MIL-C-19547B(EC)
22 September 1969
SUPERSEDING
MIL-C-19547A(SHIPS)
13 December 1961

MILITARY SPECIFICATION

CABLE, ELECTRICAL, SPECIAL PURPOSE, SHORE USE

1. SCOPE

1.1 Scope. This specification covers twisted pair multiconductor shielded cables for use within shore communication station, not to be used on-board ship.

1.2 Classification. - Cables shall be of the following number of pairs as specified (see 6.1):

6 pairs
16 pairs
26 pairs
52 pairs
104 pairs

2. APPLICABLE DOCUMENTS

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

SPECIFICATION

MILITARY
MIL-C-12000 - Cable, Cord, and Wire, Electric; Packaging of.

STANDARD

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

MILITARY
MIL-STD-129 - Marking for Shipment and Storage.

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

2.2 Other publications. The following documents form a part of this specification the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

AMERICAN SOCIETY FOR TESTING AND MATERIALS
ASTM B33-63 - Tinned Soft or Annealed Copper Wire for Electrical Purposes.
ASTM D470-64T - Testing Rubber and Thermoplastic Insulated Wire and Cable.
ASTM D1047-67 - Thermoplastic Vinyl Chloride Plastic Sheath Compound for Electrical Insulated Cords and Cables.
ASTM D1248-68 - Polyethylene Molding and Extrusion Material.
ASTM D2240-64T - Methods of Testing for Indentation Hardness of Rubber and Plastics by means of a Durometer.

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

FSC 6145

MUNSELL COLOR CHARTS FOR PLASTIC CABLE AND WIRE.

(Application for copies should be addressed to the Munsell Color Company, Inc., 2441 N. Calvert Street, Baltimore, Maryland 21218)

STANDARDS FOR ALUMINUM MILL PRODUCTS, 9th EDITION

(Application for copies should be addressed to the Aluminum Association, 420 Lexington Ave., New York, N.Y. 10017.)

3. REQUIREMENTS

3.1 First article sample. - A first article sample shall be furnished for the tests specified in 4.3.

3.2 Material. -

3.2.1 Conductors. - The conductors shall be number 22 American Wire Gage (AWG) (nominal diameter 0.0253) tinned solid copper wire in accordance with ASTM B33.

3.2.1.1 Joining conductors. - Joints made in conductor may be brazed using a silver alloy solder and a non-acid flux, or welded. Joints shall be butted and shall be free from lumps and sharp projections. The tensile strength of any section of a conductor joint which was brazed or welded, shall be not less than 85 percent of the tensile strength of an adjacent section without a joint.

3.2.1.2 Conductor resistance. - The direct current (d.c.) resistance of each conductor shall not exceed 18.3 ohms per 1,000 foot length when measured at or corrected to 68° Fahrenheit (F).

3.2.2 Insulation material. - The conductor insulation material shall be polyethylene in accordance with ASTMD-1248, type 1, class A or B, grade 4, except that the melt index shall be 0.2 to 0.4.

3.2.2.1 Insulation defects. - The insulation shall be smooth and free from holes, splits, blisters or other imperfections.

3.2.2.2 Cold bend. - The finished conductor insulation shall show no evidence of cracking or fracturing when tested in accordance with 4.5.5.

3.2.2.3 Tensile and elongation. - The insulating material removed from the finished conductor shall meet the requirements specified herein, when tested in accordance with 4.5.6.

Tensile strength, minimum pounds per square inch (psi)	1700
Elongation at rupture, minimum percent	400

3.2.2.4 Color coding of insulation. - The color coding shall be as shown in table I, so as to identify each pair in the completed cable.

3.2.2.5 Color standards. - The colored insulation shall match the centroid colors of table II, within the limits of standards for colors as defined in Munsell Color Charts for Plastic Cable and Wire. The color pigments shall be chosen to yield uniform dielectric constant between colors and shall have no injurious effects on the insulation.

Table I - Color coding.

