MILITARY SPECIFICATION

CABLE, POWER, ELECTRICAL AND CABLE, SPECIAL PURPOSE,

ELECTRICAL, MULTICONDUCTOR AND SINGLE SHIELDED

GENERAL SPECIFICATION FOR

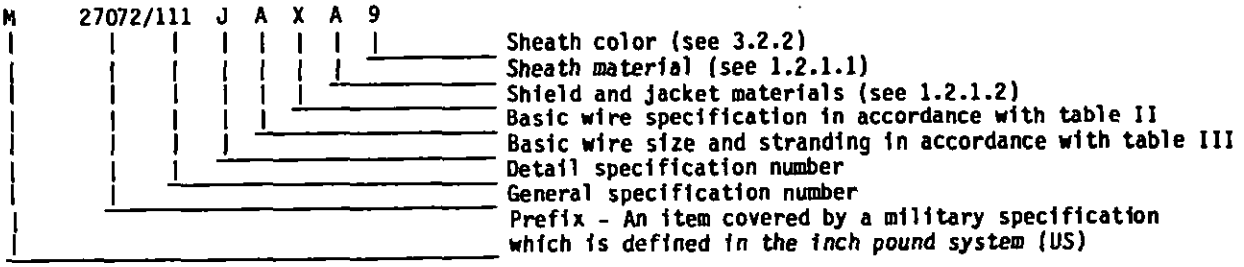
This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers cable, special purpose electrical multiconductor and single shielded for electronic circuits where the cable will be protected in racks, tunnels, or within buildings trailers or equipment.

1.2 Classification.

1.2.1 Military part number. Part numbers shall be as follows:



1.2.1.1 Cable sheath material. Overall cable sheath material shall be designated by a single letter as follows:

A	Polyvinyl chloride (PVC) in accordance with MIL-I-3930/14 1/.
B	Polyethylene in accordance with L-P-390 type III, grade 8.
C	Polychloroprene.
D	Fluorinated ethylene propylene in accordance with L-P-389 type I.
E	Polytetrafluoroethylene in accordance with ASTM D 1457.
F	Polyamide in accordance with ASTM D 4066, composition A, type III, grade E.
G	Glass braid yarn in accordance with MIL-Y-1140.
H	Polyurethane in accordance with MIL-I-3930/21.
K	No sheath.

1.2.1.2 Shield and jacket under shield. Overall cable shield and jacket material shall be designated by a single letter in accordance with table I (see 3.2.7).

1/ PVC shall not be used in aerospace applications.

Beneficial comments (recommendation, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: 2750 ABW/ESP, Gentile AFS, OH 45444-5400 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

TABLE I. Shield and jacket under shield materials.

Shield material	Unjacketed	Polyamide	Polyvinyl chloride 1/	Polyethylene	Fluorinated ethylene propulene	Glass braid
No shield	A	E	Z	M	R	V
Copper braid round	B	F	J	N	S	W
Tinned copper round	C	G	K	Q	T	X
Silver coated copper round	D	H	L	P	U	Y

1/ PVC shall not be used in aerospace applications.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

SPECIFICATIONS

FEDERAL

L-P-389 - Plastic Molding Material, FEP Fluoro-carbon, Molding and Extrusion.
L-P-390 - Plastic, Molding and Extrusion Material, Polyethylene and Copolymers (Low, Medium, and High Density).

MILITARY

MIL-C-17 - Cable, Radio Frequency, Flexible and Semirigid, General Specification for.
MIL-W-76 - Wire and Cable, Hook-up, Electrical, Insulated.
MIL-I-631 - Insulation, Electrical, Synthetic-Resin Composition, Nonrigid.
MIL-Y-1140 - Yarn, Cord, Sleeving, Cloth and Tape-Glass.
MIL-I-3930 - Insulating and Jacketing Compounds Electrical (For Cables, Cords, and Wires), General Specification for.
MIL-I-3930/14 - Insulating and Jacketing Compounds, Electrical (For Cables, Cords, and Wires), Jacketing Compound, Type JP-Medium-Low-Temperature Polyvinylchloride (PVC), and Polyvinylchloride Acetate (PVCA).
MIL-I-3930/21 - Insulating and Jacketing Compounds, Electrical (For Cables, Cords, and Wires), Jacketing Compound, Type JU-Low Temperature, Heat and Weather Resistant, Polyurethane Thermoplastic Elastomer.
MIL-W-5845 - Wire, Electrical, Iron and Constantan, Thermocouple.
MIL-W-5846 - Wire, Electrical, Chromel and Alumel, Thermocouple.
MIL-W-5908 - Wire, Electrical, Copper and Constantan, Thermocouple.
MIL-C-12000 - Cable, Cord, and Wire, Electric; Packaging of.
MIL-W-16878/1 - Wire, Electrical, Type B, 105°C, 600 Volts, (Insulated, High Temperature).
MIL-W-16878/2 - Wire, Electrical, Polyvinyl Chloride (PVC) Insulated, 105°C, 1000 Volts.
MIL-W-16878/3 - Wire, Electrical, Type D, 105°C, 3000 Volts, (Insulated, High Temperature).
MIL-W-16878/4 - Wire, Electrical, Polytetrafluoroethyulene (PTFE) Insulated, 200°C, 600 Volts, Extruded Insulation.

MIL-W-16878/5	-	Wire, Electrical, Polytetrafluoroethylene (PTFE) Insulated, 200°C, 1000 Volts, Extruded Insulation.
MIL-W-16878/6	-	Wire, Electrical, Type ET, 200°C and 260°C, 250 Volts, (Insulated, High Temperature).
MIL-W-16878/10	-	Wire, Electrical, Polyethylene Insulated, 75°C, 600 Volts.
MIL-W-16878/13	-	Wire, Electrical, Type KT, 200°C, 250 Volts, (Insulated, High Temperature).
MIL-W-16878/17	-	Wire, Electrical, Polyvinyl Chloride (PVC) Insulated, 105°C, 600 Volts, Polyamide Jacket.
MIL-W-16878/18	-	Wire, Electrical, Polyvinyl Chloride (PVC) Insulated, 105°C, 1000 Volts, Polyamide Jacket.
MIL-W-16878/19	-	Wire, Electrical, Polyvinyl Chloride (PVC) Insulated, 105°C, 3000 Volts, Polyamide Covering.
MIL-W-16878/20	-	Wire, Electrical, Polytetrafluoroethylene (PTFE), Insulated, 200°C, 250 Volts, Wrapped Insulation.
MIL-W-16878/21	-	Wire, Electrical, Polytetrafluoroethylene (PTFE), Insulated, 200°C, 600 Volts, Wrapped Insulation.
MIL-W-16878/22	-	Wire, Electrical, Polytetrafluoroethylene (PTFE), Insulated, 200°C, 1000 Volts, Wrapped Insulation.
MIL-P-22241	-	Plastic Sheet (and Film), Polytetrafluoroethylene (TFE-Fluorocarbon Resin).

