INCH-POUND
MIL-I-3190F
8 August 1991
SUPERSEDING
MIL-I-3190E
4 September 1987
(See 6.8)

MILITARY SPECIFICATION

INSULATION SLEEVING, ELECTRICAL, FLEXIBLE, COATED, GENERAL SPECIFICATION FOR

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

1. SCOPE

1.1 Scope. This specification covers coated flexible sleeving suitable for use as electrical insulation.

1.2 Classification. The coated flexible electrical insulation sleeving shall be furnished in the following classes, types and categories as specified in the contract (see 6.2).

1.2.1 Class. The class of the sleeving indicates the temperature index in degrees Celsius (°C) (see 6.3.3). The sleeving shall be of the following temperature classes (see 6.3.2) as specified in the applicable specification sheet:

Class
130
155
200
220
240
250

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 5970

1.2.2 Type. The type of sleeving indicates the coating. The sleeving shall be of the following types as specified in the applicable specification sheet:

Type	Coating
A	- Nonchlorinated organic resins, singly or in admixture.
C	- Silicone resin (other than silicone rubber).
D	- Silicone rubber.
E	- Fluoroelastomer

1.2.3 Category. The category of the sleeving designates the humidity resistance of the sleeving. The sleeving shall be of the following categories as specified in the applicable specification sheet.

Category	Humidity resistance	Percent retention of dielectric breakdown (minimum) 96/23/96
a	low	30
b	medium	50
c	high	80

2. APPLICABLE DOCUMENTS.

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

O-T-620 - 1,1,1-Trichloroethane, Technical, Inhibited (Methyl Chloroform).
TT-S-735 - Standard Test Fluids; Hydrocarbon.
PPP-F-320 - Fiberboard; Corrugated and Solid Sheet Stock (Container Grade), and Cut Shapes.

MILITARY

MIL-Y-1140 - Yarn, Cord, Sleeving, Cloth, and Tape-Glass.
MIL-E-17555 - Electronic and Electrical Equipment, Accessories, and Provisioned Items (Repair Parts): Packaging of
MIL-L-19140 - Lumber and Plywood, Fire-Retardant Treated.

(See supplement 1 for list of associated specifications.)

STANDARDS

MILITARY

MIL-STD-104 - Limits For Electrical Insulation Color.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Bldg 40, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 149 - Standard Test Method for Dielectric Breakdown Voltage Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies. (DoD adopted)

D 350 - Standard Methods For Testing Flexible Treated Sleeving Used for Electrical Insulation.

D 374 - Standard Test Methods for Thickness of Solid Electrical Insulation.

D 618 - Standard Methods of Conditioning Plastics and Electrical Insulating Materials for Testing. (DoD adopted)

D 746 - Standard Test Methods for Brittleness Temperature of Plastics and Elastomers by Impact. (DoD adopted)

D 876 - Standard Methods of Testing Nonrigid Vinyl Chloride Polymer Tubing Used for Electrical Insulation.

D 3455 - Standard Test Method For Compatability of Construction Materials With Electrical Insulating Oils of Petroleum Origin.

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

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for 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. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheets. In the event of any conflict between the requirements of this specification and the specification sheets, the latter shall govern.

3.1.1 Part number. Specification part number for items described in this document shall be formulated as specified in 6.5.

3.2 Qualification. Electrical insulation sleeving furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable qualified products list at the time set for opening of bids (see 4.3 and 6.4).

3.3 Materials.

3.3.1 Base materials. The base material of the sleeving shall be glass fiber braid with glass fibers as specified in MIL-Y-1140 or other synthetic base braids as specified in the applicable specification sheet.

3.3.2 Coating. The base materials (braid) shall be uniformly coated with synthetic resin or rubber as specified in the applicable specification sheet.

3.3.3 Recovered materials. Unless otherwise specified herein, all equipment, material, and articles incorporated in the products covered by this specification shall be new and may be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specifically specified.

3.3.4 Color. Unless otherwise specified in the contract (see 6.2), the sleeving shall be the natural color of the coating formulation. The color, when specified, shall be in accordance with MIL-STD-104 (see 1.2.4.2). For type E sleeving, the color shall be black unless otherwise specified.

3.4 Dimensions.

3.4.1 Size. Unless otherwise specified in the contract (see 6.2), the tested sleeving shall be furnished in the standard inside diameters (id) as specified in table I. Each specimen measured shall fall within the minimum and maximum limits for the id specified.

