INCH-POUND
MIL-DTL-55021D
w/AMENDMENT 3
19 August 2020
SUPERSEDING
MIL-DTL-55021D
w/AMENDMENT 2
28 June 2019

DETAIL SPECIFICATION

CABLE, ELECTRICAL, SHIELDED SINGLES, SHIELDED AND JACKETED SINGLES, TWISTED PAIRS AND TRIPLES, INTERNAL HOOKUP, GENERAL SPECIFICATION FOR

Inactive for new design after 19 January 2016.

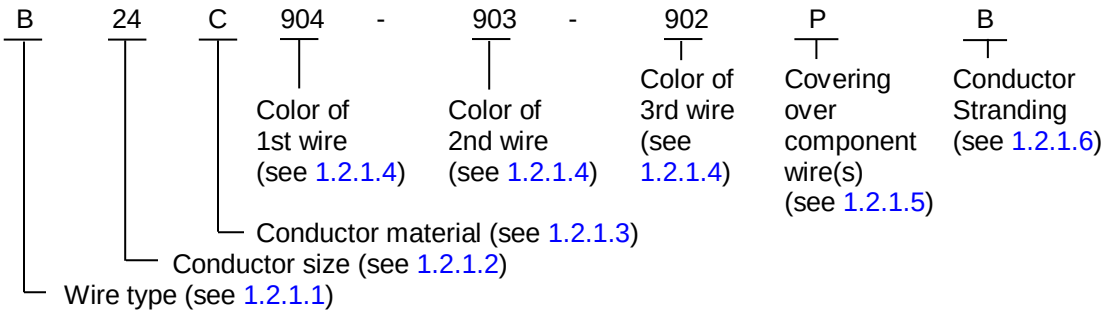
This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers electrical cables consisting of unshielded and unjacketed, shielded, jacketed, or shielded and jacketed twisted pairs and triples, and shielded or shielded and jacketed singles. The cable is intended for internal wiring of electrical equipment for application temperatures of -40 to 105 degrees Centigrade (°C), or -65 to 200 °C. Cables constructed with polyvinyl chloride (PVC) - insulated wires or jackets are not to be used for aerospace applications.

1.2 Classification.

1.2.1 Type designation. The type designation of cable consists of the following form, and as specified (see 6.2):



Type designation example: B24C904-903-902PB (MIL-DTL-16878/1 type wire; 24 AWG conductor size; copper material; 1st wire white base color, black first stripe, yellow second stripe; 2nd wire white base color, black first stripe, orange second stripe; 3rd wire white base color, black first stripe, red second stripe; covered with polyvinyl chloride jacket; 7 strands).

Comments, suggestions, or questions on this document should be addressed to DLA Land and Maritime, ATTN: VAI, P.O. Box 3990, Columbus, OH 43218-3990, or email to WireCable@dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.dla.mil/.

AMSC N/A FSC 6145

1.2.1.1 Type of wire. The type of wire is identified by a one- or two-letter symbol as specified in table I.

TABLE I. Type of wire.

Symbol type	Wire specification 1/ 2/
B	MIL-DTL-16878/1 or NEMA HP 7, Type B
C	MIL-DTL-16878/2 or NEMA HP 7, Type C
D	MIL-DTL-16878/3 or NEMA HP 7, Type D
E	NEMA HP 3 , Type E, Silver Coated, Extruded Construction
EE	NEMA HP 3 , Type EE, Silver Coated, Extruded Construction
BJ	MIL-DTL-16878/17 or NEMA HP 7, Type BN
CJ	MIL-DTL-16878/18 or NEMA HP 7, Type CN
DJ	MIL-DTL-16878/19 or NEMA HP 7, Type DN

1/ MIL-DTL-16878 wire with PVC insulation should not be used for aerospace applications.
2/ See Table A-I in Appendix A for obsolete MIL-DTL-16878 wire types and their superseding NEMA HP document wire types.

1.2.1.2 Conductor size. The conductor size is identified by a one- or two-digit number that indicates the American Wire Gauge (AWG) size.

1.2.1.3 Conductor material. The conductor material is identified by the letter “C” for copper, the letter “S” for copper clad steel, or the letter “H” for high strength copper alloy. Conductor coating information is provided in table I-A.

TABLE I-A. Type of wire and conductor material information.

Type of wire	Material symbol	Material	Conductor coating
B C D BJ CJ DJ	C	Copper	Tin
	S	Copper clad steel	
	H	High strength copper alloy	Silver
E EE	C	Copper	Silver
	S	Copper clad steel	
	H	High strength copper alloy	

1.2.1.4 Color code. The color code of each individual wire is identified by a number built up from the digits designating the colors as specified in 3.5.1. For single shielded and single shielded and jacketed constructions, a dash should not be used. The color code designators for wires 2 and 3 of a twisted pair and triplet are separated by a dash. Two groups of numbers indicate a twisted pair, three groups indicate a twisted triple. Any order of color code designators is acceptable.

1.2.1.5 Construction of covering over the finished cable. The covering of the finished cable is identified by a one-, two-, or three-letter symbol as specified in table II.

TABLE II. Finished cable covering nomenclature.

