

MIL-C-22667B(SHIPS)
11 May 1966
SUPERSEDING
MIL-C-22667A(SHIPS)
21 November 1961

MILITARY SPECIFICATION
CABLE, SPECIAL PURPOSE, BUOYANT, ELECTRICAL,
TYPE RG-298/U (SUBMARINE USE)

1. SCOPE

1.1 This specification covers special single-conductor buoyant cable with high mechanical performance characteristics, such as high strength, flexibility, low compression set, low water absorption, low temperature properties and abrasion resistance.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

FEDERAL

L-P-390 - Plastic Molding Material, Polyethylene, Low and Medium Intensity.
QQ-W-345 - Wire, Electrical, Steel, Copper Covered.

MILITARY

MIL-C-17 - Cables, Radio Frequency; Coaxial, Dual Coaxial, Twin Conductor, and
Twin Lead.

(Copies of specifications, standards, drawings, and publications required by suppliers 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 document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

OFFICIAL CLASSIFICATION COMMITTEE

Uniform Freight Classification Ratings, Rules, and Regulations

(Application for copies should be addressed to the Official Classification Committee, 1 Park Avenue at 33rd Street, New York 16, N. Y.)

3. REQUIREMENTS

3.1 Preproduction sample. - A preproduction sample shall be furnished for the inspection specified in 4.2 (see 6.2).

3.2 Materials and construction. -

3.2.1 Center conductor. - The center conductor of the cable shall be stranded in accordance with MIL-C-17. The conductor shall consist of seven strands of No. 24 AWG, high-strength, copper-covered (electroplated) wires, 30 ± 2 percent conductivity, conforming to QQ-W-345.

3.2.2 Solid core dielectric. - The solid core dielectric shall be polyethylene in accordance with type II, class L, grade 7 (natural) or 7a (colors) of L-P-390, having an outside diameter of 0.115 ± 0.004 inch.

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3.2.3 Jacket. - The jacket shall consist of two layers of continuous, homogeneous unicellular black foamed polyethylene. Minimum thickness of individual layers shall be 0.120 inch. The extreme outside diameter of the cable shall be 0.650 ± 0.025 inch. The outer layer of the jacket shall be of uniform hardness, and shall be free of major imperfections such as blow holes, cuts, valleys, and bruises. The jacket shall be manufactured from material which meets the requirements of type I, class L, grade 2 of L-P-390.

3.3 Breaking strength. - The center conductor of the cable shall have a minimum breaking strength of 400 pounds.

3.4 Shear strength. -

3.4.1 Between center conductor and solid core dielectric. - The shear strength between the center conductor and solid core dielectric shall be a minimum of 50 pounds per linear foot of cable.

3.4.2 Between solid core dielectric and inner or outer layer of jacket. - The shear strength between the solid core dielectric and the inner or outer layer of the jacket shall be a minimum of 50 pounds per linear foot of cable.

3.5 Specific gravity. - The cable shall have the lowest possible overall specific gravity consistent with the requirements specified herein. The specific gravity shall not exceed 0.80 when tested as specified in 4.4.5.

3.6 Cold bend. - There shall be no evidence of cracks or flaws in either the dielectric material or the jacket, when tested as specified in 4.4.6.

3.7 Crack resistance. - The cable shall be resistant to stress cracking, when tested as specified in 4.4.7.

3.8 Bonding. - Bonding shall be accomplished by the proper application of heat. The bond between the solid core dielectric and inner layer shall be non-continuous in such manner that the jacket will be easily strippable in certain areas to effect an "O" ring seal on the inner core dielectric without any additional preparation. These strippable areas shall be not less than 2 inches long in any linear foot of cable. The bond between the jacket layers shall be continuous and construction shall not impair the strength requirements of 3.4.

3.9 Length. - Unless otherwise specified (see 6.1) cable shall be provided in not less than 2,000-foot nor more than 2,100-foot continuous (with no joint or splice) lengths.

3.10 Marking. -

3.10.1 Manufacturer's identification. - Manufacturer's identification shall consist of coloring the solid dielectric core in accordance with a manufacturer's identification color to be assigned by the bureau or agency concerned. Coloring of the core shall not affect the characteristics of the cable. There shall be no markings on the outer surface of the cable.