TABLE I. Standard sizes.

Dash no.	AWG size	Id 1/		Wall thickness	
		Maximum (inches) 2/	Minimum (inch)	Nominal (inches)	Maximum (inch)
01	No. 24	0.027	0.020	0.022	0.030
02	No. 22	.032	.025	.027	.030
03	No. 20	.039	.032	.034	.030
04	No. 18	.049	.040	.042	.030
05	No. 17	.054	.045	.047	.030
06	No. 16	.061	.051	.053	.030
07	No. 15	.067	.057	.059	.030
08	No. 14	.074	.064	.066	.045
09	No. 13	.082	.072	.076	.045
10	No. 12	.091	.081	.085	.045
11	No. 11	.101	.091	.095	.045
12	No. 10	.112	.102	.106	.045
13	No. 9	.124	.114	.118	.045
14	No. 8	.141	.129	.133	.045
15	No. 7	.158	.144	.148	.045
16	No. 6	.178	.162	.166	.045
17	No. 5	.198	.182	.186	.045
18	No. 4	.224	.204	.208	.045
19	No. 3	.249	.229	.234	.045
20	No. 2	0.278	0.258	0.263	0.055
21	No. 1	.311	.289	.294	.055
22	No. 0	.347	.325	.330	.055
23	3/8 inch	.399	.375	.387	.055
24	7/16 inch	.462	.438	.450	.065
25	1/2 inch	.524	.500	.512	.065
26	5/8 inch	.655	.625	.640	.065
27	3/4 inch	.786	.750	.768	.075
28	7/8 inch	.911	.875	.893	.075
29	1 inch	1.036	1.000	1.018	.075

1/ The minimum id specified in table I for sizes no. 24 to 0, inclusive, are the same as the diameters of copper wire for corresponding AWG or Brown and Sharpe gauge sizes.
2/ Metric units have not been made part of this revision.

3.4.2 Length. Unless otherwise specified in the contract (see 6.2), the sleeving shall be furnished in coils as specified in the procurement. When the sleeving is to be furnished in lengths, the length shall be specified in the contract (see 6.2).

3.4.2.1 Tolerance. The tolerance in the length of pieces shall be as follows.

Length in inches	Tolerance in inches
Cut pieces 1 to 11, inclusive	Plus or minus 1/16
Cut pieces 12 to 29, inclusive	Plus or minus 1/4
Nominal lengths 30 to 42, inclusive	Plus or minus 1/2, the minimum length is 30 for any one length of sleeving.

3.5 Performance characteristics. The material shall conform to the quantitative requirements as specified herein and in the applicable specification sheet.

3.6 Workmanship. The finished sleeving shall be free from defects such as pimples, blisters, wrinkles, cracks and similar imperfections which may affect its performance. Minor surface imperfections which can be demonstrated as not detracting from the electrical and mechanical requirements shall be acceptable.

4. QUALITY ASSURANCE PROVISIONS

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

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

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

(a) Qualification inspection (see 4.3).
(b) Quality conformance inspection (see 4.5).

4.3 Qualification inspection. Qualification inspection tests shall consist of all the tests specified in table II and the applicable specification sheet.

TABLE II. Qualification and quality conformance inspections.

Inspection or test	Test	Qualification inspection	Quality conformance inspection
Visual examination	4.6.1	X	X
Dimensional measurement	4.7.1	X	X
Dielectric breakdown:			
straight	4.7.2.2	X	X
90 degrees bend	4.7.2.3	X	
Resistance to potting temperature	4.7.3	X	
Cold brittleness	4.7.4	X	
Flammability:			
Method A	4.7.5.1	X	X
Method B	4.7.5.2	X	X
Oil and solvent resistance	4.7.6	X	X
Hydrolytic stability	4.7.7	X	
Push-back after heat aging	4.7.8	X	X
Thermal endurance	4.7.9	X	
Thermal stability	4.7.10	X	X

4.3.1 Samples for qualification tests shall be furnished in the sizes and quantities as shown in table III.

TABLE III. Sizes and quantities of sleeving for qualification tests.

Size number	Nominal id (inch)	Amount (feet)
6	0.166	150
12	.085	150

4.4 Sampling for quality conformance inspection. Sampling for inspection shall be performed in accordance with the following definitions.