(See supplement 1 for list of associated specifications)

STANDARDS

FEDERAL

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

MILITARY

MIL-STD-104	-	Limits For Electrical Insulation Color.
MIL-STD-105	-	Sampling Procedures and Tables For Inspection by Attributes.
MIL-STD-686	-	Cable and Cord, Electrical, Identification Marking and Color Coding of.
MIL-STD-810	-	Environmental Test Methods and Engineering Guidelines.

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

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the non-Government documents which is current on the date of the solicitation.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B 33	-	Wire, Copper, Tinned Soft or Annealed, For Electrical Purposes.
ASTM B 298	-	Wire, Copper, Silver Coated Soft or Annealed.
ASTM D 1149	-	Rubber Deterioration, Surface Ozone Cracking in a Chamber.
ASTM D 1457	-	Materials, PTFE Molding and Extrusion.
ASTM D 4066	-	Materials (PA) Nylon Injection and Extrusion, Standard Specification for.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets, or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede 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 sheet. In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern. (If a specific requirement specified herein is not required for an item, it shall be so indicated on the specification sheet (e.g., "Shock - N/A.")).

3.1.1 Unlisted cables. For cables not specified in supplement 1 the contractor shall, when required by the contract, submit design data to the acquiring activity and custodian of this specification for approval and assignment of specification sheet number prior to production (see 6.2).

3.2 Materials. All materials used in the construction of cable in accordance with this specification shall meet the applicable specification requirements (see 3.1).

3.2.1 Basic insulated wires. The basic insulated wires shall conform to the requirements of specifications indicated in table II.

TABLE II. Basic wire specification designator.

Basic wire specification designator	Former basic wire specification designation	Basic wire specification
A 1/	Type I	MIL-W-16878/17
B 1/	Type II	MIL-W-16878/18
C superseded by H	Type III superseded by type VIII	
D	Type IV	MIL-W-16878/4 MIL-W-16878/21
E	Type V	MIL-W-16878/5 MIL-W-16878/22
F	Type VI	MIL-C-17
G	Type VII	MIL-W-5845, MIL-W-5846, MIL-W-5908
H	Type VIII	MIL-W-16878/10
J 1/	Type IX	MIL-W-16878/19
K	Type X	MIL-W-16878/6 MIL-W-16878/20
L	Type XI	MIL-W-16878/13
M 1/	Type XII	MIL-W-16878/2
N 1/	Type XIII	MIL-W-16878/3
P 1/	Type XIV	MIL-W-16878/1

1/ PVC shall not be used in aerospace applications.

3.2.1.1 Basic insulated wire gauge and stranding. The basic insulated wires shall conform to the size and stranding specified in table III.

TABLE III. Basic insulated wire gauge and stranding designator.

Size and stranding designator	Conductor size AWG	Number of strands	Strand size AWG	Size and stranding designator	Conductor size AWG	Number of strands	Strand size AWG
A	8	133	29	K	20	7	28
B	10	37	26	L	22	19	34
C	12	37	28	M 1/	22	7	30
D	12	19	25	N	24	19	36
E	14	19	27	P 1/	24	7	32
F	16	19	29	R 2/	26	19	38
G	18	19	30	S 1/ 2/	26	7	34
H 1/	18	7	26	T 1/ 2/	28	7	36
J	20	19	32	W 1/ 2/	30	7	38

1/ Inactive for new design - stranding.
2/ Inactive for new design - wire size.

3.2.1.2 Basic insulated wire identification coding. Unless otherwise specified (see 3.1) in individual specification sheets, the individual conductors shall be coded for their entire length in accordance with MIL-STD-686, table II(a). The standard means of coding shall be solid colored insulation, with colored stripe tracer, when required.

3.2.1.3 Solid-colored insulation. Cables having up to and including six conductors shall employ solid coloring and each conductor shall be clearly distinguishable. The entire thickness of the insulation shall be solid-colored.

3.2.1.4 Helical stripe tracers. Cables having more than six conductors shall employ solid coloring in the first six conductors and shall utilize a helical colored stripe tracer on the seventh and above. Where extruded polyamide jackets are used over the primary insulation, the helical stripe tracer may be applied to the underlying insulation or to the surface of the polyamide jacket.

3.2.1.4.1 Ink. The colored helical stripe shall be obtained by using nonconductive, permanent inks having pigments or dyes least affected by light, by the plasticizers incorporated in the insulation, and by the specific temperature rating of the basic insulated wire. The medium used shall provide good anchorage to the insulation.

3.2.1.4.2 Width and length of lay. The stripe width and length of lay shall be as specified in MIL-STD-686.

3.2.1.5 Color. Color shall be in accordance with MIL-STD-104.

3.2.2 Sheath stripe or band color. Cable stripes or bands shall be in accordance with MIL-STD-686. Stripe or band designations shall be in accordance with table IV. Cable sheath material shall be of a contrasting color to the stripe or band.

TABLE IV. Sheath stripe or banding designator.

Color designator	First stripe or band	Second stripe or band	Color designator	First stripe or band	Second stripe or band
1	Brown		G	Black	Violet
2	Red		H	Black	Gray
3	Orange		J	Brown	Red
4	Yellow		K	Brown	Orange
5	Green		L	Brown	Yellow
6	Blue		M	Brown	Green
7	Violet		N	Brown	Blue
8	Gray		P	Brown	Violet
9	White		R	Brown	Gray
A	Black	Brown	S	Red	Orange
B	Black	Red	T	Red	Yellow
C	Black	Orange	U	Red	Green
D	Black	Yellow	W	Red	Blue
E	Black	Green	Y	Red	Violet
F	Black	Blue	X	Unstriped	

3.2.3 Fillers. Where fillers are used they shall be either:

a. Foamed or solid polyethylene in accordance with L-P-390, type II, grade 4.

b. Polyvinyl chloride in accordance with MIL-I-631, type F, grade C. 1/

c. Polytetrafluoroethylene in accordance with ASTM D 1457.

3.2.3.1 Fibrous fillers. Fibrous fillers shall not be used.

3.2.4 Binder tape. Binder tapes may be applied at the manufacturer's option. When tapes are used they shall be:

a. Polyethylene terephthalate film conforming to MIL-I-631, type G, in thickness of 0.001 inch (minimum).

b. Polyvinyl chloride film conforming to MIL-I-631, type F, grade A, in thickness of 0.005 to 0.010 inch. 1/

c. Polyethylene film conforming to L-P-390, type II, grade 4, in thickness of 0.005 to 0.010 inch.

d. Polytetrafluoroethylene film conforming to MIL-P-22241 in thickness of 0.001 inch (minimum).

1/ PVC shall not be used in aerospace applications.