Symbol 1/	Covering over finished cable 2/
U	Unjacketed and unshielded
P	Polyvinyl chloride (PVC) jacket
F	Fluorinated ethylene propylene (FEP) jacket
J	Polyamide jacket
T	Polytetrafluoroethylene (PTFE) jacket
S	Shielded and unjacketed
SF	Shielded and covered with FEP jacket
SP	Shielded and covered with PVC jacket
SJ	Shielded and covered with Polyamide jacket
STW	Shielded and covered with wrapped PTFE jacket
STX	Shielded and covered with extruded PTFE jacket

1/ All single conductor constructions must include shielding; jacketing is optional.
2/ PVC insulated cable should not be used for aerospace applications.

1.2.1.6 Conductor stranding. The number of strands making up the conductor is designated by a single letter as follows:

Number of strands	Letter	Number of strands	Letter
1	A	133	L
7	B	168	M
10	C	259	N
16	D	665	P
19	E	817	R
26	F	1045	S
37	G	1330	T
41	H	1672 (1665 if wire type E or EE)	V
65	J	2109	W
105	K		

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 of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

FEDERAL STANDARD

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

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-572	-	Cords, Yarns and Monofilaments Organic Synthetic Fiber
MIL-DTL-16878	-	Wire, Electrical, Insulated, General Specification for
MIL-DTL-16878/1	-	Wire, Electrical, Polyvinyl Chloride (PVC) Insulated, 105 Deg. C, 600 Volts (Not for Navy Shipboard Use)
MIL-DTL-16878/2	-	Wire, Electrical, Polyvinyl Chloride (PVC) Insulated, 105 Deg. C, 1000 Volts (Not for Navy Shipboard Use)
MIL-DTL-16878/3	-	Wire, Electrical, Polyvinyl Chloride (PVC) Insulated, 105 Deg. C, 3000 Volts (Not for Navy Shipboard Use)
MIL-DTL-16878/17	-	Wire, Electrical, Polyvinyl Chloride (PVC) Insulated, Polyamide Jacket, 105 Deg. C, 600 Volts (Not for Navy Shipboard Use)
MIL-DTL-16878/18	-	Wire, Electrical, Polyvinyl Chloride (PVC) Insulated, Polyamide Jacket, 105 Deg. C, 1000 Volts, (Not for Navy Shipboard Use)
MIL-DTL-16878/19	-	Wire, Electrical, Polyvinyl Chloride (PVC) Insulated, 105 Deg. C, 3000 Volts, Polyamide Covering (Not for Navy Shipboard Use)
MIL-DTL-55021/1	-	Cable, Electrical, Shielded Singles, Shielded and Jacketed Singles, Twisted Pairs and Triples, Internal Hookup, -40 to 105 ºC
MIL-DTL-55021/2	-	Cable, Electrical, Shielded Singles, Shielded and Jacketed Singles, Twisted Pairs and Triples, Internal Hookup, -65 to 200 ºC

DEPARTMENT OF DEFENSE STANDARD

MIL-STD-681	-	Identification Coding and Application of Hookup and Lead Wire

(Copies of these documents are available online at https://quicksearch.dla.mil.)

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

ASTM INTERNATIONAL

ASTM D3032	-	Standard Test Methods for Hookup Wire Insulation
ASTM D4066	-	Standard Classification System for Nylon Injection and Extrusion Materials

(Copies of these documents are available online from https://www.astm.org.)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA HP 3	-	Electrical and Electronic PTFE (Polytetrafluoroethylene) Insulated High Temperature Hook-up Wire; Types ET (250 Volts), E (600 Volts), and EE (1000 Volts)
NEMA HP 7	-	Electrical and Electronic PVC, PVC/Nylon, and PE/Nylon 105ºC Hook-Up Wire, Types B, C, D, BN, CN, and DN (600, 1000, and 3000 V), and Types J and JN 75ºC (600V)

(Copies of these documents are available online at https://www.nema.org.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein (except for related specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Specification sheets (see 4.6.1). 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.

3.2 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.4.

3.3 Recycled, recovered, environmentally preferable, or biobased materials (see 4.6.1). Recycled, recovered, environmentally preferable, or biobased materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.4 Materials (see 4.6.1). Materials shall be as specified herein. When a material is not specified, a material shall be used that will enable the cable to meet the performance requirements of this specification.

3.4.1 Basic wire (see 4.6.1). All basic wires used in the construction of the cable shall be of the same type (see 1.2.1.1). All basic wires shall conform to either MIL-DTL-16878, NEMA HP 7, or NEMA HP 3.

3.4.2 Shielding (see 4.6.1). When shielding is specified, the cable shield strand size shall be based on the cable core outside diameter and as specified in table III. The cable core outside diameter shall be based on the basic wire diameter multiplied by 1.0 for singles, 1.64 for pairs, and 1.95 for triples. The metallic coating of the copper strands of the shield shall be the same as the metallic coating of the conductor of the basic wire.

TABLE III. Cable shield strand size.

Cable core outside diameter	Shield strand size
.060 inch or smaller	38 AWG
.061 to .310 inch	36 AWG
.311 to .750 inch	34 AWG
.751 inch or larger	32 AWG

3.4.2.1 Braid angle and shield coverage (see 4.6.1, 4.6.13). Braid angle and shield coverage shall be as specified in the applicable specification sheet.