4.4.1 Lot. For purpose of sampling, a new inspection lot for examinations and tests shall consist of the same class, type, category, braid and size produced from identifiable quantities of raw material every time that new material is added to the mixture.

4.5 Quality conformance inspection. Quality conformance inspection shall be performed on each lot offered for delivery as specified in the applicable specification sheet (see tables II and III). Quality conformance testing shall consist of all the tests specified in the applicable specification sheet (see table I).

The sample unit shall be 25 linear feet with no piece less than 6 inches long. The inspection level shall be S-1 except that no less than three sample units shall be randomly selected throughout the lot. Long pieces shall be cut into parts of equal length not to exceed 10 inches for measurement of id.

TABLE IV. Sample size.

Lot size	Paragraph 4.6.1.1	Paragraph 4.6.1.2
2 to 8	All	5
9 to 50	8	5
51 to 90	8	7
91 to 150	12	11
151 to 280	19	13
281 to 500	21	16
501 to 1200	27	19
1201 to 3200	35	23
3201 to 10,000	38	29
10,001 to 35,000	46	35
35,001 to 150,000	56	40

4.5.1 Test conditions.

4.5.1.1 Nomenclature. The designations indicating conditioning of test specimens shall be in accordance with ASTM D 618.

4.5.2 Temperature and humidity tolerances. Specified temperatures and relative humidities shall be maintained within the tolerances as specified in table IV.

TABLE V. Temperature and humidity tolerances.

Temperature		Relative humidity	
°C	Plus or minus °C	Percent	Plus or minus (percent)
23 to 180	2	50	5
181 to 300	3	96	2
301 to 325	4	--	-
326 to 375	5	--	-

4.6 Examinations.

4.6.1 Examination of the end item. Examination and test of the end item shall be made in accordance with table IV. The sample size shall be expressed in units of lengths of insulation sleeving for examinations as specified in 4.6.1.1 and 4.6.1.2.

4.6.1.1 Examination of the end item for defects in appearance and construction. The sample unit for this examination shall be one piece of treated insulation sleeving. The sample unit shall be examined as follows:

Examine	Defect
Appearance	Broken, split, twisted, sharp bends. Discontinuous surface. Color other than specified. Presence of dirt, foreign material, embedded particles. Openings in braid. Blisters, pimples, tackiness, wrinkles or cracks.
Construction	Braid other than specified or required by contract or purchase order. Resin type other than coating specified or required by contract or purchase order. Discontinuous coating, as applicable.

4.6.1.2 Examination of the end item for dimensional defects. The sample unit for this examination shall be one length of braided sleeving.

Examine	Defect
Length (1 to 29 inches, inclusive)	Varies by more than the tolerances specified in 3.4.2.1.
Over 29 inches	Varies by more than minus zero, plus 1/2 inch from any dimension over 29 inches. Over 42-1/2 inches.
Inside diameter	See 3.4.1 and table I.

4.7 Tests.

4.7.1 Dimensional measurement. Dimensional measurements shall be made in accordance with ASTM D 350, except for the following modifications.

4.7.1.1 Conditioning. Specimens shall be tested after conditioning at 96/23/50 (see 4.5.1).

4.7.1.2 Test specimens. Test specimens shall be a minimum of 12 inches in length.

4.7.2 Dielectric breakdown.

4.7.2.1 Electrical apparatus. Step up transformer, circuit breaker, voltage control and voltmeter shall be in accordance with ASTM D 149. Power supply frequency shall be not greater than 100 Hertz and the transformer shall have a rating of not less than 2 kilovoltamperes. The short-time test in accordance with ASTM D 149 shall be used with a rate rise of 500 volts (V) per second.

4.7.2.2 Procedure for straight specimens. Measurements shall be made in accordance with ASTM D 350, except for the following modifications.

4.7.2.2.1 Conditioning. Specimens shall be conditioned as follows:

96/23/50 (see ASTM D 350)
96/23/96 (see ASTM D 350)

Dielectric breakdown shall then be measured on all specimens at room conditions of 23°C as rapidly as practicable (within 5 minutes) after removal from the humidity conditioning chamber. Other specimens shall be maintained at the elevated temperature, as specified in the applicable specification sheet, for 8 ± 3 minutes and shall then be subjected to dielectric breakdown at the indicated temperature.