Pair number	Color	Pair number	Color
1	Blue and white (or natural)	4	Brown and white (or natural)
2	Orange and white (or natural)	5	Slate and white (or natural)
3	Green and white (or natural)	6	Blue and red

Table I - Color coding. (Continued)

Pair number	Color	Pair number	Color
7	Orange and red	32	Orange-white (stripe) and red
8	Green and red	33	Green-white (stripe) and red
9	Brown and red	34	Brown-white (stripe) and red
10	Slate and red	35	Slate-white (stripe) and red
11	Blue and black	36	Blue-white (stripe) and black
12	Orange and black	37	Orange-white (stripe) and black
13	Green and black	38	Green-white (stripe) and black
14	Brown and black	39	Brown-white (stripe) and black
15	Slate and black	40	Slate-white (stripe) and black
16	Blue and yellow	41	Blue-white (stripe) and yellow
17	Orange and yellow	42	Orange-white (stripe) and yellow
18	Green and yellow	43	Green-white (stripe) and yellow
19	Brown and yellow	44	Brown-white (stripe) and yellow
20	Slate and yellow	45	Slate-white (stripe) and yellow
21	Blue and violet	46 1/	Blue-white (stripe) and violet
22	Orange and violet	47	Orange-white (stripe) and violet
23	Green and violet	48	Green-white (stripe) and violet
24	Brown and violet	49	Brown-white (stripe) and violet
25	Slate and violet	50	Slate-white (stripe) and violet
26	Blue-white (stripe) and white (or natural)	51	Red and white (or natural)
27	Orange-white (stripe) and white (or natural)	52	Red-white (stripe) and white (or natural)
28	Green-white (stripe) and white (or natural)	Spare (For 1/ 52 or 104 pair)	Red and black (see 3.1.3)
29	Brown-white (stripe) and white (or natural)		
30	Slate-white (stripe) and white (or natural)		
31	Blue-white (stripe) and red		

1/ At the manufacturer's option, pair number (46) and the "Spare" pair may be used to assure the required number of (non-defective) pairs.

TABLE II. -Munsell Centroid Colors

		TOLERANCE LIMITS					
		HUE		VALUE		CHROMA	
COLOR	CENTROID	H-	H+	V-	V+	C-	C+
Red	2.5R 4/12	1.25R 4/12	3.75R 4/12	2.5R 3/12	2.5R 4.5/12	2.5R 4/10	None
Orange	2.5YR 6/14	1.25R 6/14	3.75YR 6/14	2.5YR 5/14	2.5YR 6.5/14	2.5YR 6/12	None
Brown	2.5YR 3.5/6	10R 3.5/6	5YR 3.5/6	2.5YR 3/6	2.5YR 4/6	2.5YR 3.5/4	2.5YR 3.5/7
Yellow	5Y 8.5/12	2.5Y 8.5/12	7.5Y 8.5/12	5Y 8/12	None	5Y 8.5/10	None
Green	2.5G 5/12	1.25G 5/12	3.75G 5/12	2.5G 4/10	2.5G 5.5/12	2.5G 5/9	None
Blue	2.5PB 4/10	10B 4/10	5PB 4/10	2.5PB 3.5/10	2.5PB 4.5/10	2.5PB 4/9	None
Violet	2.5P 4/10	1.25P 4/10	3.75P 4/10	2.5P 3/10	2.5P 4.5/10	2.5P 4/8	None
White	N 9/	Value Tolerances: V- is N 8.75 no V+ limit. Chromaticity Tolerances: 5R 9/1, 5YR 9/1, 5Y 9/1, 5G 9/0.5, 5B 9/0.5, 5P 9/0.5					
Slate	N 5/	Value Tolerances: V- is N 4.5/; V+ is N 5.5/ Chromaticity Tolerances: 5R 5/0.5, 5Y 5/0.5, 5G 5/0.5, 5B 5/0.5, 5P 5/0.5					
Black	N 2/	Value Tolerances: No V- limit; V+ is N 2.3 Chromaticity Tolerances: 5R 2/0.5, 5Y 2/0.5, 5G 2/0.5, 5B 2/0.5, 5P 2/0.5					

3.2.2.5.1 Insulation striping. - All striping shall be such as to provide readily discernible white stripes on the conductor insulation. These stripes may be integral of the insulation or the striping may be provided as an internal plastic coating. All striping shall firmly adhere to the insulation and remain intact through the life of the conductor insulation.

3.2.2.6 Twisting of pairs. - The insulated conductors shall be twisted into pairs. The length of lay of the twisted pairs shall be designed in order that the voice frequency crosstalk will be minimized and in order to enable the cable to meet the capacitance unbalance requirements of 3.3.2. The average length of lay in any pair of the finished cable shall not exceed 6 inches when measured on any 10-foot length.