3.4.3 Cable jacket (see 4.6.1). When jacketing is specified, the cable jacket shall be as specified herein or in the applicable specification sheet.

3.5 Design and construction.

3.5.1 Color coding (see 4.6.1). Unless otherwise specified (see 6.2), color coding of individual wires and jackets shall be in accordance with MIL-STD-681.

3.5.2 Wire twist (twisted pairs and triples) (see 4.6.1). The basic wires shall be grouped together and cabled so that the individual wire is not twisted and a minimum overall diameter is obtained. Unless otherwise specified in the contract or order (see 6.2), fillers shall not be used.

3.5.2.1 Direction of lay (see 4.6.1). The direction of lay may be left hand or right hand.

3.5.2.2 Length of lay (see 4.6.1). The length of lay shall be as specified in the applicable specification sheet.

3.5.3 Covering over finished cable.

3.5.3.1 Shield (see 4.6.1). When a shield is specified in the cable construction (see 1.2.1.5), it shall be applied over the wire(s) as specified herein or in the applicable specification sheet.

3.5.3.2 Jacket (see 4.6.1). When a jacket is specified in the cable construction (see 1.2.1.5), it shall be applied over the shielded or unshielded construction as specified herein or in the applicable specification sheet.

3.5.3.3 Jacket material.

3.5.3.3.1 Polyamide (see 4.6.1, 4.6.9, 4.6.11). Polyamide jackets shall be applied concentrically and shall have a wall thickness as specified in the applicable specification sheet. Polyamide material shall conform to ASTM D4066, type PA0621E22, or to MIL-PRF-572.

3.5.3.3.2 Polyvinyl chloride (PVC) (see 4.6.1, 4.6.9, 4.6.11). PVC jackets shall have a wall thickness as specified in the applicable specification sheet. The tensile strength and elongation of the jacket shall be 1,800 psi minimum and 150 percent minimum, respectively.

3.5.3.3.3 Fluorinated ethylene propylene (FEP) (see 4.6.1, 4.6.9, 4.6.11). FEP jackets shall have a wall thickness as specified in the applicable specification sheet. The tensile strength and elongation of the jacket shall be 3,000 psi minimum and 200 percent minimum, respectively.

3.5.3.3.4 Extruded or taped polytetrafluoroethylene (PTFE) (see 4.6.1, 4.6.9, 4.6.11). Extruded or taped PTFE jackets shall have a wall thickness as specified in the applicable specification sheet. The tensile strength and elongation of the jacket shall be 3,000 psi minimum and 150 percent minimum, respectively.

3.6 Performance.

3.6.1 Dielectric strength.

3.6.1.1 Unshielded cable (see 4.6.2.1). The unshielded cable shall withstand the applicable voltage specified in table IV for not less than 1 minute without breakdown.

3.6.1.2 Shielded cable (see 4.6.2.2). The shielded cable shall withstand the applicable voltage specified in table IV for not less than 1 minute without breakdown.

3.6.2 Cold bend.

3.6.2.1 Unshielded cable (see 4.6.3). Unless otherwise specified in the contract or order (see 6.2), cold bend requirements are not applicable for unshielded cable constructions.

TABLE IV. Dielectric strength voltage.

Type of wire	Basic wire spec	Conductor size	Volts (rms)
B & BJ	MIL-DTL-16878/1 & /17	32 to 14 AWG	2,000
C & CJ	MIL-DTL-16878/2 & /18	26 to 12 AWG	3,000
D & DJ	MIL-DTL-16878/3 & /19	24 to 1/0 AWG	6,000
E	NEMA HP 3	32 to 10 AWG	2,000
EE	NEMA HP 3	32 to 6 AWG	3,000

3.6.2.2 Shielded cable (see 4.6.2.2, 4.6.3). All shielded (with and without jacket) cable constructions shall exhibit no cracking of the insulation, jacket material, or any other cable component when subjected a temperature of -40 °C.

3.6.3 Conductor continuity (see 4.6.8). No conductor in a cable shall have any electrical discontinuity.

3.6.4 Concentricity of extruded jackets (see 4.6.10). The concentricity of extruded jackets shall be not less than 70 percent.

3.6.5 Spark (see 4.6.4). All jacketed (shielded and unshielded) cables shall withstand a spark voltage of 1,500 volts (rms) without breakdown.

3.6.6 Dielectric immersion (see 4.6.5). When immersed in water and subjected to a potential voltage, the finished cable shall not exhibit insulation breakdown or damage.

3.6.7 Heat resistance (see 4.6.6). The insulation of each conductor in the cable shall not shrink more than .125 inch after the cable has been subjected to the heat resistance condition specified in the applicable specification sheet. The cable shall then meet the dielectric strength requirements specified in 3.6.1.

3.6.8 Low-temperature storage (see 4.6.7). After being placed in a temperature chamber at a temperature of -62 °C for a minimum of 72 hours, the cable shall be capable of operating satisfactorily and shall meet the dielectric strength requirements specified in 3.6.1.

3.6.9 Flammability (see 4.6.12). Cable specimens with all jacket materials loaded with sufficient weight to remain taut throughout the test shall not burn for more than 30 seconds, nor burn more than 3 inches, after 30 seconds of flame application.