3.10.2 Reel marking. - All reels shall be marked with cable designation, contract, date of manufacture, manufacturer, and lengths of cable.

3.11 Workmanship. - The workmanship shall be first class in every respect and uniform throughout each lot of cable offered for delivery.

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, the supplier may utilize his own facilities or any commercial laboratory acceptable to 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 Quality control system. - The supplier shall provide and maintain a quality control system which meets the requirements specified in the appendix.
- # 4.2 Preproduction inspection. - A 300-foot sample of cable constructed in accordance with this specification shall be subjected to the examination and tests specified in 4.3.2 and 4.4.
- # 4.2.1 Preproduction test report. - A report of the tests conducted shall be forwarded to the Bureau of Ships and the contracting officer. The manufacturer shall not initiate production prior to receipt of approval of this report except at his own risk.
- # 4.3 Quality conformance inspection. -
- # 4.3.1 Sampling. - A 10-foot sample of cable shall be selected from every production run for the examination and tests of 4.3.2, 4.4.1, 4.4.2, 4.4.3, 4.4.4, and 4.4.5. Samples of sufficient length shall be selected from every 40,000 feet of cable for the tests of 4.4.6 and 4.4.7.
- 4.3.2 Visual and dimensional examination. - The samples selected in accordance with 4.3.1 shall be examined to verify that the design, construction, physical dimensions, and workmanship are in accordance with this specification.
- 4.3.3 Tests. - Samples selected in accordance with 4.3.1 shall be subjected to the tests of 4.4.
- 4.4 Test procedures. -
- # 4.4.1 Dimensions and out-of-round. - The overall diameter of solid core polyethylene dielectric and outer jacket shall be measured. The cable making equipment shall be fitted with electronic or mechanical measuring device(s) to produce graphic records of the cable produced. Two recordings shall be made as nearly simultaneously as possible of each diameter, 90 degrees apart, and at a point in manufacturing where further dimensional changes such as cooling, tension, and so forth will not occur. The recordings shall be permanent and reproducible by a common commercial process. The recording accuracy shall be no less than ± 5 percent of the tolerance being measured, and any portion of the recording shall be identifiable to within ± 2 feet of the cable being measured and not less than 1/20 of an inch of paper per each 1 foot of cable being monitored. Each recording shall be identified with the reel of cable being monitored. The beginning of the cable length and end of the cable run shall be indicated on the recordings.
- # 4.4.1.1 Calibration. - The zero position on the graph and an indication of which side of zero is over and which side is under the nominal cable diameters shall be required, and an indication of specific values in thousandths of an inch shall be made on the recording with regard to the dielectric and outer jacket outside diameters.
- # 4.4.2 Bonding. - The cable shall be tested for conformance with 3.8.
- 4.4.3 Breaking strength. - The breaking strength of the center conductor shall be determined by means of a power-driven tensile machine. The rate of travel of the power-actuated grip shall be adjusted to move at a rate of $2 \pm 1/2$ inch per minute. A 20-inch specimen of center conductor shall be used for this test.
- # 4.4.4 Shear strength. - A suitable device shall be constructed to measure the shear strength between each bond surface. Five 1-foot pieces shall be used for the tests.
- 4.4.5 Specific gravity. - The specific gravity shall be measured under a hydrostatic pressure of 600 pounds per square inch gage (p. s. i. g.) at room temperature in fresh water. The measurement shall be made after a continuous immersion of 24 hours. The cable sample shall not be removed from the pressure tank nor the pressure reduced until after the measurement is completed.
- 4.4.6 Cold bend. - The cable shall be subjected to the cold bend test specified in MIL-C-17.
- 4.4.7 Crack resistance. - The cable shall be tightly wrapped around a mandrel 3 inches in diameter continuously for 24 hours to determine conformance with 3.7.
- 4.5 Inspection conditions. - Unless otherwise specified herein, all inspections shall be made at room ambient temperature, pressure and humidity.

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5. PREPARATION FOR DELIVERY

5.1 Domestic shipment and early material use. -

5.1.1 Packaging. - Cable in the length specified (see 3.9) shall be packaged to afford adequate protection against deterioration and physical damage during shipment from the supply source to the using activity and until early use.