3.2.5 Shielding. Shielding for coaxial cables shall be in accordance with MIL-C-17. Where tinned-coated copper strands are specified, the strands shall conform to ASTM B 33 before shielding. Where silver-coated copper strands are specified, the strands shall conform to ASTM B 298.

3.2.6 Cotton. The cotton used for the cable separator (see 3.4.4.4) shall be dry, soft, 26/2 cotton braid. The cotton shall be treated by a method that will render the cotton fungus resistant and shall have passed the fungus resistance test specified in MIL-STD-810, method 508, procedure II. Certification by a qualified testing laboratory, or by the producer, that the cotton will pass this test will generally be sufficient evidence of acceptability.

3.2.7 Component jackets (see 6.3.2). When construction includes jacketed components, the jackets shall be of the following materials:

a. Polyamide in accordance with MIL-M-20693, composition A, type III, grade E.

b. Polyvinyl chloride in accordance with MIL-I-3930/14. 1/

c. Polyethylene in accordance with L-P-390, type II, grade 7 or 7a, except that colored material may be used.

d. Fluorinated ethylene propylene in accordance with L-P-389, type I.

e. Glass braid yarn in accordance with MIL-Y-1140.

3.2.8 Cable sheaths (see 6.3.4). Cable sheaths shall be one of the following materials:

a. Polyvinyl chloride in accordance with MIL-I-3930/14. 1/

b. Polyethylene in accordance with L-P-390, type III, grade 8.

c. Polychloroprene.

d. Fluorinated ethylene propylene in accordance with L-P-389, type I.

e. Polytetrafluoroethylene in accordance with ASTM D 1457.

f. Polyamide in accordance with ASTM D 4066, composition A, type III, grade E.

g. Glass braid yarn in accordance with MIL-Y-1140.

h. Polyurethane in accordance with MIL-I-3930/21.

1/ PVC shall not be used in aerospace applications.

3.2.8.1 Physical properties. Physical properties of the sheath shall be in accordance with table V.

TABLE V. Sheath physical properties.

Inspection	Test paragraph	Sheath material designator (see 1.2.1.1)							
		A 1/	B	C	D	E	F	G	H
Original tensile strength (PSI) (min)	4.5.2.1	2100-2700	1800	1800	2200	3000	7000	In accordance with MIL-Y-1140	3500
Original ultimate elongating percent (min)	4.5.2.2	250-350	250	300	200	150	150	In accordance with MIL-Y-1140	550
Tear strength (min)	4.5.2.4	N/A	N/A	20	N/A	N/A	N/A	N/A	N/A
Tension set (max)	4.5.2.3	N/A	N/A	3/8	N/A	N/A	N/A	N/A	N/A
Accelerated aging	4.5.2.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tensile strength	4.5.2.1	75% of original	N/A	1600 (lbf/in^2) (min)	N/A	N/A	N/A	N/A	50%
Ultimate elongation	4.5.2.2	75% of original	N/A	2-7 (inches) (min)	N/A	N/A	N/A	N/A	50%
Oil resistance	4.5.2.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Percent change from original tensile strength	4.5.2.1	N/A	N/A	60	N/A	N/A	N/A	N/A	N/A
Percent change from original ultimate elongation (inches) (min)	4.5.2.2	N/A	N/A	60	N/A	N/A	N/A	N/A	N/A

1/ PVC shall not be use in aerospace applications.

3.3 Components (see 6.3). When specified (see 6.2) the cable shall include components such as:

a. Shielded single conductors, shielded twisted pairs, shielded twisted triplets, etc. Unless otherwise specified, all shielded components shall be insulated by a component jacket, applied over the shield, to prevent electrical noise and stray ground currents. For applicable jacket materials see 3.4.3.1.

b. Nonshielded twisted pairs, twisted triplets etc. with a component jacket, when specified, applied over the twisted assembly. For applicable jacket materials see 3.4.3.1.

3.4 Design and construction.

3.4.1 Component twisting. Twisted components of the finished cable shall be laid up either on a tubular or planetary type cable machine so that there will be no residual twist on the individual conductors. The length of lay shall be between 8 and 16 times the pitch diameter of layer in the component. Fillers may be used, as needed, to permit compliance with the roundness requirements specified herein and to modify diameters to fit components to the finished cable. At the option of the manufacturer, binder tapes may be applied over the components to assist in further operations.

3.4.2 Component shielding (braid coverage). For the shielded components specified in 3.3.a, the shield shall consist of a woven braid using strand material specified in 3.2.5. The metallic coating on the copper strands of the shield shall be similar to the metallic coating of the conductor to which the shield is applied. Unless otherwise specified (see 6.2.2), metallic shielding shall provide coverage of not less than 90 percent. The angle of the braid with the axis of the cable shall lie between 20 degrees and 40 degrees for diameters up to 0.600 inch. For diameters larger than 0.600 inch, the braid angle may be greater than 40 degrees. Percent coverage and angle of braid shall be calculated as follows:

$$K = (2F - F^2) \times 100$$

Where:

K = Percent coverage
F = NPd/Sin a
N = Number of wires per carrier
P = Picks per inch of cable length
d = Diameter of individual braid wire in inches
a = Angle of braid with axis of cable
Tan a = $2\pi (D + 2d) P/C$
D = Diameter of cable under shield in inches
C = Number of carriers

3.4.2.1 Strand size. Braided shields with round copper and copper alloy wires shall be as specified in table VI.

TABLE VI. Strand size to covered diameter.

Strand size AWG	Diameter covered
38	to .060 inch
36	.061 to .310
34	.311 to .750 inch
32	.751 inch and larger

3.4.3 Component jacketing. The jacket shall be extruded directly over the shield or binder tape if present, or over the insulated wire.

3.4.3.1 Jacket material applications. Jacket material used for a specific basic wire shall be as specified in table VII.

TABLE VII. Jacket material applications.

Basic wire designator	Jacket material	
	Shielded components (multiconductor cable)	Unshielded components
M, J, P	Polyamide 1/ or polyvinyl chloride 2/	
N	Polyvinyl chloride 2/	
G, B		Polyvinyl chloride 2/
N		Polyethylene

1/ Shall not be used if the diameter of the component exceeds .250 inch.
2/ PVC shall not be used in aerospace applications.

3.4.3.2 Other wire types. For components having wire types not specified in table VII, the jacket material will be specified and shall be limited to materials listed in 3.2.7.

3.4.3.3 Dimensions. Dimensions of component jackets shall be in accordance with table VIII. The average jacket thickness shall be not less than that shown in table VIII. The minimum wall thickness at any cross section shall be not less than 70 percent of the average wall thicknesss at that cross section.

TABLE VIII. Jacket wall thickness.