3.7 Cable identification (see 4.6.1). The method of identification shall be compatible with the cable construction as indicated by type designation (see 1.2.1). Identification shall be at intervals of 1 to 3 feet and may be by marking of the outer jacket or tape placed beneath the shield or jacket. All materials used for identification shall conform to the environmental requirements of the particular construction. The identification shall be clear and legible and shall include the following where practicable:

MIL-DTL-55021/(add specification sheet number and revision), manufacturer's name or CAGE code (CAGEC), type designation, and year of manufacture.

Example: MIL-DTL-55021/2C XXXXX (CAGEC) E24C904-903-902SF 2000

Finished unjacketed and unshielded cable shall be identified with the printed marking of a contrasting color applied to the surface of any of the wires in a multiconductor cable (see example above). The size of the printed characters shall be compatible with the basic wire size. No other printed marking shall be applied to the basic wire.

3.8 Workmanship (see 4.6.1). Cable shall be uniform in shape and free of kinks, splints, cuts, cracks, abrasions, and foreign material. The basic wire(s) in the cable shall be free from any imperfections that can affect performance.

4. VERIFICATION

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

a. First article inspection (see 4.4).

b. Conformance inspection (see 4.5).

4.2 Requirements-verification cross-reference matrix. DELETED.

TABLE V. Requirements-verification cross-reference matrix. DELETED.

4.3 Inspection conditions. Unless otherwise specified (see 6.2), all inspections shall be performed in accordance with the test conditions specified in FED-STD-228.

4.4 First article inspection (see 3.2). When required (see 6.2), first article inspection shall consist of all of the tests in groups A, B, and C of table VI.

4.4.1 Specimen length. Unless otherwise specified herein, the length of specimens for tests shall be as specified in the applicable test method.

4.4.2 Failures. One or more failures shall be cause for rejection of the first article sample.

4.5. Conformance inspection. Conformance inspections shall consist of the inspections listed in groups A and B of table VI. Conformance inspection shall be performed on each lot of cable produced under this specification.

4.5.1 Inspection lot. An inspection lot shall consist of all cables of one type and size made under essentially the same conditions, produced on a substantially continuous basis, and offered for inspection at one time.

TABLE VI. First article and conformance inspections.

Inspection	Requirement	Verification
Group A		
Basic wire	3.4.1	4.6.1
Conductor continuity	3.6.3	4.6.8
Spark	3.6.5	4.6.4
Group B		
Jacket wall thickness	3.5.3.3	4.6.11
Braid angle and shield coverage	3.4.2.1	4.6.13
Concentricity of extruded jackets	3.6.4	4.6.10
Visual and mechanical inspection	Specification sheet	4.6.1
Jacket tensile strength and elongation	3.5.3.3	4.6.9
Dielectric strength (unshielded and shielded)	3.6.1.1 and 3.6.1.2	4.6.2.1 and 4.6.2.2
Group C		
Cold bend	3.6.2.1 and 3.6.2.2	4.6.3
Dielectric immersion	3.6.6	4.6.5
Heat resistance	3.6.7	4.6.6
Low-temperature storage	3.6.8	4.6.7
Flammability	3.6.9	4.6.12

4.5.1.1 Unit of product. The unit of product for determining lot size for sampling shall be one continuous length of cable (see 6.2).

4.5.1.2 Sample unit. A sample unit shall consist of one of the individual lengths of the sample. Each sample unit shall be of sufficient length to permit the performance of all applicable inspections or tests.

4.5.1.3 Specimen. A specimen shall consist of a piece of one sample unit upon which a particular inspection or test is made.

4.5.2 Group A inspection. Group A inspection shall consist of the inspections specified in group A of table VI. All finished cable shall be subjected to group A inspection.

4.5.3 Group B inspection. Group B inspection shall consist of those tests specified in group B of table VI. The sample shall be selected from the inspection lots that have passed group A inspection.

4.5.3.1 Sampling. A random sample shall be selected from the inspection lot. The sample size shall be based on the inspection lot size from which the sample was selected for group A inspection. Sample size for inspection shall be in accordance with table VII.

4.5.3.2 Specimen length. Unless otherwise specified herein, specimens for group B inspection shall be of the length specified in the applicable test method.

4.5.4 Rejected lots. Failure of any sample to pass these inspections 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 4.5.5).

TABLE VII. Inspection sample.

Inspection lot size 1/	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	35
3,201 to 10,000	38
10,001 to 35,000	46

1/ Lot size is based on the number of continuous lengths of cable.

4.5.5 Noncompliance. If a sample fails to pass group B inspections (see 4.5.3), the contractor shall notify the cognizant inspection activity of such failure and shall take corrective action on the materials, 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, group B inspection shall be repeated on replacement articles. (This includes all test and examinations, or only the test that the original sample failed, at the option of the cognizant inspection activity.) Group A inspection may be re-instituted; however, final acceptance and shipment shall be withheld until group B inspection has shown that the corrective action was successful. In the event of failure after re-inspection, information concerning the failure shall be provided to the cognizant inspection activity.