4.7.2.2.2 Outer electrode. The strip of metal foil used as the outer electrode shall be 1 inch in width.

4.7.2.3 Procedure for 90 degree bend specimens. Pieces of the sleeving sample shall be cut into 4-inch lengths and placed on straight lengths of bare soft copper conductors of the nominal AWG size of the sleeving. The conductors serving as inner electrodes shall be approximately 5 inches long so that the exposed end can be formed into a hook or secured by a metal clip for supporting specimens in conditioning or in an oven. The specimens shall be bent 90 degrees around a smooth mandrel of 10 times the nominal id of the sleeving so that the bend is at the center of the 4-inch length of sleeving. The 90 degree bend specimens shall then be tested immediately after each of the following conditions:

(a) 96/23/50.
(b) 2 hours heat aging as specified on the individual specification sheet plus 2/23/50.

A 1-inch wide strip of metal foil (see 4.7.2.2.2) shall be wrapped snugly at the bend and dielectric breakdown determined.

4.7.3 Resistance to potting temperature. Measurements shall be made in accordance with ASTM D 350, except specimens shall be 6 inches in length.

4.7.4 Cold brittleness. Cold brittleness determinations shall be made in accordance with ASTM D 876, except for the following modifications.

4.7.4.1 Procedure. Ten specimens shall be tested at each temperature starting at the estimated brittle temperature in accordance with ASTM D 746. Temperature intervals of 2°C shall be used.

4.7.5 Flammability. (See 6.3.1.)

4.7.5.1 Flammability, method A. Measurements shall be made in accordance with ASTM D 876, except for the following modifications.

4.7.5.1.1 Test specimens. Specimens shall be 17 inches in length.

4.7.5.1.2 Bare steel wire. The 0.029-inch diameter steel wire used for supporting specimens shall have a 1 pound weight attached to the lower end to hold the wire straight.

4.7.5.1.3 Gas supply. Ordinary illuminating gas at normal pressure shall be used.

4.7.5.1.4 Positioning flat specimens. When the sleeving is flat, the wire shall support the specimen by one of the two small curvatures found in flat sleeving. The flats of the sleeving shall be directed vertically downward. The distance of 1-1/2 inches from burner to specimen shall be between the tip of the stem and the surface of the narrow side of the flat specimen. The valve controlling the gas supply to the burner shall be opened, and the flame shall be applied to the narrow side of the specimen for a period of 15 seconds.

4.7.5.2 Flammability, method B. Measurements shall be made in accordance with method B of ASTM D 350, except for the following modifications.

4.7.5.2.1 Marking of test specimens. Mark a gauge length of 1 inch on each test specimen approximately 3/4 inch from one end of the specimen.

4.7.5.2.2 Ignition of specimen. Insert the end of the specimen, on which the gauge marks have been placed, approximately 1/2 inch into the side of the Bunsen burner.

4.7.6 Oil and solvent resistance.

4.7.6.1 Test specimens. Test specimens shall be of any convenient length. Three specimens shall be used for each condition.

4.7.6.2 Swelling oil and solvent resistance. Separate sets of specimens shall be immersed in the following media and shall be maintained at 23°C for the period of time specified in the applicable specification sheet:

(a) Swelling oil conforming to type VI of TT-S-735.
(b) Xylol.
(c) 1,1,1-trichloroethane conforming to O-T-620.
(d) Mixture of paraffin oil (USP grade, white, heavy, Saybolt viscosity of 335 - 350) and xylol, 1:1 by volume.
(e) Jet fuel.
(f) Alkanex (G.E/IMI 9522-10 GL).

At the end of the specified period, the specimens shall be removed and blotted with a clean cloth. They shall then be examined for visible flaking, peeling or shredding. Measurements of outside diameter (od) shall be made in accordance with ASTM D 374.

4.7.6.3 Transformer oil resistance. Specimens shall be immersed in ASTM Oil No. 2 and shall be maintained at 105°C for the period of time specified in the individual specification sheet. At the end of this time the specimens shall be removed, allowed to cool and blotted with a clean cloth. They shall then be examined for visible flaking, peeling, shredding, softening or swelling. Measurements of od shall be made in accordance with ASTM D 350 employing method B in accordance with ASTM D 374

4.7.6.4 Compatibility with electrical insulating oils. Polyester Varnish over Type E sleeving shall be tested in accordance with ASTM D 3455.