3.2.3 Cable forming. - The twisted pairs shall be assembled to form a substantially cylindrical core. Adjacent layers may be stranded in the same direction or in opposite directions. For 104 pair cable, the cable shall be formed in two 52-pair concentric units or four 26-pair units.

3.2.3.1 Binder tape. - A colored binder shall be applied around the center unit for separation. When bindings are used, the colors shall be readily recognizable. Bindings shall be applied with a lay of not more than 4 inches.

3.2.4 Core covering. - The core covering shall be completely covered with mylar, polyethylene, or mylar backed "SBR" or equivalent, which shall be non-hygroscopic and shall be applied with an overlap.

3.2.4.1 Dielectric. - In each length of completed cable, the insulation between conductors and between conductors and shield shall withstand the dielectric d.c. potential for 3 seconds as follows:

	D.c. volts
Between conductors	3,600
Between conductors and shield	10,000

3.2.5 Shield. A single shield of corrugated aluminum shall be applied longitudinally over the core covering. The aluminum shield shall be 0.008± 0.001 inch thick in accordance with alloy No. AA-1145, Temper 0, alloy No. AA-1100, Temper 0, or alloy No. AA-1235, Temper 0, as covered in the Standards for Aluminum Mill Products (9th edition, 1966) except that the requirements for tensile strength are waived. The 6 pair cable may be corrugated if the manufacturer so desires. The shield may be joined during manufacture by electric welding, cold welding, or soldering with a non-acid flux. The shield shall completely cover the cable core.

3.2.5.1 Shield resistance. - The d.c. resistance of the shield for a 1000-foot length of completed cable shall not exceed 0.75 ohm for a cable having a diameter of 1 inch under the sheath.

3.2.5.2 Shield bending. - The shield shall show no evidence of fracture visible to the unaided eye after the cable bending test (see 4.5.4).

3.2.6 Jacket material. - The jacket material shall be polyvinylchloride, colored black, which shall meet the physical (finished cable) requirements outlined in 3.2.5.1 and 3.2.5.2. The cable jacket shall have a hardness of 80 plus or minus 5 as determined on a shore durometer, type A, test specified in ASTM D2240. The jacketing material shall contain a minimum of 1 percent of carbon black or similar material to resist ultraviolet light.

3.2.6.1 Tensile strength. - The cable jacket shall have a minimum tensile strength of 2000 pounds per square inch when tested in accordance with FED-STD-228, method 3021, or ASTM D470.

3.2.6.2 Elongation. - The cable jacket shall have a minimum elongation of 250 percent when tested in accordance with FED-STD-228, method 3031, or ASTM D470

3.2.6.3 Jacket thickness and outside cable diameters. The jacket thickness and outside cable diameter shall be as specified in table III. The minimum spot thickness of the jacket shall be not less than 70 percent of the specified thickness. The average thickness at any cross section of the jacket material shall be not less than 90 percent of the specified thickness.

Table III. - Jacket thickness and outside diameters (o.d.)

No. of pairs	Nominal jacket thickness (inch)	Approx. O.d. (inches)
6	0.05	0.40
16	0.06	.51
26	0.06	.62
52	0.06	.832
104	0.07	1.200

3.2.6.4 Cold bend. - A sample of the finished cable shall show no evidence of cracking or fracturing when tested in accordance with 4.5.5.

3.2.7 Cable marking. - A tape shall be permanently marked and inserted between the jacket and shield, and the footage marked every 12 inches. The tape shall be marked at least every 24 inches with the following:

(a) Manufacturer's name (or symbol designation).
(b) Date of manufacture.
(c) Contract number.
(d) Specification number.

3.2.7.1 Defective pair (s). - Each end of the cable length containing defective pair (s) shall be tagged. The tags shall indicate the specific defective pair (s). For reel marking of lengths containing defective pair (s) see 5.2.

3.3 Electrical requirements. -

3.3.1 Mutual capacitance. - The average mutual capacitance of all pairs in a completed cable in any reel shall be 0.083 ± 0.008 microfarad (uf) per mile. The mutual capacitance test shall be performed in accordance with 4.5.2.

3.3.2 Capacitance unbalance. - The pair-to-pair and pair-to-shield unbalance tests shall be performed on the completed cable in accordance with 4.5.3 and 4.5.3.1.

3.3.3 Continuity. - In each length of cable, the conductors shall be free from grounds (contacts between a conductor and shield) short circuits and open circuits. The shielding shall be free from open circuits.