4.6 Methods of inspection.

4.6.1 Visual and mechanical inspection (see 3.1, 3.3, 3.4, 3.4.1, 3.4.2, 3.4.2.1, 3.4.3, 3.5.1, 3.5.2, 3.5.2.1, 3.5.2.2, 3.5.3.1, 3.5.3.2, 3.5.3.3.1, 3.5.3.3.2, 3.5.3.3.3, 3.5.3.3.4, 3.7, 3.8). Cable, components, and wire shall be subjected to a thorough visual and mechanical inspection to ascertain that the materials, construction, workmanship, marking, colors, dimensions, and lengths are in accordance with the applicable requirements.

4.6.2 Dielectric strength.

4.6.2.1 Unshielded cable (see 3.6.1.1). The unshielded cable dielectric strength test shall be conducted in accordance with method 6111 of FED-STD-228 between each conductor and other conductors at the applicable voltage specified in table IV. The minimum immersion period is 4 hours for unshielded/unjacketed cables. Immersion is not required for jacketed cables.

4.6.2.2 Shielded cable (see 3.6.1.2, 3.6.2.2). The shielded cable dielectric strength test shall be conducted in accordance with method 6111 of FED-STD-228. The applicable test voltage (see table IV) shall be applied between the conductor and shield for singles and between each conductor and the other conductors and shield in common for pairs and triples. Immersion is not required.

4.6.3 Cold bend (see 3.6.2.1, 3.6.2.2). Specimens of the finished cable shall have each conductor stripped, approximately 1 inch at each end, to the bare conductor and shall have one end attached to a mandrel and the other end weighted. After conditioning for 4 hours at a temperature of -40±2 °C, and while maintained at this temperature, the cable shall be wrapped around a mandrel having a maximum diameter that is 15 times the finished cable diameter at a uniform rate of 15 revolutions per minute (rpm) for three complete turns. After bending and before straightening, the cable shall be subjected to the appropriate dielectric strength test specified in 4.6.2.

4.6.4 Spark test (see 3.6.5). The spark test shall be conducted in accordance with method 6211 of FED-STD-228. The spark test voltage shall be 1,500 volts (rms).

4.6.5 Dielectric immersion (jacketed or shielded and jacketed cable) (see 3.6.6). The cable sample shall be immersed in tap water containing .5 percent, by volume, of a suitable wetting agent, except for 6 inches of each end. The cable shall be soaked for a minimum period of 4 hours in the water solution maintained at 25 °C. The shield of the shielded and jacketed cable or the conductors of the jacketed cables shall be electrically connected and subjected to a potential of 2,000 volts (rms) between them and the water solution.

4.6.6 Heat resistance. The cable specimen shall be placed in a temperature-controlled chamber and heated to the temperature and for the period specified in the applicable specification sheet. The cable specimen shall then be removed from the oven and allowed to return to room temperature. The length of exposed conductor, if any, at each end of the specimen shall be considered as shrinkage of the insulation. In no case shall the shrinkage at either end exceed the maximum value specified in 3.6.7. After 1 hour at room temperature, the cable specimen shall be wound 2 close turns around a mandrel having a maximum diameter that is 10 times the cable diameter. While in the wound position, the cable shall be subjected to the dielectric test of 4.6.2.

4.6.7 Low-temperature storage (see 3.6.8). The cable specimen shall be placed in a temperature chamber at a temperature of -62 °C for a minimum of 72 hours. Upon completion of the 72-hour exposure, the cable shall be allowed to stabilize at normal room temperature and then shall be subjected to the dielectric strength test of 4.6.2.

4.6.8 Conductor continuity (see 3.6.3). An ohmmeter or other suitable low-voltage device shall be used to check the continuity of each conductor. There shall be no indication of discontinuity.

4.6.9 Jacket tensile strength and elongation (see 3.5.3.3.1, 3.5.3.3.2, 3.5.3.3.3, 3.5.3.3.4). Jacket materials requiring tensile strength and elongation testing shall be tested in accordance with ASTM D3032, using 1-inch bench marks, a 1-inch initial jaw separation, and a jaw separation speed of 2 inches per minute.

4.6.10 Jacket concentricity (see 3.6.4). The minimum wall thickness of a cross section of the extruded jacket shall be located and recorded. The maximum wall thickness of the jacket in this same cross section shall be measured and recorded. The ratio of the minimum wall thickness to the maximum wall thickness times 100 shall be defined as the percent concentricity.

4.6.11 Jacket wall thickness (see 3.5.3.3.1, 3.5.3.3.2, 3.5.3.3.3, 3.5.3.3.4). The jacket wall thickness shall be measured in accordance with method 1013 of FED-STD-228, except for tape wrapped jacket constructions. For tape wrapped jacket constructions, use method 1018 of FED-STD-228.

4.6.12 Flammability (see 3.6.9). Finished cable shall be tested in accordance with ASTM D3032. The period of flame application shall be 30 seconds for cables having wires of size 10 AWG or smaller. Cables with larger wires than 10 AWG shall not be tested.