Diameter of component under jacket	Jacket material			
	Polyamide	Polyvinyl chloride and polyethylene 1/	Fluorinated ethylene propylene	Glass braid yarn
0.000 through 0.100	0.005	0.012	0.008	0.008
0.101 through 0.125	0.007	0.015	0.012	0.008
0.126 through 0.200	0.007	0.015	0.012	0.010
0.201 through 0.250	0.008	0.015	0.012	0.010
0.251 through 0.500		0.020	0.017	0.017
0.501 through 0.750		0.030	0.020	0.017
0.751 through 1.000		0.040	0.025	0.017

1/ PVC shall not be used in aerospace applications.

3.4.4 Final cabling. The cabling of conductors, components or combinations thereof, and fillers, if applicable, shall be accomplished on a planetary type cable machine. There shall be no residual twist left in the individual conductors or components. The length of lay shall be between 8 and 16 times the pitch diameter of the particular layer.

3.4.4.1 Binder tapes. Binder tapes may be used in the final cabling process. When they are used they shall be in accordance with 3.2.4 and shall be applied with a minimum overlap of 25 percent.

3.4.4.2 Temperature equivalent. When a fluorinated ethylene propylene sheath is specified for use with basic wires, designated D or E, the tape and filler material, if used in the construction, shall have a temperature rating equivalent to that of the basic insulated wire.

3.4.4.3 Over-all shielding (see 6.3.3). When specified (see 6.2) an over-all shield shall be applied over the complete cable core prior to application of the cable sheath. Shielding requirements shall be in accordance with 3.4.2 and 3.4.2.1.

3.4.4.4 Cable separator. When a polychloroprene sheath is specified, a cable separator shall be applied over the cabled components, binder tapes, or overall shield. The cable separator, consisting of the cotton specified in 3.2.6, shall have a coverage of not less than 80 percent when computed by the following formula:

$$\text{Percent coverage} = (2F - F_2)100$$

$$F = \frac{NPd}{\sin a} \qquad \tan a = \frac{2 \times (D+2d)P}{C}$$

Where:

N = Number of ends per carrier
P = Picks per inch
d = 0.009 inch
a = Angle of braid with cable axis (degrees)
D = Diameter of cable under separator
C = Number of carriers

3.4.5 Cable sheath.

3.4.5.1 Sheaths of materials designated A, B, D, E, F, and G. Sheaths of materials designated A, B, D, E, F, and G shall be well centered over the cable core. Sheaths of materials A, B, D, and E shall be extruded directly over the cabled components or over-all shield or binder tape, if present.

3.4.5.2 Sheaths of material designated C. Sheaths of materials designated C shall be applied over the cable separator in two layers with the reinforcement between the layers, except for sheath thickness less than 0.100 (or equal). The reinforcement shall consist of two serves of 16/2/3 cabled cotton served in reverse using seven ends with a 1-inch lay. Equivalent rayon or nylon tire cord may be substituted at the option of the manufacturer. In order that the surface of the finished cable *shall present a smooth appearance without objectionable roughness or irregularities*, the sheath shall be cured in a close fitting mold or continuous lead pipe extruded directly onto the cable. After vulcanization, the sheath shall be a firmly bound, strong, highly elastic, homogeneous mass. The sheath shall not be over-vulcanized, sticky or tacky, and shall with only extreme difficulty be separable into layers or removable from the cable separator.

3.4.5.3 Sheath thickness. The average sheath thickness shall be not less than shown in table IX. The minimum wall thickness at any cross section shall be not less than 70 percent of the average wall thickness at that cross section.

TABLE IX. Sheath wall thickness in inches.

Cable diameter directly under sheath	Sheath material by designator				
	A 1/ and B	C	D, E, and H	F	G
0.000 through 0.080	0.025	0.072	0.010	0.005	0.008
0.081 through 0.125	0.025	0.072	0.010	0.006	0.010
0.126 through 0.250	0.025	0.072	0.010	0.009	0.017
0.251 through 0.500	0.040	0.087	0.015	0.011	0.017
0.501 through 1.000	0.065	0.100	0.021	0.011	0.017
1.001 through 1.500	0.085	0.115	0.025	0.011	0.017
1.501 through 2.000	0.110	0.135	-	-	-
2.001 through 2.500	0.125	0.152	-	-	-
2.501 through 3.000	0.125	0.195	-	-	-

1/ PVC shall not be used in aerospace applications.

3.5 Cable identification. The following cable identification shall be placed on the outer surface of sheaths with material designations of A, B, C, and F or on a suitable tape placed longitudinally under sheath materials designated D, E, G, and H:

a. Manufacturer's name or CAGE.

b. Military part number (see 1.2.1).

c. Number of conductors.

d. Voltage rating of the component wire.

e. AWG size for homogeneous cables.

f. National stock number (if applicable).

3.5.1 Inked marking. Inked or indent marking shall be used on sheath materials designated A, B, and C. Indent marking is allowed only when sheath wall thickness is equal to or greater than .010 inch. Inked marking is required on all other sheath materials and those sheaths with wall thickness less than .010 inch. Marking shall repeat at intervals of not more than 24 inches. Continuous marking is acceptable. Marking at the discretion of the manufacturer may be on either one, two, or three lines.

3.6 Workmanship.

3.6.1 Basic insulated wire. All basic insulated wires shall be subjected to all inspection test requirements of the applicable specification (see 3.1) by the cable manufacturer immediately preceding cabling. Reports of these tests shall be kept on file for the particular cable under construction.

3.6.1.1 Stripe durability. Color striping on basic insulated wires shall be capable of withstanding 250 cycles (500 strokes) when tested in accordance with 4.4.7. A continuous line of the colored stripe shall not be removed.

3.6.2 Dielectric test. Prior to final cabling, all components shall receive the dielectric test of 4.5.4 without failure. The test voltage applied shall be those specified in the specifications for the basic insulated wire types in the component.

3.6.2.1 Heat stability. Polyamide jackets shall be tested in accordance with 4.5.8 for heat stability. There shall be no cracking of the jacket as a result of this test.

3.6.2.2 Finished cable. The finished cable shall conform to the requirements specified herein and those of the applicable military specification sheet (see 3.1) when inspected in accordance with 4.5.1. The cable shall be round, i.e., possessing a circular cross section. The cable shall also possess cylindrical uniformity and, in addition, shall be free from lumps and kinks. The cable outer surface shall be smooth, and free from abrasions, scraped, pitted or pocked surfaces, skin impurities, and other deficiencies as noted herein.

3.6.2.3 Sheath physical properties. The physical properties of the sheath, removed from the finished cable, shall be in accordance with table V when tested in accordance with 4.5.2 through 4.5.2.6.

3.6.2.4 Conductor resistance. The direct current resistance of each conductor shall not exceed the values of the applicable specifications increased by the ratio computed as specified in 4.5.3.

3.6.2.5 Cable dielectric strength. Insulated conductors in the finished cable shall be subjected to the dielectric strength test of 4.5.4. The voltages used shall be those specified in the specifications for the basic insulated wire types in the cable.