3.3.4 Workmanship. - Workmanship shall be such that the finished product will meet all requirements of this specification.

3.4 Cable put-up. - Cable shall be put-up on reels which shall contain lengths as follows (see 5.1.1):

(a) Put-up for cables having one pair through and including 52 pair shall be:

(1) 85 percent minimum of all cables shall be furnished on reels which contain either 500 or 1000 foot continuous lengths plus or minus 10 percent.
(2) 15 percent maximum of all cables may be furnished in random 100 foot minimum lengths a maximum of 1100 feet per reel.

(b) Put-up for cable having 104 pair shall be:

(1) 85 percent minimum of all cable shall be furnished on reels which contain 500 foot continuous lengths plus or minus 10 percent.
(2) 15 percent maximum of all cable may be furnished in random 100 foot minimum lengths to a maximum of 550 feet per reel.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. - Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

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

(a) First article (See 4.3)
(b) Quality conformance inspection (See 4.4).

4.3 First article inspection. - First article samples shall be fabricated by the manufacturer with tools and methods that, as far as practicable are the same as those which will be used for quantity production of the product. The manufacture of the cable for a government contract, prior to approval of the first article sample, shall be at the manufacturer's risk. First article inspection shall be performed on a suitable length of cable. Certification of compliance for the basic material may be obtained from the supplier of the material providing that such certification contains actual test, examination or other verifiable quality data. First article inspection test reports shall be forwarded to the procuring activity, unless otherwise specified, for approval.

4.3.1 The first article samples shall be subjected to the tests listed in table IV. No failure will be permitted.

Table IV. - First article inspection.

Examination and test	Requirement paragraph	Test paragraph
Visual and dimensional	3.2.1, 3.2.1.1, 3.2.2, 3.2.2.1, 3.2.2.4, 3.2.2.5, 3.2.2.5.1 3.2.2.6, 3.2.3, 3.2.3.1, 3.2.4, 3.2.5, 3.2.6, 3.2.6.3, 3.2.7	
	3.3.4	4.5.1
Continuity	3.3.3	---
Conductor resistance	3.2.1.2	4.5.8
Mutual capacitance	3.3.1	4.5.2
Capacitance unbalance	3.3.2	4.5.3
Insulation:		
Material	3.2.2	---
Defects	3.2.2.1	4.5.1
Cold bend	3.2.2.2	4.5.5
Tensile and elongation	3.2.2.3	4.5.6
Striping (if applicable)	3.2.2.5.1	---
Color coding	3.2.2.4	---
Color standards	3.2.2.5	---
Forming of pairs	3.2.2.6	---
Binder tape	3.2.3.1	---
Core covering	3.2.4	---
Shield:		
Resistance	3.2.5.1	4.5.8
Bending	3.2.5.2	4.5.4
Jacket:		
Cold bend	3.2.6.4	4.5.5
Tensile	3.2.6.1	4.5.6
Elongation	3.2.6.2	4.5.6
Dielectric	3.2.4.1	4.5.7

4.4 Quality conformance inspection.

4.4.1 Sampling. -

4.4.1.1 Inspection lot. - All cable of the same size (number of pairs) and color coding, offered for delivery at one time, shall be considered a lot for purposes of sampling and inspection.

4.4.2 The group A inspection shall consist of the tests shown in table V.

4.4.2.1 Sampling for visual and dimensional examination. - One end of each 500-foot shipping length shall be measured and examined to verify conformance to 4.5.1, and the requirements in table V. The number of pairs to be examined shall be as follows:

Pairs in the cable	Pairs to be examined
6	5
16	9
26	10
52	15
104	20

Any defect in a sample of five or nine shall cause rejection of the 500-foot length; one defect is allowed in samples of 10, 15, and 20 pairs; two or more defects cause rejection. In the event that defect or error is found at any inspected end, the other end of that length shall be examined for the same defect. The reel which contains the adjacent section of cable shall also be examined for the same defect.

4.4.2.2 Sampling for continuity, resistance, and insulation tests. - In each 500-foot length of cable, tests shall be performed on the number of pairs specified in 4.4.2.1. Each of the selected pairs shall be subjected to all of the tests necessary to verify conformance to 3.2.1.2, 3.2.4.1, and 3.2.5.1. If any pair fails in any test, the entire length of cable shall not be offered for delivery. The same pair on the adjacent reels shall be subjected to the same test in which failure occurred.

