistance of each conductor in a finished cord shall not exceed 11.57 ohms (max.) / 1,000 feet at 20°C when tested in accordance with 4.5.2.3.

3.5.4 Capacitance. The capacitance of the finished cord shall not exceed the value specified in table I when tested in accordance with 4.5.2.4.

3.6 Physical properties.

3.6.1 Cold bend. Neither the jacket nor the insulation shall show evidence of cracks, flaws, or other damage when tested in accordance with 4.5.3.1 at a temperature of  $-55^{\circ} \pm 2^{\circ}\text{C}$ .

3.6.2 Lengths (see 4.5.1). Unless otherwise specified (see 6.2), the cord shall be furnished wound on spools or reels in continuous lengths of not less than 250 feet.

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3.6.3 Sealing of cord ends (see 4.5.1). To prevent moisture from entering the finished cord, both ends of all cords shall be dipped in a sealer, which shall completely seal the ends. No treatment is required over that part of the cord covered by the jacket.

3.6.4 Workmanship. Cords shall be constructed and finished in a thoroughly workmanlike manner in accordance with accepted high grade production techniques. The cords shall be a uniform and consistent product and shall be free from any defects which will adversely affect the serviceability of the product and shall be free from any defects which will adversely affect the serviceability of the product, such as lumps, kinks, splits, abrasions, scrapes, corroded surfaces, skin impurities, and faulty extruded surfaces.

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-Z540.1 or equivalent.

4.2 Classification of inspections. The examinations and tests of cords are classified as follows:

- a. Materials inspection (see 4.3).
- b. Conformance inspection (see 4.4).

4.3 Materials inspection. Materials inspection shall consist of certification supported by verifying data that the materials listed in table III, used in fabricating the designated cord type (see 3.2), are in accordance with the applicable referenced specification or requirement prior to such fabrication.

TABLE III. Materials inspection.

Material	Requirement paragraph	Applicable specification
Conductors	3.4.1	A-A-59551
Yarn	3.4.2	MIL-C-572
Tape	3.4.3	MIL-I-631
Insulation	3.4.4	MIL-I-3930
Shield	3.4.6	A-A-59551
Jacket	3.4.7	MIL-I-3930

4.4 Conformance inspection. Conformance inspection shall consist of groups A and B inspections (see 4.4.3 and 4.4.4, respectively) specified in table IV and shall be performed on every lot of cable procured under this specification. Sampling inspection shall be accomplished for each lot in accordance with 4.4.2.

4.4.1 Lot. A lot shall consist of all cable manufactured under substantially the same conditions and offered for inspection at one time.

4.4.1.1 Lot size. The lot size shall be defined as the number of units of product submitted for inspection.

4.4.1.2 Unit of product. A unit of product shall be defined as the continuous length of cable contained on a single reel, spool, or in a coil.

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TABLE IV. Group A and B inspections.

Inspection	Requirement	Verification	Group A	Group B
Visual and mechanical	-	4.5.1	X	-
Construction	3.3	4.5.1	X	-
Conductors	3.4.1	4.5.1	X	-
Yarn	3.4.2	4.5.1	X	-
Tape	3.4.3	4.5.1	X	-
Insulation	3.4.4	4.5.1	X	-
Color coding	3.4.5	4.5.1	X	-
Shield	3.4.6	4.5.1	X	-
Jacket	3.4.7	4.5.1	X	-
Outside diameter	3.4.8	4.5.1	X	-
Lengths	3.6.2	4.5.1	X	-
Sealing of cord ends	3.6.3	4.5.1	X	-
Workmanship	3.6.4	4.5.1	X	-
Electrical	-	-	X	-
Dielectric withstanding voltage	3.5.1	4.5.2.1	X	-
Insulation resistance	3.5.2	4.5.2.2	X	-
Conductor resistance	3.5.3	4.5.2.3	X	-
Capacitance	3.5.4	4.5.2.4	X	-
Physical	-	-		X
Cold bend	3.6.1	4.5.3.1		X

4.4.1.3 Specimen. A specimen is a single piece of finished cable or any part removed from the finished cable such as conductors, separators, insulated conductors, shielded conductors, or cabled and shielded conductors, insulations, and jacket, which is taken from a sample unit and subjected to inspection.

4.4.2 Sampling. A random sample shall be selected from each lot in accordance with table V.

TABLE V. Inspection sample.

Inspection lot size <u>1/</u>	Accept on zero sample size
1	1
2 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

1/ Lot size is based on the number of units of product

4.4.3 Group A inspection. Group A inspection shall include the visual and mechanical and electrical inspections specified in table IV.

4.4.3.1 Visual and mechanical inspections. Visual and mechanical inspections, as specified in table IV, shall be performed according to the sampling plan as specified in table V and may be performed in any order.

4.4.3.2 Electrical inspections. Electrical inspections, as specified in table IV, shall be performed on every length of cord in the inspection lot according to the sampling plan as specified in table V. The electrical inspections shall be performed in the order shown in table IV.

4.4.4 Group B inspection. Group B inspection shall include the applicable inspections specified in table IV. Unless otherwise specified (see 6.2), group B inspection shall be performed on sample units that have been subjected to and have passed the group A inspection. Sampling for group B shall consist of one sample per 5,000 feet of cord, or fraction thereof, not to exceed a total of five samples per order.

4.4.5 Rejected lot. Failure of any sample to pass any inspection shall constitute a failure of the lot. If an inspection lot is rejected, the contractor may rework the lot to correct the 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 (see 4.4.6).

4.4.6 Noncompliance. If a sample fails to pass any inspection, 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, the conformance 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 shall be withheld until 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.