4.6.13 Braid angle and shield coverage (see 3.4.2.1). The shield braid angle and the percent coverage of the braid shall be determined by the following formula:

$$\text{Tan } a = 2\pi (D+2d) P/C$$
$$k = 100 (2f-f^2)$$

Where:

k = percent coverage
f = EPd/sin a
P = picks per inch (the number of times the carrier in a braid cross over each other in the same direction along the longitudinal axis for each inch of length) of cable length
a = angle of braid with axis of cable
E = number of strands per carrier
d = diameter of one shield strand
D = diameter of cable under shield*
C = number of carriers
* = (basic wire diameter) X (geometry cable factor)
where the geometry cable factor is:
1.0 for singles
1.64 for pairs
1.95 for triples

5. PACKAGING

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

6. NOTES

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

6.1 Intended use. This specification is being retained as a military detail specification because of the unique military requirements for use in systems operating in an environment from -65 to 200°C. Cable covered by this specification is intended for use in the hook-up of various electronic assemblies as specified in the specification sheets. Cables constructed with PVC insulated wires or jacketing are not to be used for aerospace equipment.

6.1.1 PVC jacketed cable. PVC jacketed cable is intended for use at temperatures between -40 and 105 °C.

6.1.2 Polyamide jacketed cable. Polyamide jacketed cable is intended for use at temperatures between -40 and 105 °C.

6.1.3 PTFE jacketed cable. PTFE jacketed cable is intended for use at temperatures between -65 and 200 °C.

6.1.4 FEP jacketed cable. FEP jacketed cable is intended for use at temperatures between -65 and 200 °C.

6.2 Acquisition requirements. Acquisition documents must specify the following:

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

b. Length of cable required.

c. Complete type designation (see 1.2.1).

d. The specific issue of individual documents referenced (see 2.2.1 and 2.3).

e. Title, number, and date of applicable specification sheet (see 3.1).

f. Whether first article is required (see 3.2 and 4.4). Invitations for bids should provide that the government reserves the right to waive the requirement for samples for first article inspection for those bidders offering a product that has been previously acquired or tested by the government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior government approval is presently appropriate for the pending contract.

g. Color coding, if other than specified (see 3.5.1).

h. Whether the use of fillers is permitted in the cable's construction (see 3.5.2).

i. Whether cold bend requirements are applicable to unshielded cable construction (see 3.6.2.1).

j. Inspection conditions, if other than specified (see 4.3).

k. Minimum length of continuous cable (see 4.5.1.1).

l. Packaging. Packaging (see 5.1).

6.3 Subject key word listing.

FEP
Polyamide
PVC
PTFE
Shielding

6.4 Hazardous materials and waste. Caution should be taken during handling and disposal of all insulating and jacketing materials in accordance with FED-STD-313.

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

APPENDIX A

SUPERSESSION AND CROSS REFERENCE DATA

A.1 GENERAL

A.1.1 Scope. This appendix provides a guide for supersession of cable type designations and Part or Identifying Number (PIN) data that exist in MIL-C-55021B and MIL-C-27072 (and earlier versions of both) that are superseded to those covered in MIL-DTL-55021C and its associated specification sheets. This Appendix is not a mandatory part of the specification. The information contained herein is intended for guidance only.

A.2 SUPERSESSION DATA

Original type designations	New type designations
EC24T90-95STX	E24C90-95STX
EC24U90-95STX	E24C90-95STX
EC24B90-95STX	E24C90-95STX
BC24P90-95SP	B24C90-95SP
BC24J90-95SJ	B24C90-95SJ
BC24SP90-95SP	B24C90-95SP
BC24SJ90-95SJ	B24C90-95SJ
EC24STW90-95STW	E24C90-95STW
EC24STX90-95STX	E24C90-95STX
EC24U9-0*** 1/	E24C9-0***1/

Original PIN	New type designations
M27072/90-N9	E24C9SS
M27072/91-M9	E22C9SF
M27072/93-M9	B22C9SP
M27072/96-P9	B24C9SJ
M27072/99-M9	C22C9SP
M27072/101-P9	C24C9S
M27072/103-M9	D22C9SP
M27072/104-M9	E22C9SP
M27072/105-P9	E24C9SJ
M27072/106-L9	EE22C9SJ
M27072/107-N9	C24C9SJ
M27072/109-N9	EE22C9SJ
M27072/112-M9	D22C9S
M27072/114-N9	B24C9S
M27072/120-K9	D20C9SJ
M27072/122-M9	EE24C9S
M27072/125-M9	EE22C9SP
M27072/126-L9	E22C9STW
M27072/127-L9	EE24C9STW

1/ "***" represents wildcard characters.

A.2.1 Superseded documents. The documents referenced below are superseded and replaced as follows:

Superseded documents	Replacement documents
MIL-C-55021(ORD)	MIL-DTL-55021/1
MPD 1507	MIL-DTL-55021/2
MPD 9171	MIL-DTL-55021/2
MIL-C-27072/93	MIL-DTL-55021/1
MIL-C-27072/96	MIL-DTL-55021/1
MIL-C-27072/99	MIL-DTL-55021/1
MIL-C-27072/101	MIL-DTL-55021/1
MIL-C-27072/103	MIL-DTL-55021/1
MIL-C-27072/107	MIL-DTL-55021/1
MIL-C-27072/112	MIL-DTL-55021/1
MIL-C-27072/114	MIL-DTL-55021/1
MIL-C-27072/120	MIL-DTL-55021/1
MIL-C-27072/90	MIL-DTL-55021/2
MIL-C-27072/91	MIL-DTL-55021/2
MIL-C-27072/104	MIL-DTL-55021/2
MIL-C-27072/105	MIL-DTL-55021/2
MIL-C-27072/106	MIL-DTL-55021/2
MIL-C-27072/109	MIL-DTL-55021/2
MIL-C-27072/122	MIL-DTL-55021/2
MIL-C-27072/125	MIL-DTL-55021/2
MIL-C-27072/126	MIL-DTL-55021/2
MIL-C-27072/127	MIL-DTL-55021/2