4.4.2.3 Sampling for measurement of colors. - In each 500-foot length of cable, pairs shall be selected at random for verification of the color in accordance with 3.2.2.5 by comparison with Munsell color cards. The number of pairs so examined shall be the same as specified in 4.4.2.1. If any pair is found not having color as specified, every pair in that 500-foot length shall be compared with the Munsell color card. Also, the reels of cable preceding and following shall be examined to determine the extend of the incorrect coloring. If the colored insulation does not meet the requirements of 3.2.2.5, the lot shall not be offered for delivery.

4.4.3 Group B inspection. - The group B inspection shall consist of the tests shown in table VI.

4.4.3.1 Sampling for group B tests. - The number of tests in accordance with table VI shall be determined as follows:

Number of pairs in assembled cable	Number of tests of capacitance required
104	5 per 500-foot length
52	3 per 500-foot length
26	1 per 500-foot length
16	1 per 500-foot length
6	1 per three 500-foot lengths

The acceptance number shall be 8 percent of the number of tests. If test failures in any lot exceed the 8 percent acceptance number, this shall be cause for rejection of the entire lot. For example, if twenty-five tests are performed, the acceptance number is two; if the number of test failures exceeds two, this shall cause for rejection of the lot on the basis of capacitance.

4.4.4 Rejected lots. - If an inspection lot is rejected, the supplier may replace it with a new lot, rework it to correct the defects, or screen out the defective units, and again inspect it. Such lots shall be inspected using tightened inspection. Reinspected lots shall be kept separate from new lots and shall be clearly identified as reinspected lots.

Table V. - Group A inspection.

Examination and tests	Requirement paragraph	Test paragraph
Visual and dimensional	3.2.1, 3.2.1.1, 3.2.2.1, 3.2.2.4, 3.2.2.6, 3.2.3, 3.2.4, 3.2.5	4.5.1
Continuity	3.3.3	4.5.1
Jacket thickness and o.d.	3.2.6.3	4.5.1
Insulation defects	3.2.2.1	4.5.1
Insulation striping	3.2.2.5.1	4.5.1
Insulation colors:		
Pre-mixed (mixed in plant)	3.2.2.5	
Mixed (mixed by material manufacturer)	3.2.2.5	
Dielectric	3.2.4.1	4.5.7
Shield resistance	3.2.5.1	4.5.8
Conductor resistance	3.2.1.2	4.5.8

Table VI. - Group B inspection.

Examination and test	Requirement paragraph	Test paragraph
Mutual capacitance Capacitance unbalance	3.3.1 3.3.2	4.5.2 4.5.3, 4.5.3.1

4.5 Test procedures. -

4.5.1 Visual and dimensional examination. - The color coding, shielding, core covering, marking tape and jacket thickness shall be examined at both ends of the shipping length on the reel. The cable shall be examined for jacket imperfections on all of the surface which is visible without unwinding the cable from the reel.

4.5.2 Mutual capacitance test. - The mutual capacitance test shall be performed on the cable shipping length in place on the reel. Mutual capacitance is the effective capacitance between the two wires of a pair. Mutual capacitance may be measured on individual pairs, or the average mutual capacitance may be on a number of pairs in groups. The mutual capacitance shall be measured by using a suitable capacitance or impedance bridge with a test frequency of 1000 ± 100 Hz. The cable shall meet the requirement of 3.3.1. Where group measurements of mutual capacitance are performed with cables exceeding 26 pairs in size, these measurements should be made on individual groups rather than on all pairs of the cable grouped together for a single average measurement. In any reel of 12 pairs or more, the rms deviation of mutual capacitance of all the pairs from the average mutual capacitance of that reel shall not exceed 3 percent.

4.5.3 Capacitance unbalance. - The capacitance unbalance test shall be performed on the cable shipping length in place on the reel. The pair-to-pair capacitance unbalance for 1,000-foot lengths of completed cable measured at 1,000 Hz ± 100 Hz shall not exceed the following:

Average for any reel	40 picofarads (pf)
Maximum individual for any reel	140 pF

For lengths of cable other than 1,000 foot, the value shall be converted to 1,000 foot values by dividing the unbalance of the length measured by the square root of the ratio of the length measured to 1,000. In cables with 52 pairs and less and in each group of multigroup cables the unbalances to be considered shall be:

(a) Between pairs adjacent in a layer.
(b) Between pairs in centers of four pairs or less.
(c) Between pairs in adjacent layers when the number of pairs in the inner (smaller) layer is six or less. In this, the center is counted as a layer.