5.1.2 Packing. - Packing shall be accomplished in a manner which will insure acceptance by common carrier and will afford protection against physical and mechanical damage during direct shipment from the supply source to the using activity for early use. The shipping containers or method of packing shall conform to the Uniform Freight Classification Ratings Rules, and Regulations or other carrier regulations as applicable to the mode of transportation.

5.1.3 Marking. - Shipment marking information shall be provided in accordance with the contractor's commercial practice. The information shall include nomenclature, Federal stock number or manufacturer's part number, specification number, contract or order number, date of manufacture (month and year), contractor's name, and destination.

5.1.3.1 Marking of each reel or spool shall be located on the flange area in a manner designed to preclude the possibility of the marking's becoming illegible during use.

5.2 Domestic shipment and storage or overseas shipment. - The requirements and levels of packaging, packing, and marking for shipment shall be specified by the procuring activity (see 6.1).

5.2.1 The following provides various levels of protection during domestic shipment and storage or overseas shipment, which may be required when procurement is made (see 6.1).

(5.2.1.1 Packaging, packing, and marking. - Cable in lengths specified (see 3.9) shall be packaged level A or C as specified (see 6.1), packed level A or B as specified (see 6.1) and marked in accordance with the requirements of MIL-C-12000.)

6. NOTES

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

- (a) Title, number, and date of this specification.
- (b) Length if other than specified in 3.9.
- (c) Level of packaging, packing, and marking required if other than as specified in 5.1 (see 5.2).

6.2 Preproduction. - Invitations for bids should provide that the Government reserves the right to waive the requirement for preproduction samples as to 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.

6.3 CHANGES FROM PREVIOUS ISSUE. THE OUTSIDE MARGINS OF THIS DOCUMENT HAVE BEEN MARKED "#" TO INDICATE WHERE CHANGES (DELETIONS, ADDITIONS, ETC.) FROM THE PREVIOUS ISSUE HAVE BEEN MADE. THIS HAS BEEN 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 AS WRITTEN IRRESPECTIVE OF THE MARGINAL NOTATIONS AND RELATIONSHIP TO THE LAST PREVIOUS ISSUE.

Preparing activity:
Navy - SH
(Project 6145-N145Sh)

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APPENDIX

QUALITY CONTROL SYSTEM REQUIREMENTS

CABLE, SPECIAL PURPOSE, BUOYANT

TYPE RG-298/U (SUBMARINE USE)

10. SCOPE

10.1 This appendix requires the establishment of a quality control system by the contractor to assure that supplies meet the quality standards established by the contract. This system, including procedures, is subject to surveillance by the Government representative. The procedures shall be designed by the contractor. The contractor's procedures used to implement the requirements of this appendix shall be subject to the disapproval of the Government representative.

10.2 Applicability. - This appendix shall apply to all supplies on which Government inspection is required.

10.3 Significance. - This appendix and any procedure or document executed in implementation thereof, shall be in addition to and not in derogation of other contract requirements.

20. REQUIREMENTS

20.1 Outline. - The contractor shall maintain an effective and economical quality control system planned and developed in conjunction with other planning functions. The system, including procedures, shall be adjusted to suit production procurement. The system shall be based upon consideration of the complexity of product design, quantity under procurement, interchangeability and reliability requirements, and manufacturing techniques. The system shall assure that adequate control of quality is maintained throughout all areas of contract performance, including, as applicable, the receipt, identification, stocking and issuance of material, and the entire process of manufacture, packaging, shipping, storage, and maintenance. All supplies under the contract, whether manufactured or performed within the contractor's plant or at any other source, shall be subject to control at such points as necessary to assure conformance to contractual requirements. The system shall provide for the prevention and ready detection of discrepancies and for timely and positive corrective action. The contractor shall make objective evidence of quality conformance readily available to the Government representative. It is the intent of this appendix to provide a quality control procedure suitable for production of cable for military use utilizing as much as possible normal control procedures for commercial production. Where differences exist between items for Naval use and commercial use, those items for Naval use shall be identified during production process. Where items for Naval use are identical to those produced for commercial use, the cable supplier shall verify that these items meet the requirements specified herein. The commercial product should be utilized to satisfy contract requirements insofar as practicable.