3.6.2.6 Cold bend. The cable shall be subjected to the cold bend test of 4.5.5 and shall show no evidence of cracked sheath, component jacket, or conductor insulation.

3.6.2.7 Ozone resistance. Cables with sheath material C shall be tested in accordance with 4.5.6. After testing, the sheath shall have no visible cracks when examined under three power magnification.

3.6.2.8 Marking durability. Marking on sheath material C shall be capable of withstanding 250 cycles (500 strokes), and 150 cycles (300 strokes) for sheath materials A, B, F, and G when tested in accordance with 4.5.7. No letter or number shall be illegible following the test. This test is not applicable to the indent marking method of identificaton.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor 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 any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

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

a. Process control inspection (see 4.3).

b. Quality conformance inspection (see 4.4).

4.3 Process control inspection. Process control test shall consist of:

a. Group 1 tests (see 4.3.1).

b. Group 2 tests (see 4.3.2).

4.3.1 Group 1 tests. Group 1 tests shall be those specified in table X. The basic insulated wires shall be sampled and tested as provided for in the governing specification by the cable manufacturer prior to cabling. An inspection lot shall be defined as all the wire to be used for each load on the twisting machine with basic wire A, B, D, E, F, H, M, N, and P. The dielectric test shall be conducted on all wire in the lot.

TABLE X. Group 1 process control test.

Inspection	Requirement paragraph	Test method paragraph
All inspection test of basic wire specification	3.6.1	Applicable wire specification
Wire identification	3.2.1.2 through 3.2.2	MIL-STD-686
Stripe durability	3.6.1.1	4.5.7

4.3.2 Group 2 tests. Group 2 tests shall be those tests specified in table XI and shall be performed on components including the jackets of jacketed components and on jackets of single conductor shielded wire. The dielectric test shall be conducted on all components in the lot. The lot shall be defined as all components entering a given cable machine load. The sample unit shall be each reel to be loaded on the cabling machine. The sampling and inspection shall be in accordance with MIL-STD-105. Inspection level II shall be used with an acceptance number of 0, rejection number 1.

TABLE XI. Group 2 process control tests.

Inspection	Requirement paragraph	Test method paragraph
Visual and dimensional inspection		
Filler material	3.2.3	4.5.1 through 4.5.1.4, and specified methods of FED-STD-228
Component twisting (length of lay)	3.4.1	
Tape material and dimensions	3.2.4	
Shield		
Material	3.2.5	
Coverage and braid angle	3.4.2	
Jacket dimensions	3.4.3	
Jacket material		
Physical properties	3.2.8.1	In accordance with applicable specification
Electrical		
Dielectric strength	3.6.2	4.5.4

4.3.3 Noncompliance. If a lot fails group 1 or 2 tests, the manufacturer may screen out or rework defectives and resubmit the lot for Government inspection.

4.4 Quality conformance. Quality conformance tests shall be those tests specified in table XII and shall be performed on completed cable or material removed from completed cable. The dielectric test shall be conducted on all cable in the lot. The lot shall consist of all cable of one type manufactured substantially under the same conditions and offered for inspection at one time. Visual and mechanical inspection shall be conducted on the basic finished insulated wires in the completed cable in accordance with the basic wire specification. The sampling and inspection shall be in accordance with MIL-STD-105. The sample unit shall be each reel. Inspection level II shall be used with an acceptance number of 0 rejection number 1.

TABLE XII. Quality Conformance Tests.

Inspection	Requirement paragraph	Test method paragraph
Visual and dimensional inspection		
Basic wire		
Components		
Filler material	3.2.3	
Lay	3.4.4	4.5.1.1 and specified methods of FED-STD-228
Tape material and dimensions	3.2.4	
Shield		4.5.1.2 and specified methods of FED-STD-228
Material	3.2.5	
Braid coverage	3.4.2	
Cable separator	3.4.4.4	
Sheath thickness	3.4.5.3	
Workmanship	3.6	
Sheath		
Physical properties	3.6.2.3	4.5.2.1 through 4.5.2.6
Cable		
Conductor resistance	3.6.2.4	4.5.3
Dielectric strength	3.6.2.5	4.5.4
Cold bend	3.6.2.6	4.5.5
Ozone resistance	3.6.2.7	4.5.6
Marking durability	3.6.2.8	4.5.7

4.4.1 Inspection of packaging. The sampling and inspection of the preservation, packing, and container marking shall be in accordance with the requirements of MIL-C-12000.

4.5 Methods of inspection.

4.5.1 Visual and mechanical inspection. Cable, components, and wire shall be subjected to a thorough visual and mechanical inspection to ascertain that the materials, construction, workmanship, marking, and lengths are in accordance with the applicable requirements. In the event of dimensional discrepancy, 5 feet shall be cut from the end of the sample unit and the dimensions shall be remeasured beyond this 5 foot point.

4.5.1.1 Length of lay (see 3.4.1). The length of lay shall be determined in accordance with method 1521 of FED-STD-228.

4.5.1.2 Shield coverage. Shield coverage shall be determined by method 8121 of FED-STD-228 except that the formula specified in 3.4.2 shall be used for the calculation.

4.5.1.3 Outside diameter. The outside diameter of the cable shall be measured using the applicable portions of method 1331 of FED-STD-228.

4.5.1.4 Wall thickness of jackets and sheaths (see 3.4.3.3 and 3.4.5.3). The wall thickness of jackets and sheaths shall be measured by method 1014 of FED-STD-228 with method 1018 of FED-STD-228 used as a referee.

4.5.2 Cable sheath tests (see 3.6.2.3).

4.5.2.1 Tensile strength. The tensile strength test shall be made in accordance with method 3021 of FED-STD-228. Bench marks on test specimens shall be 2 inches apart before tensile loading is applied.

4.5.2.2 Ultimate elongation. Ultimate elongation test shall be made in accordance with method 3031 of FED-STD-228. Bench marks on test specimens shall be 2 inches apart before tensile loading is applied.

4.5.2.3 Tension set. The tension set test shall be performed in accordance with method 3161 of FED-STD-228 except that the minimum set shall be determined by elongating the specimen until the 2-inch gauge marks are 6 inches apart, releasing within 5 seconds and determining the distance between gauge marks 1 minute after release. The set is the difference between this length and the original 2 inch gauge length.

4.5.2.4 Tear strength. The tear strength test shall be made in accordance with method 3111 of FED-STD-228.

4.5.2.5 Accelerated aging tests. For sheath material A, the accelerated aging shall be conducted in accordance with 4031 of FED-STD-228 and for sheath material C, the aging shall be conducted in accordance with method 4011 of FED-STD-228.

4.5.2.6 Oil resistance. The oil resistance test shall be performed in accordance with method 4221 of FED-STD-228.

4.5.3 Conductor resistance (see 3.6.2.4). Conductor resistance shall be measured by method 6021 of FED-STD-228. The added length of conductor due to cabling shall be determined by the length of lay of the conductor and the mean diameter of the layer.