A.2.2 Superseded wire types. The wire types listed below are superseded by the following replacement wire types:

Superseded wire type	Replacement wire type
LW	B
MW	C
HW	D

A.2.3 Superseded MIL-DTL-16878 wire types. See Table A-I for obsolete MIL-DTL-16878 wire types and their superseding NEMA HP document wire types.

TABLE A-I. Supersession Data.

Superseded Part Number 1/	NEMA Part Number 1/	Type / Voltage Rating	Construction	Conductor Material 2/	Temperature Rating °C	
M16878/1B***	HP7-B-B**-*	B / 600	Extruded	TCC	-55	105
M16878/1D***	HP7-B-D**-*	B / 600	Extruded	SCA	-55	105
M16878/1C***	HP7-B-C**-*	B / 600	Extruded	TCCCS	-55	105
M16878/2B***	HP7-C-B**-*	C / 1000	Extruded	TCC	-55	105
M16878/2D***	HP7-C-D**-*	C / 1000	Extruded	SCA	-55	105
M16878/2C***	HP7-C-C**-*	C / 1000	Extruded	TCCCS	-55	105
M16878/3B***	HP7-D-B**-*	D / 3000	Extruded	TCC	-55	105
M16878/3D***	HP7-D-D**-*	D / 3000	Extruded	SCA	-55	105
M16878/3C***	HP7-D-C**-*	D / 3000	Extruded	TCCCS	-55	105
M16878/4B***	HP3-EXB***	E / 600 V	Extruded	SCC	-65	200
M16878/4C***	HP3-EXF***	E / 600 V	Extruded	SCCCS	-65	200
M16878/4D***	HP3-EXD***	E / 600 V	Extruded	SCA	-65	200
M16878/5B***	HP3-EEXB***	EE / 1000 V	Extruded	SCC	-65	200
M16878/5C***	HP3-EEXF***	EE / 1000 V	Extruded	SCCCS	-65	200
M16878/5D***	HP3-EEXD***	EE / 1000 V	Extruded	SCA	-65	200
M16878/6B***	HP3-ETXB***	ET / 250 V	Extruded	SCC	-65	200
M16878/6C***	HP3-ETXF***	ET / 250 V	Extruded	SCCCS	-65	200
M16878/6D***	HP3-ETXD***	ET / 250 V	Extruded	SCA	-65	200
M16878/7B***	HP6-S-B***	S / 600 V	Extruded	SCC	-55	200
M16878/8B***	HP6-SS-B***	SS / 1000 V	Extruded	SCC	-55	200
M16878/10B***	HP7-J-B**-*	J / 600 V	Extruded	TCC	-65	75
M16878/10C***	HP7-J-C**-*	J / 600 V	Extruded	TCCCS	-65	75
M16878/11B***	HP4-K-B***	K / 600	Extruded	SCC	-65	200
M16878/11C***	HP4-K-F***	K / 600	Extruded	SCCCS	-65	200
M16878/12B***	HP4-KK-B***	KK / 1000 V	Extruded	SCC	-65	200
M16878/12C***	HP4-KK-F***	KK / 1000 V	Extruded	SCCCS	-65	200
M16878/13B***	HP4-KT-B***	KT / 250 V	Extruded	SCC	-65	200
M16878/13C***	HP4-KT-F***	KT / 250 V	Extruded	SCCCS	-65	200
M16878/14B***	HP5-L-B***	L / 600 V	Extruded	TCC	-65	125
M16878/15B***	HP5-LL-B***	LL / 1000 V	Extruded	TCC	-65	125
M16878/16B***	HP5-LX-B***	LX / 3000 V	Extruded	TCC	-65	125
M16878/17B***	HP7-BN-B**-*	BN / 600	Extruded	TCC	-55	105
M16878/17D***	HP7-BN-D**-*	BN / 600	Extruded	SCA	-55	105

TABLE A-I. Supersession Data – Continued.