The capacitance involved and test methods are as shown on figure 1.

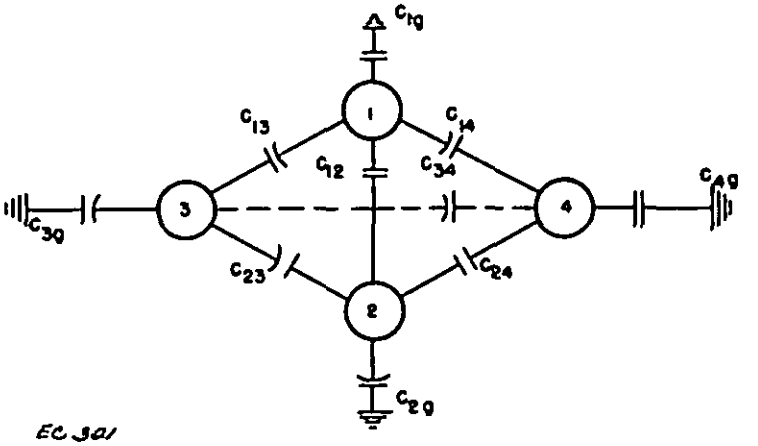


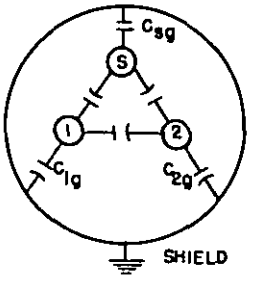
Figure 1. - Test method for determining capacitance unbalance of pair to pair.

One and two represent the two conductors of a pair. Three and four represent the two conductors of a second pair. The capacitances, namely - C_{13}, C_{14}, C_{23}, C_{24}, C12, and C_{34} are the direct capacitances between conductors. The capacitances C_{1g}, C_{2g}, C_{3g}, and C_{4g} are the direct capacitances between wires to 4, respectively, and all other conductors in the cable connected to the shield and grounded.

The pair-to-pair capacitance unbalance is:

$$(C_{14} + C_{23}) - (C_{13} + C24)$$

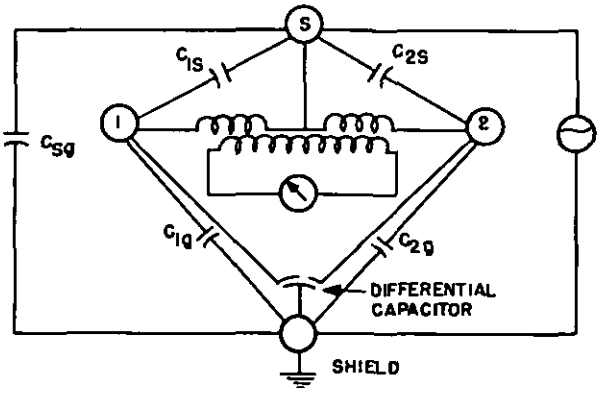
4.5.3.1 Capacitance unbalance, pair-to-shield. - The pair-to-shield direct capacitance unbalance for 1,000-foot lengths of completed cable, when measured at 1,000 Hz ± 100 Hz shall not exceed the average value for any reel of 100 pF. In figure 2, S indicates all wires (except conductors 1 and 2) bunched together. Wires 1 and 2 have a direct capacitance between them as well as a direct capacitance to the shield. Wires 1 and 2 also have direct capacitance to S and S has a direct capacitance to the shield.



EC 322

Figure 2. -Test method for determining capacitance unbalance of pair-to-shield.

The pair-to-shield direct capacitance unbalance for pair 1-2 is C_{1g} -C_{2g}. The measurement of this difference shall be made in such a way that the measured value is not appreciably affected by the direct capacitances of wires 1 and 2 to other wires. A schematic of a form of measuring bridge often used to measure C_{1g} -C_{2g} at 1,000 Hz, is shown on Figure 3.



EC 323

Figure 3. -Test method for determining capacitance unbalance of pair-to-shield.

S indicates all wires (except conductors 1 and 2) bunched together.

If a group or subgroup is always separated from the shield (by other groups or subgroups) the wires of a pair in the separated group have very small direct capacitances to the shield and their difference is negligible.