4.5.4 Dielectric strength (see 3.6.2.5). The dielectric strength test shall be conducted in accordance with method 6111 of FED-STD-228, except that the shielded specimens shall be tested dry against the shield as a ground electrode.

4.5.5 Cold bend (see 3.6.2.6). Two specimens shall be subjected to the cold bend test at the temperature indicated in table XIII. The specimens shall be placed in a cold chamber in a nonflexed position and maintained at the required temperature for a minimum of 16 hours. Without removal from the cold chamber, each specimen shall be bent around a mandrel with a diameter in accordance with table XIII for one complete turn. Upon removal from the chamber, the specimen shall be examined for conformance with 3.6.2.6. The insulated conductors removed from the cable shall be submitted to the dielectric strength test of the applicable basic insulated wire specification.

TABLE XIII. Cold bend test temperature and mandrel size.

Cable outside diameter	Sheath material designator			
	A and F	B and G	C	D, E, and H
	Temperature			
	-40°C	-55°C	-55°C	-55°C
0.000 through 0.300	3 X OD	3 X OD	3 X OD	3 X OD
0.301 through 0.350	3 X OD	3 X OD	3 X OD	3 X OD
0.351 through 0.450	3 X OD	3 X OD	3 X OD	3 X OD
0.451 through 0.550	4 X OD	4 X OD	3 X OD	4 X OD
0.551 through 0.750	5 X OD	5 X OD	4 X OD	5 X OD
0.751 through 0.850	6 X OD	6 X OD	5 X OD	6 X OD
0.851 through 0.950	8 X OD	8 X OD	5 X OD	8 X OD
0.951 through 1.500	10 X OD	10 X OD	6 X OD	
1.501 through 2.000	15 X OD	15 X OD	8 X OD	
2.001 through over	20 X OD	20 X OD	10 X OD	

4.5.6 Ozone resistance (see 3.6.2.7). Samples shall be prepared for ozone testing by bending around mandrels as indicated in table XIV. The mandrels may be removed after bending provided the diameter of bend of the cable samples is maintained for a minimum of 180 degrees of bend. Prior to placing the samples into the ozone chamber, the samples shall be wiped with a clean cloth to remove dirt, sweat and surface moisture. The samples shall then be exposed in accordance with ASTM D 1149 at a temperature of 49°C ±5°C for a period of 7 days. Upon removal from the ozone chamber, the samples shall be examined for conformance with 3.6.2.7.

TABLE XIV. Ozone mandrel size.

Cable outside diameter	Mandrel diameter
0 through .500	4 X OD
.501 through .750	5 X OD
.751 through 1.250	6 X OD
1.251 through 1.750	8 X OD
1.751 through 2.250	10 X OD

4.5.7 Stripe and marking durability test (see 3.6.2.8). A short specimen of finished cable shall be firmly clamped in a horizontal position with its upper longitudinal surface area freely exposed. A steel mandrel (0.025 diameter ±0.001 inch) shall be repeatedly rubbed over the surface at the strip or mark so that the longitudinal axis of the mandrel and specimen shall be at right angles to each other. A weight shall so be attached to the jig holding the rubbing mandrel such that the combined jig and weight exerts a 500 gram thrust normal to the surface. A motor driven reciprocating cam mechanism and counter shall be used to permit an accurately measured number of abrasion strokes. The length of the stroke in one direction shall be 3/8 inch and the frequency of the stroke shall be 100 strokes per minute. The direction of the motion shall be along the axis of the specimen and perpendicular to the axis of the mandrel. The procedure shall be repeated on two additional specimens of wire or cable selected 50 feet apart on a sample.

5. PACKAGING.

5.1 Packaging requirement. The requirements for packaging shall be in accordance with MIL-C-12000.

6. NOTES.

6.1 Intended use. The cable covered by this specification is intended for use in extensive electrical and electronic applications in protected areas. The above cables are not intended for use as portable cables, to be laid in the open where they may be subjected to vehicular traffic and direct burial. The cables described in this specification will provide flexible single shielded and multi-conductor cable for use within tunnels, wire ways, instrument racks, and conduits within the electronic equipment, trailers, or buildings and in protected runways between building. The cable will be used for data transmission, synchronizing pulses, audio and video signals, control power, radio frequency signals, and operating power for electronic equipment.

6.1.1 Selection of basic wire. Table XV may be used as a guide to the selection of the basic wires designated A through E, and H. The values given are for engineering guidance only and are not intended to be specification requirements or firm limitations.

6.1.1.1 Wire types designated M and P. Where the cable is to be striped back and the individual insulated wires are exposed and may be subject to some mechanical abuse, it is suggested that wire designated M be used for sizes 24 through 12. Wires M and P may be used with conductor temperatures of 105°C and any combination of ambient temperature and current so that this conductor temperature is not exceeded. A life of approximately 3 months may be expected with conductor temperatures as high as 115°C and a life of approximately 1 week may be expected with conductor temperatures as high as 135°C. Wire M and P should not be used where it is expected that the exposed single conductor at cable ends will be bent or flexed at temperatures below minus 10°C in service and installation.

6.1.1.2 Wire type designated N. Type N wire may be used where handling bending and flexing of the individual conductors beyond the stripped back cable sheath may be experienced at temperatures as low as -55°C. The electrical properties of this insulation makes it suitable for the transmission of pulses with steep wave fronts, data transmission, video and radio frequency power. It is superior electrically to M and P wires, since the insulation resistance is several million megohms per thousand feet, its power factor is less than 0.005, and its dielectric constant in the order of 2.25 resulting in a low loss, low capacitance insulated wire. Provision is made for increasing the wall thickness of the polyethylene insulation to further reduce capacitance when required.

6.1.1.3 Wire types designated D and E. Wire types designated D and E should be used where reliability is of utmost importance. The desirable features of M, P, and H are combined in D and E wire. Maximum conductor temperatures up to 200°C are permissible (consistent with proper component jackets, tape and filler material, and sheath material). Wires D and E may be bent and flexed as a single conductor at temperatures as low as -210°C (liquid nitrogen or liquid oxygen spillage). Wires D and E have somewhat better electrical properties than N wire. The power factor is in the order of 0.0002 and the dielectric constant in the order of 2.0 thus giving improved performance where low capacitance and low loss is necessary. Provision is made for increasing the wall thickness of the insulation to further reduce capacitance when required.

6.1.1.4 Wire designated F. The coaxial cable should be used when dictated by the radio, or audio frequency circuits, or for data transmission when the electrical properties of this type cable are necessary.

TABLE XV. Guide for selection of basic insulated wire.