4.7.7 Hydrolytic stability.

4.7.7.1 Test specimens. Test specimens shall be full sections of sleeving 6 inches in length.

4.7.7.2 Procedure. A copper wire of the correct AWG size shall be inserted in the length of sleeving and the specimen shall be placed in a test tube containing a small amount of water. The specimen shall be suspended from the cork or stopper to keep it above the water level and to prevent contact with the sides of the test tube. Distilled water shall be used to maintain a high relative humidity and the cork shall be coated with a high temperature wax or other means to produce a vapor tight seal. The sealed test tube shall be placed in an oven maintained at 70°C for 336 hours. The test tube shall then be removed and allowed to cool to room temperature. The specimen shall then be removed from the sealed tubes and shall be tested for straight dielectric breakdown at room conditions of 23°C in accordance with ASTM D 350. Each specimen shall be tested as rapidly as practicable, (within 3 minutes) after removal from the sealed tube.

4.7.8 Push-back after heat aging.

4.7.8.1 Test procedure. Specimens (4 inches long in the case of sleeving smaller than no. 0, and 4-3/4 inches long in the case of sizes no. 0 and larger) shall be subjected to 168/250 or 168/280 in the case of Type E sleeving and shall then be removed from the oven. After 1/2 hour at room temperature, straight standard annealed copper wire shall then be inserted into the sleeving. The wire shall be of the same size as the specified minimum diameter of the sleeving (see 3.4.1). In the case of sizes no. 0 and larger, both ends of the sleeving shall be wrapped with three turns of a 3/8-inch wide glass-backed adhesive tape prior to push-back. The length of the sleeving or the unwrapped portion shall then be reduced 20 percent by pushing the ends of the sleeving slowly toward each other. Test for breakdown as specified in 4.7.2.2. For Type E sleeving, the test shall be performed on sizes 6 and 12 only.

4.7.9 Thermal endurance. For qualification tests, the thermal endurance evaluation shall consist of tests on a representative size of no. 12 or no. 6 sleeving, using the 90 degree bend dielectric breakdown test method. The method shall be in accordance with ASTM D 350, except for the following modifications.

4.7.9.1 Exposure temperatures The specimens shall be exposed at a minimum of three selected temperatures spaced not less than 20°C apart, although the use of four temperatures is preferable, to establish the life-temperature relationships. The thermal life of the sleeving at the highest aging temperature shall not be less than 100 hours. The lowest exposure temperature shall be such that a thermal life greater than 2500 hours is obtained. The endpoint to determine life at each temperature shall be 3500V. For Type E sleeving, four selected temperatures spaced not less than 20°C apart shall be used.

4.7.10 Thermal stability. For Type E sleeving, 90-degree bend shall be performed on sizes 6 and 12 only.

4.7.10.1 Test specimens. For Type E sleeving five 90-degree bend tests specimens shall be performed on AWG size 6 and 12 only as specified in 4.7.2.3.

4.7.10.2 Procedure. The specimens shall be aged at the temperature and time indicated in the applicable specification sheet. Specimens shall be removed from the oven, cooled and tested for dielectric breakdown as specified in 4.7.8. The average dielectric breakdown shall be determined and reported.

4.8 Inspection of packaging. Sample packages and packs, and the inspection of the preservation, packing and marking for shipment, stowage and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5 PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition. For the extent of the applicability of the packaging or preparation for delivery requirements of referenced documents listed in section 2, see 6.7.)

5.1 General.

5.1.1 Navy fire-retardant requirements.

(a) Lumber and plywood. Unless otherwise specified (see 6.2), all lumber and plywood including laminated veneer material used in shipping container construction members, blocking, bracing, and reinforcing shall be fire retardant treated material conforming to MIL-L-19140 as follows:

Level A and B	- Type II - weather resistant. Category I - general use.
Level C	- Type I - non-weather resistant. Category I - general use.

(b) Fiberboard. Unless otherwise specified (see 6.2), fiberboard used in the construction of interior (unit and intermediate) and exterior boxes including interior packaging forms shall conform to the class-domestic/fire retardant or class-weather resistant/fire retardant materials requirements, as specified (see 6.2), of PPP-F-320 and amendments thereto.

5.1.2 Quantity per unit pack. Insofar as practicable, unit containers shall contain the quantities as specified in table VI. Since a definite unit length is not specified herein, the quantities listed for each unit package shall be expressed in feet.

