

MIL-C-13892A(EL)

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Superseding  
MIL-C-13892(SigC)  
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## MILITARY SPECIFICATION

CABLE, TELEPHONE (FLEXIBLE)  
(CORDS AND CORDAGE, MULTIPAIR)

## 1. SCOPE

1.1 Scope.- This specification covers multipair rubber or synthetic-rubber insulated and jacketed flexible telephone cable.

1.2 Classification.- The cable shall be of the number of good pairs and size as follows:

<u>Number of good pairs</u>	<u>Maximum outside diam.</u>
25	0.800 inch
15	0.656 inch

## 2. APPLICABLE DOCUMENTS

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

## SPECIFICATIONS

## Federal

1. QQ-W-343 Wire, Electrical (Uninsulated)

## Military

MIL-I-3930 Insulating and Jacketing Compounds, Electrical (For Cables, Cords and Wires).

MIL-C-12000 Cable, Cord and Wire, Electric, Packaging and Packing for

MIL-C-45662 Calibration System Requirements

FSC 6145

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## STANDARDS

## Federal

FED-STD-228

Federal Test Method Standard; Cable and Wire,  
Insulated; Method of Testing

## Military

MIL-STD-105

Sampling Procedures and Tables for Inspection  
by Attributes

(Copies of specifications and standards required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

## 3. REQUIREMENTS

3.1 Materials.- The materials for the cable shall be as specified herein. When a definite material is not specified, a material shall be used which conforms to good commercial practice of wire and cable manufacturers.

3.1.1 Conductor.- Each conductor shall conform to QQ-W-343, type B coated, Class K, for severe flexing service, except that each conductor shall be 22 AWG (7 X 30) stranded wire.

3.1.2 Insulation.- The conductor insulation shall be natural rubber-type IR, styrene butadiene rubber-type IS, in accordance with MIL-I-3930.

3.1.3 Jacketing compound.- The jacketing compound shall be styrene butadiene rubber-type JS, in accordance with MIL-I-3930.

3.2 Construction of pairs.-

3.2.1 Natural rubber insulation.- Each conductor shall be insulated with not less than a 0.012 inch wall of natural rubber compound (see 3.1.2) and shall then be covered with a dry, unsized rayon braid. Two insulated conductors shall be twisted together with a right hand lay not exceeding 2 inches, to form a pair. The braid of one conductor of each pair shall be colored black and that of the other conductors of the pair shall be colored white.

3.2.2 Styrene butadiene rubber insulation.- When Styrene butadiene rubber is used in lieu of natural rubber (see 3.1.2 and 3.2.1), the minimum insulation thickness shall be 0.013 inch and the braid over the insulating conductor may be omitted. If the braid is omitted, the insulation of one conductor of each pair shall be colored black and that of the other conductors of the pair shall be colored white.

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3.3 Cabling.- The conductors shall be loosely bound together by a braid or suitable fabric binder in such a manner as to permit sliding movement when the cable is bent and slanted or twisted sharply. The ratio of lay to pitch diameter of each layer of pairs shall not exceed 10. A styrene butadiene rubber jacket (see 3.1.3), with a minimum wall thickness of 0.050 inch shall then be applied.

3.3.1 Diameter of finished cable.- The outside diameter of the finished cable shall not exceed the dimensions specified in 1.2.

3.4 Cable Dielectric strength and insulation resistance.- The finished cable shall be capable of withstanding, without breakdown, an ac potential of 1000 volts rms applied for 5 seconds between each conductor and all other conductors connected together. (See 4.5.2.1) Immediately after the dielectric strength test, the insulation resistance measured with a galvanometer shall be not less than 500 megohms per thousand feet at, or corrected to, 60 degrees Fahrenheit, when measured with not less than 100 volts dc, applied for one minute between each conductor and all other conductors connected together. The insulation resistance test may be terminated in less than one minute if the galvanometer has ceased fluctuating, and the reading indicates that the required minimum insulation resistance has been obtained. (See 4.5.2.2)

3.5 Cold bend.- Neither the jacket nor the insulation shall show evidence of cracks, flaws, or other damage as a result of the cold bend test. (See 4.5.3.1)

3.6 Sealing of cord ends.- To prevent moisture from entering the finished cord, both ends of each shipping length of all cable shall be dipped in a sealer which shall completely seal the ends.