Characteristic	Basic wire by designator									
	A and B (Polyvinyl chloride)	D and E (Polytetra-fluoroethylene)	G (Thermocouple)	H (Polyethylene)	J (Polyvinyl chloride)	K (Polytetra-fluoroethylene)	L (Fluorinated ethylene propylene)	M (Polyvinyl chloride)	N (Polyvinyl chloride)	P (Polyvinyl chloride)
Approximate dielectric constant	3.7	2		2.5	3.7	2	2.1	3.7	3.7	3.7
Approximate power factor Change with frequency Change with temperature	Varies Varies	<0.0002 Constant Constant		<0.005 Constant Constant	Varies Varies	<0.0002 Constant Constant		Varies Varies	Varies Varies	Varies Varies
Approximate insulation resistance 15°C 85°C	1000 MΩ per 1000 feet 5 MΩ per 1000 feet	$>10^6$ MΩ per 1000 feet $>10^6$ MΩ per 1000 feet		$>10^6$ MΩ per 1000 feet $>10^6$ MΩ per 1000 feet						
Flammability	Will ignite but is self-extinguishing	Noncombustible		Burns slowly when exposed beyond jacket	Will ignite but is self-extinguishing	Noncombustible	Noncombustible	Will ignite but is self-extinguishing	Will ignite but is self-extinguishing	Will ignite but is self-extinguishing
Solderability	Good	Excellent; hot soldering iron may be laid against insulation with no damage		Fair	Silver-good Tin-fair	Excellent; hot soldering iron may be laid against insulation with no damage.	Excellent; hot soldering iron may be laid against insulation with no damage.	Silver-good Tin-fair	Silver-good Tin-fair	Silver-good Tin-fair
Operating temperature for sheltered cables Stationary Flexing	 -60°C to +105°C -25°C to +105°C	 -200°C to +200°C -200°C to +200°C		 -60°C to +80°C -55°C to +80°C						
Exposed single conductors Stationary Flexing	 -60°C to +105°C -10°C to +105°C	 -200°C to +200°C -200°C to +200°C		 -60°C to +80°C -40°C to +80°C						
Fluid resistance	Nylon jacket is insoluble in common solvents except alcohols. Unattacked by alkalis, dilute mineral acids, and most organic acids. Unaffected by petroleum hydrocarbon. Dissolves in alcohols phenols and formal acid.	Unaffected by all solvents and chemicals except molten alkali metals.				Unaffected by all solvents and chemicals except molten alkali metals.	Unaffected by all solvents and chemicals except molten alkali metals.			

6.1.1.5 Wires designated A, B, and J. These wires have a tough mechanical outer coating over the primary insulation. This jacket is considered necessary because of the physical abuse presented to multiconductor cable during manufacture and installation and is particularly necessary where the wires are to be shielded or in contact with other shielded wires, to prevent small broken strands in the shield from penetrating through the relatively soft primary insulation and causing circuit failure. The polyamide specified is that which has been used for several years successfully in electronic and aircraft type wire for electrical purposes and has very low moisture absorption with desirable electrical properties.

6.1.2 Selection of component jackets. Table XVI may be used as a guide in the selection of component jackets. The values listed are for engineering guidance only and are not intended to be specification requirements or firm limitations.

TABLE XVI. Guide for selection of component jacket.

Characteristic	Material				
	Polyamide	Polyvinyl chloride 1/	Polyethylene	Fluorinated ethylene propylene	Glass braid yarn
Continuous operating temperature					
Stationary	-60°C to +105°C	-85°C to +90°C	-55°C to +75°C	-200°C to +200°C	-200°C to +200°C
Flexing	-40°C to +105°C	-10°C to +90°C	-55°C to +75°C	-55°C to 200°C	-85°C to +200°C
Insulating value	Fair	Good	Excellent	Excellent	Excellent
Softening due to soldering shield	Good	Good	Fair	Excellent	Excellent
Abrasion resistance	Excellent	Good	Good	Fair	Fair
Fluid resistance	Good	Fair	Good	Excellent	Poor
Statements apply to continual soaking and occasional spillage of reactive solvents which will not affect cable usefulness.	Unaffected by petroleum hydrocarbons and most solvents except alcohols and phenol.	Swells or dissolves in hydrocarbons present in fuels and lubricants. Resists alcohols and paraffin based oils. Dissolves in ketones and esters.	Swelled by some fuel hydrocarbons above 60°C. Resists alcohols, mineral acids, and alkalis.	Not measurably attacked by any known fluid in use.	Not measurably attacked by any known fluid in use.

1/ PVC shall not be used in aerospace applications.

6.1.2.1 Polyamide jackets. Polyamide jackets are intended to provide shield isolation where shields are carried at ground potential for small components. Polyamide jackets are not permitted for use except over shields because the polyamide component jacket would adhere to the polyamide jackets over the individually twisted pairs or triples and make it impossible to separate and properly strip the twisted component group. Further, this type of jacket is not allowed on diameters over 1/4 inch because of the tendency of polyamide when applied over large diameters to stretch when bent, and wrinkle when straightened again. With repeated working, these wrinkles may easily become cracks.

6.1.2.2 Polyvinyl chloride jacket. Polyvinyl chloride jackets are generally recommended for polyvinyl chloride insulated wires to be used in applications where ambient temperatures do not exceed 90°C and maximum conductor temperatures do not exceed 105°C for continuous use. Polyvinyl chloride jackets are suitable for short time use with polyvinyl chloride insulated wire with conductor temperatures as defined in 6.1.1.1. Polyvinyl chloride shall not be used in aerospace applications.

6.1.2.3 Polyethylene jackets. Polyethylene jacket is recommended where polyethylene insulated wire is used since it is compatible with maximum and minimum operating tempertures as defined in 6.1.1.2 and permits operation and handling at low temperatures of the complete component with a good degree of flexibility.

6.1.2.4 Fluorinated ethylene propylene. Fluorinated ethylene propylene jacket is recommended for polytetrafluoroethylene insulated wire where the advantage of the high operating temperature is desired. Fluorinated ethylene propylene jacket is suitable for operation up to 200°C for continuous service, and is satisfactory for use where the component must be handled at temperatures as low as minus 85°C.

6.1.2.5 Glass braid jacket. Glass braid jacket is recommended for use only on single shielded constructions where protection is needed between the basic insulation and the shield. It is recommended for use with polyvinyl chloride insulated wires.

6.1.3 Selection of sheath. Table XVII may be used as a guide to the selection of a sheath. The values given are for engineering guidance only and are not intended to be specification requirements or firm limitations.

6.1.3.1 Polyvinyl chloride sheath. Polyvinyl chloride is suitable for ambient temperatures up to 90°C for continuous service and is suitable as a jacket for polyvinyl chloride insulated wires within the high conductor temperature limits set forth in 6.1.1.1 for short time use. If the cable is to be bent or flexed at low temperatures, extreme caution should be used with this style of sheath. It is not recommended that polyvinyl chloride sheath be used when the cable is to be handled at temperatures below minus 10°C. Even though a cold bend test at minus 40°C is provided in the specification, this test is only a comparison for quality control purposes between various types of polyvinyl chloride which might be used and an assurance of proper extrusion techniques, and the test does not represent the physical use that the cable in the field may get by manual handling. Polyvinyl chloride sheath provides a tough abrasion resistant outer covering for the cable. Polyvinyl chloride shall not be used in aerospace applications.