#### 4.5 Methods of inspection.

4.5.1 Visual and dimensional examination. The specimens of finished cords selected for the group A, subgroup I inspection (see 4.4.3.1) shall be examined for conformity to those parts of requirements 3.3 to 3.4.8 inclusive, 3.6.2, 3.6.3, and 3.6.4 which can be determined by visual and dimensional examination. Conformity to the shield coverage requirement (see 3.4.6) shall be determined as specified in FED-STD-228, method 8121.

#### 4.5.2 Electrical tests.

4.5.2.1 Dielectric withstanding voltage (see 3.5.1). The finished cord shall be tested as specified in FED-STD-228, method 6111, except for the following:

- a. The test shall be performed on finished cord only.
- b. The immersion period shall be not less than 9 hours.
- c. One terminal shall be each conductor in turn, and the other terminal shall be all the remaining conductors tied together in electrical contact with the shield and the water.

4.5.2.2 Insulation resistance (see 3.5.2). The insulation resistance of the finished cord shall be determined as specified in FED-STD-228, method 6031 except for the following:

- a. The test shall be performed on finished cord only.
- b. The immersion period shall be not less than 9 hours.
- c. The test voltage shall be not less than 100 volts or more than 500 volts dc.
- d. The polarity of the conductor shall be maintained negative with respect to the water. One terminal shall be each conductor in turn, and the other terminal shall be all the remaining conductors tied together in electrical contact with one another and the shield, and the water.
- e. If the measurement is made at a temperature lower than 15.6°C, the supplier shall correct the measured value of insulation resistance to the resistance at 15.6°C.

4.5.2.3 Conductor resistance. The DC resistance of each conductor in a finished cord shall be determined in accordance with FED-STD-228, method 6021, and shall meet the requirements of 3.5.3.

4.5.2.4 Capacitance (see 3.5.4). The capacitance per foot of cord between each conductor and all other conductors connected together with the shield shall be measured at a frequency of 1000 Hz by using an alternating current balanced bridge method accurate to within ¼ of 1 percent.

#### 4.5.3 Physical tests.

##### 4.5.3.1 Cold bend (see 3.6.1).

4.5.3.1.1 Specimen. One specimen shall be cut from each sample unit. Each specimen so cut shall be divided into two parts, one for checking the cord as a whole, and the other for checking the insulation apart from the cord.

4.5.3.1.2 Procedure. The specimens selected for checking cord as a whole shall be attached to a mandrel of the proper size as specified in 4.5.3.1.3. The specimens selected for checking the insulation apart from the cord shall have the jacket removed, and each insulated conductor therefrom shall be attached to a mandrel 0.062 inch diameter. The specimens shall be suspended vertically, with their lower ends weighted sufficiently to keep the specimens taut and to permit bending them without handling. The mandrel and specimen shall be placed for at least 20 hours in a cold chamber at a temperature of  $-55^{\circ} \pm 2^{\circ}\text{C}$  and, while at this temperature, bent for five close turns around the mandrel at the rate of  $15 \pm 3$  turns per minute. After the test has been completed, the jacket on the specimens of the cord shall be examined through a magnifying glass of at least 3-diameter magnification. The jacket shall then be removed so that the insulation can be examined. The insulation on all specimens shall be examined for cracks with the magnifying glass.

4.5.3.1.3 Mandrels for cord. The mandrel for testing the cord as a whole shall be selected from the following list of standard size mandrels.

Mandrel diameters (inches)

0.68  
0.84  
1.05  
1.31  
1.66  
1.90

The size selected shall be the largest size, which does not exceed three times the specified maximum overall diameter of the cord (see 3.2).

## 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 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 intended for use as patch cords for telephone switchboards and for use with microphones, headsets, handsets, etc., where flexibility is required.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number and date of this specification.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1).
- c. Packaging requirements (see 5.1).
- d. Classification of cord required (see 3.2)
- e. Length of finished cords to be delivered.
- f. Size of spool and length on each (see 5.1).
- g. Coil, spool, and reel marking requirements.

6.3 Subject term (key word) listing.

Flexibility  
Handset  
Headset  
Microphone  
Patch cords  
Rubber, styrene butadiene  
Telephone switchboard

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.

CONCLUDING MATERIAL

Custodians:  
Army - CR  
Navy - SH  
Air Force - 11  
DLA - CC

Preparing activity:  
DLA - CC  
  
(Project 6145-2331-000)

Review activities:  
Army - AR, AT, AV, CR4  
Navy - EC, MC, OS

**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.

<b>I RECOMMEND A CHANGE:</b>	1. DOCUMENT NUMBER <b>MIL-DTL-3883B</b>	2. DOCUMENT DATE (YYYYMMDD) <b>20030418</b>
3. DOCUMENT TITLE <b>CORD, ELECTRICAL, SHIELDED (AUDIO FREQUENCY)</b>		
4. NATURE OF CHANGE <i>(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)</i>		
5. REASON FOR RECOMMENDATION		
<b>6. SUBMITTER</b>		
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)
<b>8. PREPARING ACTIVITY</b>		
a. NAME Defense Logistics Agency Defense Supply Center, Columbus		b. TELEPHONE <i>(Include Area Code)</i> (1) Commercial 614-692-0538 (2) DSN 850-0538
c. ADDRESS <i>(Include Zip Code)</i> DSCC-VAI P.O. Box 3990 Columbus, Ohio 43216-5000		<b>IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:</b> 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

DD Form 1426, FEB 1999 (EG) PREVIOUS EDITION IS OBSOLETE.

WHS/DIOR, Feb 99