3.7 Workmanship.- The cable shall be fabricated in a thoroughly workmanlike manner, in accordance with the applicable portions of the following paragraphs herein:

- 3.2 Construction of pairs
- 3.3 Cabling
- 3.6 Sealing of cord ends

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection.- Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform

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any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.1.1 Test equipment and inspection facility.- Inspection equipment and test facilities shall be established and maintained in accordance with MIL-C-45662.

4.2 Classification of inspection.- Inspection shall be classified as follows:

(a) Materials inspection. (see 4.3)

(b) Quality conformance inspection. (see 4.4)

1. Inspection of product for delivery. (see 4.4.1)

2. Inspection of preparation for delivery. (see 4.4.2)

4.3 Materials inspection.- Materials inspection shall consist of certification supported by verifying data that the materials listed in table I, used in fabricating telephone cable, are in accordance with the applicable referenced specifications or requirements prior to such fabrication.

Table I. Materials inspection.

Material	Requirement paragraph	Applicable Specification
Conductor	3.1.1	QQ-W-343
Insulation	3.1.2	MIL-I-3930
Jacketing compound	3.1.3	MIL-I-3930

4.4 Quality Conformance inspection.-

4.4.1 Inspection of product for delivery.- Inspection of product for delivery shall consist of groups A and B inspection.

4.4.1.1 Inspection lot.- An inspection lot consists of all product of one type, produced under substantially the same conditions on a continuous basis, and offered for inspection at one time.

4.4.1.2 Lot size.- The lot size is the number of units of product in an inspection lot. The minimum and maximum lot sizes for inspection purposes shall be determined by the Government, and may differ from the quantity designated in the contract or order as a lot for production, shipment, or other purpose.

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4.4.1.3 Unit of product.- The unit of product is a continuous length of bare, insulated, or jacketed conductor, or finished cable contained on a reel or spool, or in a coil.

4.4.1.4 Sample.- A sample is one or more sample units selected from an inspection lot to represent that inspection lot for inspection purposes.

4.4.1.5 Sample unit.- A sample unit is a unit of product, selected in an unbiased manner to be part of a sample, from which specimens are taken for inspection.

4.4.1.6 Specimen.- A specimen is a single piece of finished cable which is taken from a sample unit and subjected to inspection.

4.4.1.7 Finished cable.- Finished cable is cable on which all manufacturing operations have been completed and which is ready to be submitted for acceptance.

4.4.1.8 Rejected lots.- If an inspection lot is rejected, the supplier may rework it to correct the defects, or screen out the defective units, and resubmit for inspection. Resubmitted lots shall be inspected using tightened inspection. Such lots shall be separate from new lots, and shall be clearly identified as re-inspected lots.

4.4.1.9 Group A inspection.- Group A inspection shall consist of the examinations and tests specified in table II.

4.4.1.9.1 Sampling plan.- Statistical sampling and inspection for Group A shall be in accordance with MIL-STD-105 for general inspection level II. The acceptable quality level (AQL) shall be as shown in table II. Major and minor defects shall be as defined in MIL-STD-105.

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Table II. Group A inspection.

Examination or test	Requirement paragraph	Test Method paragraph	AQL (Percent Defective)	
			Major	Minor
Visual and dimensional				
Construction of pairs	3.2	4.5.1	1.0% for the group combined	4.0% for the group combined
Thickness of insulation	3.2.1, 3.2.2			
Color Coding	3.2.1, 3.2.2			
Thickness of jacket	3.3			
Ratio of lay to pitch diam.	3.3			
Diameter of finished cable	3.3.1			
Sealing of cable ends	3.6			
Workmanship	3.7			
Electrical				
Dielectric strength	3.4	4.5.2.1	1.0% for the group combined	*
Insulation resistance	3.4	4.5.2.2		

\*All electrical defects are considered major.

4.4.1.10 Group B inspection.- Group B inspection shall consist of the examinations and tests specified in table III, and the sample shall be selected from inspection lots that have passed group A inspection. Group B inspection shall be performed in any order which is satisfactory to the Government.