20.2 Description of procedures. - The contractor shall provide and maintain a description of procedures for control of quality. To the extent necessary, written examination and test procedures shall be prepared to supplement the applicable drawings and specifications, and shall make clear the manner in which such examination and test procedures are to be used. This description may be a compilation of existing shop travelers, routing cards, inspection method sheets, test procedures, route sheets, or other documents normally used by the contractor to define inspection operations. The description of the quality control system and all applicable examination and test procedures shall be available to the Government representative.

20.3 Drawing and change control. - A procedure shall be maintained by the contractor to assure that the latest applicable drawing, technical requirement, and contract change information will be available at the time and place of contractor's inspection. Concurrently with the effectivity of revised drawings or changes, the contractor's drawing and change control shall assure that obsolete information is removed from all points of issue and use. All changes shall be processed in a manner which will assure accomplishment on the affected supplies at the specified effective points. The contractor shall maintain a record of the point of effectivity of changes. This record shall be available for ready reference by the Government representative.

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20.4 Measuring and testing equipment. - Unless otherwise specified in the contract, the contractor shall provide and maintain gages and other measuring and testing devices necessary to assure that supplies conform to contract requirements. These devices shall be calibrated against measurement standards or designed measuring equipment at established periods to assure continued accuracy. The contractor shall prepare and maintain a written schedule for the maintenance and calibration of such equipment based on type, purpose, and degree of usage.

20.4.1 Production tooling used as media of inspection. - When production jigs, fixtures, tool masters and other such devices are used as media of inspection they shall be initially inspected or, by other suitable means, proved for accuracy prior to release for production use. The devices shall be reinspected or proved at established intervals.

20.4.2 Use of contractor's inspection equipment. - The contractor's gages, measuring, and testing devices shall be made available for reasonable use by the Government, when required, to determine conformance with contract requirements. If conditions warrant, contractor's personnel shall be made available for operation of such devices and for verification of their accuracy and condition.

20.5 Inspection during manufacture. - The contractor shall establish and maintain inspection at appropriately located points in the manufacturing process to assure continuous control of quality of parts, components, and assemblies.

20.6 Special processes. - When Government approval or certification of processes, equipment, or personnel is required under the contract, the contractor shall assure that he is fully qualified prior to requesting Government approval.

20.7 Inspection of completed supplies. - The contractor shall inspect completed supplies as necessary to assure that contract requirements have been met.

20.8 Sampling inspection. - Any sampling procedures, in addition to those required by contract, used by the contractor to determine the acceptability of supplies, shall afford reliable assurance of the maintenance of acceptable quality levels.

20.9 Indication of inspection status. - The contractor shall maintain a system for identifying the inspection status of supplies. Identification may be accomplished by means of stamps, tags, routing cards, move tickets, tote box cards or other normal control devices. Such controls shall be of a design distinctly different from Government inspection identification.

20.10 Nonconforming supplies. - Procedures shall be provided for control of nonconforming supplies, including procedures for the identification, presentation and disposition of reworked, repaired or waived supplies. The acceptance of nonconforming supplies is a prerogative of and shall be as prescribed by the Government. All nonconforming supplies shall, when practicable, be diverted from normal material movement channels. The nonconforming supplies shall be positively identified to prevent use until disposition is made. Holding areas mutually agreeable to the contractor and Government representative shall be provided.

20.11 Storage. - The contractor shall provide adequate procedures for control of supplies stored for the Government or to be applied to Government contracts to insure preservation and treatment in accordance with applicable requirements. Procedures shall define inspections to be conducted at scheduled intervals.

20.12 Transportation. - The contractor shall provide procedures for protecting the quality of supplies during transit in accordance with contract requirements.

20.13 Quality control records. - The contractor shall maintain adequate records throughout all stages of contract performance of examination and tests, including checks made to assure accuracy of inspection, testing equipment and other control media. All quality control records shall be available for review by the Government representative, and copies of individual records shall be furnished him upon request.

20.14 Corrective action. - The contractor shall take prompt action to correct conditions which might result in defective supplies or services. Use shall be made of feedback data generated and furnished by using activities as well as that generated in the contractor's facility.

SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No. 119-R004	
<p style="text-align: center;"><u>INSTRUCTIONS</u></p> <p>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).</p>			
SPECIFICATION			
ORGANIZATION (Of submitter)		CITY AND STATE	
CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT	
MATERIAL PROCURED UNDER A		3	
<input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> 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? <input type="checkbox"/> YES <input type="checkbox"/> 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	