4.5.4 Bending shield test. - A suitable length of cable shall be bent, at room temperature, with the shield overlap on the outside of the bend, in a 180° arc around a mandrel whose diameter is 20 times the outside diameter of the cable; straightened, then bent 180° in the reverse direction, completing one cycle. The sample shall then be straightened and rotated 90°, and a second cycle of bending performed. The shield shall then meet the requirements of 3.2.5.2.

4.5.5 Cold bend test. - The conductor insulation or the jacket material of the finished cable shall be subjected to the cold bend test in accordance with ASTM D1047 except that the temperature shall be -55° + 1°C. The conductor insulation or the jacket shall then be visually examined for evidence of cracks or fracture of the cable jacket.

4.5.6 Tensile and elongation test. - Samples of the conductor insulation or the jacket material, removed from the finished cable or conductor, shall be tested in accordance with standard ASTMD-470 to determine conformance with 3.2.2.3.

4.5.7 Dielectric. - The cable shall be subjected to a dielectric test to determine conformance with 3.2.4.1.

4.5.8 Resistance. - The resistance of the conductors and shield shall be measured to determine conformance with 3.2.1.2 and 3.2.5.1.

5. PREPARATION FOR DELIVERY

(The preparation for delivery requirements specified herein apply only for direct Government procurements. Preparation for delivery requirements of referenced documents listed in section 2 do not apply unless specifically stated in contract or order. Preparation for delivery requirements for products procured by contractors shall be specified in the individual order.)

5.1 Preservation - packaging and packing. - Preparation for delivery shall be in accordance with the applicable levels of preservation - packaging and packing of MIL-C-12000, and as specified herein and in the contract or order.

5.1.1 Level A. - Cables shall be furnished on non-returnable reels which shall contain lengths as specified in 3.4. The cable lengths shall have both ends brought out so that cable can be readily tested without unreeling. The reels shall be constructed with flanges of sufficient thickness to protect the cable from damage during handling, shipment and storage. The diameter of the reel core shall be not less than 20 times the diameter of the cable.

5.1.2 Lagging. - Reels shall be closed with wooden lagging. Lagging shall be 2 inche lumber and shall be strapped with a minimum of 2 straps, 1 inch wide. Straps shall be stapled at intervals in accordance with the contractor's practice. A minimum clearance of one cable diameter shall be provided between the inner face of the lagging and cable. The lagging shall be cut even with the outside of the reel flanges railed with cement coated steel rails.

5.2 Marking. - In addition to any special marking required by the contract or order, both flanges of each reel shall be marked in accordance with MIL-STD-129 and with the following information:

(a) Reel number
(b) Number of pairs in cable
(c) Length and location of each piece in feet for reels of multi-lengths.
(d) Specific defective pair and cable length (if applicable)

5.2.1 Where practicable, metal tags, stencils, or paper labels containing the information specified in 5.2 shall be securely attached to the reels. Where paper labels are used, they shall be securely attached and protected by a transparent compound to prevent deterioration of the markings.

6. NOTES

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

(a) Title, number and date of this specification.
(b) Number of pairs in cable (see 1.2).
(c) Number of feet of cable required on each reel (see 5.1.1).
(d) Packaging, packing and marking requirements other than those required by 5.1 and 5.2.

6.2 First article. - Invitations for bids should provide that the Government reserves the right to waive the requirement for first article samples for those bidders offering a product which has been previously procured 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 procurement. (See 4.2)

6.3 CHANGES FROM PREVIOUS ISSUE. THE EXTENT OF CHANGES (DELETIONS, ADDITIONS, ETC.) PRECLUDE THE ANNOTATION OF THE INDIVIDUAL CHANGES FROM THE PREVIOUS ISSUE OF THIS DOCUMENT.

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NAVAL ELECTRONIC SYSTEMS COMMAND
WASHINGTON, D. C. 20360

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SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 119-R004

INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity *(as indicated on reverse hereof)*.

SPECIFICATION

ORGANIZATION *(Of submitter)* | CITY AND STATE

CONTRACT NO. | QUANTITY OF ITEMS PROCURED | DOLLAR AMOUNT $

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

☐ YES ☐ NO IF "YES", IN WHAT WAY?

4. REMARKS *(Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)*

SUBMITTED BY *(Printed or typed name and activity)* | DATE

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