4.4.1.10.1 Sampling procedure.- Six specimens shall be selected for testing for every 50,000 feet or fraction thereof of finished cable, with no failures permitted.

Table III. Group B inspection.

Examination or test	Requirement paragraph	Test Method paragraph
Cold bend	3.5	4.5.3.1

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4.4.1.10.2 Noncompliance.-- If a sample fails to pass group B inspection, the supplier shall 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 conditions, with essentially the same materials, processes, etc., and which are considered subject to the same failure. Acceptance of the product shall be discontinued until corrective action, acceptable to the Government, has been taken. After the corrective action has been taken, group B inspection shall be repeated on additional sample units (all inspection, or the inspection which the original sample failed, at the option of the Government). Group A inspection may be reinstated; however, final acceptance shall be withheld until the group B reinspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure and corrective action taken shall be furnished to the cognizant inspection activity and the qualifying activity.

4.4.2 Inspection of preparation for delivery.-- Sample packages or packs and the inspection of the preservation, packaging, packing and marking for shipment and storage shall be in accordance with the requirements of Section 5.

#### 4.5 Methods of examination and test.--

4.5.1 Visual and dimensional inspection.-- The cable shall be inspected to verify that the visual and dimensional requirements listed in table II are in accordance with this specification.

#### 4.5.2 Electrical inspection.--

4.5.2.1 Dielectric strength.-- The finished cable shall be tested as specified in method 6111 of FED-STD-228 (except that the test shall be performed on the finished cable only), or alternate test procedure of 4.5.2.1.1. (See 3.4)

4.5.2.1.1 Alternate test procedure.-- The following alternate test procedure may be used in place of the test procedure specified in 4.5.2.1.

(a) Arrange the conductors in a rectangle containing rows and columns as specified below. The last column will contain unused spaces as specified below.

<u>No. of Conductors</u>	<u>No. Rows</u>	<u>No. Columns</u>	<u>No. Unused space</u>
30	5	6	0
50	7	8	6

(b) Connect all the conductors in a column together. Do this for each column.

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(c) Apply the specified test voltage, for the specified time, between each column of the rectangle in turn, and the remaining columns connected together.

(d) Connect all the conductors in a row together. Do this for each row.

(e) Apply the specified test voltage, for the specified time, between each row of the rectangle in turn, and the remaining rows connected together.

(f) Connect all the conductors together.

(g) Apply the specified voltage, for the specified time, between all the conductors connected together and the sheath.

4.5.2.2 Insulation resistance.- Insulation resistance of the finished cable shall be determined as specified in method 6031 of FED-STD-228 (except that the test shall be performed on the finished cable only). (See 3.4)

#### 4.5.3 Physical inspection.-

##### 4.5.3.1 Cold bend.- (See 3.5)

4.5.3.1.1 Specimens.- One specimen shall be cut from each sample unit. Each specimen so cut shall be divided into two parts, one for checking the cable 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 cable 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 cable shall have the jacket removed, and each insulated wire therefrom shall be attached to a mandrel of the proper size as specified in 4.5.3.1.3. 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  $-40^{\circ}\text{F}$ .  $+5^{\circ}\text{F}$ ., and while at this temperature, bent for five close turns around the mandrel. After the test has been completed, the jacket on the specimens of the cable shall be examined through a magnifying glass of at least 3 X 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.



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4.5.3.1.3 Mandrels.- Mandrels shall be as shown in table IV.

Table IV. Mandrel sizes.

Cable (Outside dia.)	Maximum mandrel size	
	For testing cable	For testing conductor
0.825 in.	4.50 in.	0.062 in.
0.652 in.	2.88 in.	0.062 in.

## 5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, packing and marking shall be in accordance with the applicable provisions of MIL-C-12000. (See 6.1 (c)).

## 6. NOTES

6.1 Ordering data.- Procurement documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Type of cable to be furnished (see 1.2)
- (c) Level of packaging and level of packing required for shipment (see Section 5).

Custodian:  
Army - EL

Preparing Activity  
Army-EL

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