6.1.3.2 Polyethylene sheath. Polyethylene is suitable for operation over the temperature range indicated in 6.1.2.3 for polyethylene jackets. Polyethylene gives a tough highly abrasion resistant outer coating and retains flexibility at low temperatures.

6.1.3.3 Polychloroprene sheath. Polychloroprene sheaths are intended for general purpose use between the temperature range of -55°C and +75°C. If the cable must be handled in any degree at low temperatures, polychloroprene would provide a more flexible cable than any of the other sheaths.

6.1.3.4 Florinated ethylene and polytetrafluoroethylene sheath. Florinated ethylene and polytetrafluoroethylene sheaths are intended for the outer covering of cable to be operated at temperatures above those permissible with polyvinyl chloride, polyethylene, and polychloroprene sheaths.

6.1.3.5 Polyamide sheath. Polyamide sheath is intended for the outer covering on single shielded cables needing a tough mechanical outer layer.

6.1.3.6 Glass braid sheath. Glass braid sheath is intended for the same use as polytetrafluoroethylene but for applications which need temperatures above 110°C.

TABLE XVII. Guide for selection of sheath material.

Sheath material	Continuous operating temperature	Abrasion resistance	Ability to take impact loading	Flexibility degrees 1/			Fluid resistance statement 2/
				-30°C	0°C	40°C	
Polyvinyl chloride 3/	-55°C to +90°C (stationary) -10°C to +90°C (flexing)	Good	Fair	G	F	P	Swells or dissolves in hydrocarbons present in fuel and lubricants. Resist alcohol and parafin base oils. Dissolves in ketones and esters.
Polyethylene	-55°C to +75°C (stationary) -55°C to 75°C (flexing)	Excellent	Fair	G	G	G	Swells in some hydrocarbons present in fuels above 60°C. Resists alcohols mineral acids, alkalis.
Polychloroprene	-55°C to +75°C (stationary) -55°C to +75°C (flexing)	Good	Excellent	E	E	G	Resistant to alcohols, oils, grease, and most solvents. Attached by chlorinated hydrocarbons and benzene based solvents.
Fluorinated ethylene propylene	-200°C to +200°C (stationary) -55°C to +200°C (flexing)	Fair	Poor	G	G	G	Not measurably attached by any known fluid within usage temperature range.
Polytetra-fluoroethylene	-200°C to +200°C (stationary) -65°C to 200°C (flexing)	Fair	Poor	G	G	G	Not measurably attached by any known fluid within usage temperature range.
Polyamide	-55°C to +150°C (stationary) -55°C to +110°C (flexing)	Good	Good	G	F	P	Unaffected by petroleum hydrocarbons and most solvents except alcohols and phenol.
Glass braid	-200°C to +200°C (stationary) -200°C to +200°C (flexing)	Poor	Excellent	P	P	P	No comment available.
Polyurethane							

1/ E - Excellent
G - Good
F - Fair
P - Poor

2/ Apply to continual soaking occasional spillage of reactive solvents will generally not affect cable usefulness.

3/ PVC shall not be used in aerospace applications.

6.2 Ordering data.

6.2.1 Cables with military specification sheets. Cables for which military specification sheets have been established. Acquisition document should specify the following:

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

b. Title, number, and date of the applicable military specification sheet and length of cable required (see 3.1).

c. Military specification part number (see 1.2.1).

d. Required nontechnical constructional changes such as sheath color, addition of binder tapes, or other minor deviations that do not affect the performance requirements.

e. Inspection responsibility, if other than specified (see 4.1).

f. Applicable level of preservation, packaging, and packing required (see 5.1).

6.2.2 Cables for which military specification sheets have not been established. Acquisition documents should specify the following in addition to the information required in 6.2.1:

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

b. That prior to cable fabrication, the contractor shall furnish a copy of the design data, as required herein, to the acquiring activity and custodian of this specification for configuration, documentation and approval, and assignment of a specification sheet number (see 3.1.1).

c. Basic wire specification, number, AWG of conductors, and sheath material (see 3.3, 1.2.1.1).

d. Required component should be specified as follows:

(1) Jacket material for shielded components (see 3.4.3.1).

(2) Jacket material for nonshielded components (see 3.4.3.1).

e. The percent shield coverage if other than specified (see 3.4.2).

f. Over-all shield, if required (see 3.4.4.3).

6.3 Definitions. For the purpose of this specification, the following definitions are established.

6.3.1 Component. A single conductor is shielded and jacketed, or any combination of conductor laid up as a subassembly such as twisted pairs, quads, etc., to be later assembled as a group into the complete cable core.

6.3.2 Component jacket. Component jacket is that cover applied over shielded single conductors; twisted pairs shielded and nonshielded; twisted triplets shielded and nonshielded, etc.

6.3.3 Over-all shielding. Over-all shielding is that shield applied over the completed cable core prior to application of the cable sheath.

6.3.4 Cable sheath. Cable sheath is the over-all outer covering that forms the finished cable.

6.4 Cross references.

6.4.1 Cross reference of type to wire specification shall be in accordance with table XVIII.

TABLE XVIII. Cross reference of type to wire specification designator.

Current basic wire specification designator	Former basic wire specification designation
A	Type I
B	Type II
C superseded by H	Type III superseded by type VIII
D	Type IV
E	Type V
F	Type VI
G	Type VII
H	Type VIII
J	Type IX
K	Type X
L	Type XI
M	Type XII
N	Type XIII
P	Type XIV

6.4.2 Cross reference of class to component jacket material. Cross reference of class to component jacket material shall be in accordance with table XIX.

TABLE XIX. Class to jacket material.

Former class	New class	Jacket material
A	E, F, G, H	Polyamide
B	I, J, K, L	Polyvinyl chloride
C	M, N, O, P	Polyethylene
D	R, S, T, U	Fluorinated ethylene propylene
E	V, W, X, Y	Glass braid yarn

6.4.3 Style cross reference. Style to sheath material designator shall be in accordance with table XX.

TABLE XX. Style to sheath material designator.

Former style	Current sheath material designator
1	A
2	B
3	C
4	D
5	E
6	F
7	G
8	H

6.5 Subject term (key word) listing.

Cable
Multiconductor cable
Power cable
Shielded cable

6.6 Changes from previous issue. Asterisks (or vertical lines) are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:
Army - CR
Navy - SH
Air Force - 85

Review activities:
Air Force - 85
DLA - ES, IS

Preparing activity:
Air Force - 85

Agent:
DLA - ES

(Project 6145-0908)

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