Superseded Part Number 1/	NEMA Part Number 1/	Type / Voltage Rating	Construction	Conductor Material 2/	Temperature Rating °C	
M16878/17C***	HP7-BN-C**-*	BN / 600	Extruded	TCCCS	-55	105
M16878/18B***	HP7-CN-B**-*	CN / 1000	Extruded	TCC	-55	105
M16878/18D***	HP7-CN-D**-*	CN / 1000	Extruded	SCA	-55	105
M16878/18C***	HP7-CN-C**-*	CN / 1000	Extruded	TCCCS	-55	105
M16878/19B***	HP7-DN-B**-*	DN / 3000	Extruded	TCC	-55	105
M16878/19D***	HP7-DN-D**-*	DN / 3000	Extruded	SCA	-55	105
M16878/19C***	HP7-DN-C**-*	DN / 3000	Extruded	TCCCS	-55	105
M16878/20B***	HP3-ETWB***	ET / 250 V	Wrapped	SCC	-65	200
M16878/20C***	HP3-ETWF***	ET / 250 V	Wrapped	SCCCS	-65	200
M16878/20D***	HP3-ETWD***	ET / 250 V	Wrapped	SCA	-65	200
M16878/21B***	HP3-EWB***	E / 600 V	Wrapped	SCC	-65	200
M16878/21C***	HP3-EWF***	E / 600 V	Wrapped	SCCCS	-65	200
M16878/21D***	HP3-EWD***	E / 600 V	Wrapped	SCA	-65	200
M16878/22B***	HP3-EEWB***	EE / 1000 V	Wrapped	SCC	-65	200
M16878/22C***	HP3-EEWF***	EE / 1000 V	Wrapped	SCCCS	-65	200
M16878/22D***	HP3-EEWD***	EE / 1000 V	Wrapped	SCA	-65	200
M16878/23B***	HP3-ETXC***	ET / 250 V	Extruded	NCC	-65	260
M16878/23C***	HP3-ETXG***	ET / 250 V	Extruded	NCCCS	-65	260
M16878/23D***	HP3-ETXE***	ET / 250 V	Extruded	NCA	-65	260
M16878/24B***	HP3-ETWC***	ET / 250 V	Wrapped	NCC	-65	260
M16878/24C***	HP3-ETWG***	ET / 250 V	Wrapped	NCCCS	-65	260
M16878/24D***	HP3-ETWE***	ET / 250 V	Wrapped	NCA	-65	260
M16878/25B***	HP3-EXC***	E / 600 V	Extruded	NCC	-65	260
M16878/25C***	HP3-EXG***	E / 600 V	Extruded	NCCCS	-65	260
M16878/25D***	HP3-EXE***	E / 600 V	Extruded	NCA	-65	260
M16878/26B***	HP3-EWC***	E / 600 V	Wrapped	NCC	-65	260
M16878/26C***	HP3-EWG***	E / 600 V	Wrapped	NCCCS	-65	260
M16878/26D***	HP3-EWE***	E / 600 V	Wrapped	NCA	-65	260
M16878/27B***	HP3-EEXC***	EE / 1000 V	Extruded	NCC	-65	260
M16878/27C***	HP3-EEXG***	EE / 1000 V	Extruded	NCCCS	-65	260
M16878/27D***	HP3-EEXE***	EE / 1000 V	Extruded	NCA	-65	260
M16878/28B***	HP3-EEWC***	EE / 1000 V	Wrapped	NCC	-65	260
M16878/28C***	HP3-EEWG***	EE / 1000 V	Wrapped	NCCCS	-65	260
M16878/28D***	HP3-EEWE***	EE / 1000 V	Wrapped	NCA	-65	260

TABLE A-I. Supersession Data – Continued.

Superseded Part Number 1/	NEMA Part Number 1/	Type / Voltage Rating	Construction	Conductor Material 2/	Temperature Rating °C	
M16878/29B***	HP6-S-H***	S / 600 V	Extruded	TCC	-55	150
M16878/30B***	HP6-SS-H***	SS / 1000 V	Extruded	TCC	-55	150
M16878/31B***	HP6-SSB-H***	SSB / 1000 V	Extruded	TCC	-55	150
M16878/32B***	HP6-SSB-B***	SSB / 1000 V	Extruded	SCC	-55	200
M16878/33B***	HP7-JN-B**-*	JN / 600 V	Extruded	TCC	-55	75
M16878/33B***	HP7-JN-C**-*	JN / 600 V	Extruded	TCCCS	-55	75
M16878/34B***	HP3-EEWB***	EE / 1000 V	Wrapped	SCC	-65	260
M16878/35B***	HP3-EEWC***	EE / 1000 V	Wrapped	NCC	-65	260
M16878/36B***	HP8-LS-B***	LS / 600 V	Extruded	TCC	-40	105
M16878/36D***	HP8-LS-D***	LS / 600 V	Extruded	SCA	-40	105
M16878/36C***	HP8-LS-C***	LS / 600 V	Extruded	TCCCS	-40	105
M16878/37B***	HP9-EP-B***	EP / 600 V	Extruded	TCC	-25	125
M16878/38B***	HP9-EPD-B***	EPD / 5000 V	Extruded	TCC	-25	125

1/ **-* indicates AWG, number of strands and color, and are identical for each part number.
2/ NCA = Nickel-coated high-strength copper alloy, NCC = Nickel-coated copper, NCCCS = Nickel coated copper clad steel, SCA = Silver-coated high-strength copper alloy, SCC = Silver-coated copper, SCCCS = Silver-coated copper clad steel, TCC = Tin-coated copper, TCCCS = Tin-coated copper clad steel

CONCLUDING MATERIAL

Custodians:
Army - MI
Navy - AS
Air Force – 85
DLA - CC

Preparing activity:
DLA - CC

(Project 6145-2020-018)

Review activities:
Army – AR, CR

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