TABLE VI. Quantity per unit container.

AWG sizes	Maximum QUP 1/ (feet)
24 - 15	1,000
14 - 6	500
5 - 0	250
3/8 inch and over	100

1/ In the event that the acquisition or individual shipment quantity is not evenly divisible by the maximum quantity per unit package, the remainder shall be enclosed within a separate unit container.

5.2 Packaging requirements. Insulation sleeving shall be preserved level A, B and C, or commercial, packed level A, B, C, or commercial as specified (see 6.2) and marked in accordance with MIL-E-17555 and shall include bar codes and applicable packaging acquisition options therein as specified (see 6.2).

6. NOTES

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

6.1 Intended use. The coated flexible insulation sleeving covered by this specification and the applicable specification sheets is intended for use as electrical insulation on lead wires, and connections in motors, transformers, and similar electrical apparatus.

6.2 Acquisition requirements. Acquisition documents should specify the following:

(a) Title, number, and date of this specification and applicable specification sheet.
(b) Class, type and category required (see 1.2).
(c) Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1 and 2.2).
(d) Color, if required (see 3.3.4).
(e) Size required (see 3.4.1).
(f) Length and/or number of lengths, or length of coil and number of coils (see 3.4.2).
(g) Level of preservation and level of packing required (see 5.2).
(h) When fire-retardant requirements are not required (see 5.1.1).
(i) Packaging acquisitioning options required (see 5.2).
(j) Class of fire retardant fiberboard required (see 5.1.1).

6.3 Definitions.

6.3.1 Flammability. Flammability classifications are covered by two methods which are useful for comparing materials but do not necessarily reflect the flammability of the compound. The materials covered by method B may be highly flammable and burn readily.

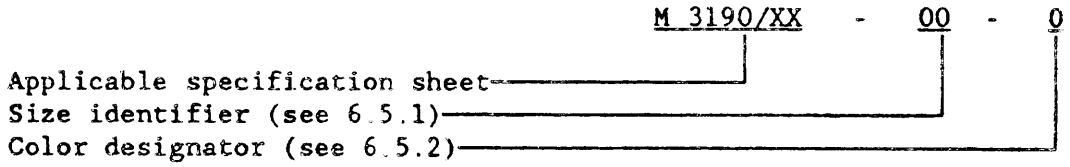
6.3.2 Temperature classification. The temperature classification for electrical equipment should be determined in terms of the thermal endurance of the insulation system rather than on the individual materials.

6.3.3 Temperature index. The temperature index is the highest temperature in degrees Celsius at which the material will provide satisfactory life as determined by the test methods described herein. The temperature index is a guide and does not imply a thermal classification or a limitation on its use in electrical equipment.

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time set for opening of bids, qualified for inclusion in Qualified Products List QPL-3190, whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Sea Systems Command, SEA 55Z3, Department of the Navy, Washington, DC 20362-5101 and information pertaining to qualification of products may be obtained from that activity. Application for qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.4.1).

6.4.1 Copies of "Provisions Governing Qualification SD-6" may be obtained upon application to Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

6.5 Part numbers. Part numbers under this specification shall be formulated as follows (see 3.1.1):



6.5.1 Size identifier. A two-position field shall be used to identify size (see 3.4.1).

6.5.2 Color designator. Color shall be designated as follows:

Designator	Color	Designator	Color
0	Black	7	Violet (purple)
1	Brown	8	Gray (slate)
2	Red	9	White
3	Orange	C	Clear
4	Yellow	P	Pink
5	Green	T	Tan
6	Blue	N	Natural

6.6 Subject term (key word) listing.

Dielectric breakdown
Flammability
Hydrolytic stability
Thermal endurance
Thermal stability

6.7 Sub-contracted material and parts. The packaging or preparation for delivery requirements of referenced documents listed in section 2 do not apply when material or parts are acquired by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.8 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of changes.

Custodians:
Army - ER
Navy - SH
Air Force - 20

Review activities:
Army - AR, AV, EA, MI
Navy - EC
Air Force - 85, 99, 80
DLA - GS

User activities:
Army - ME
Navy - MC, OS

Preparing activity:
Navy - SH
(Project 5970-1064)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL-I-3190F	8 AUGUST 1991

3. DOCUMENT TITLE
INSULATION SLEEVING, ELECTRICAL, FLEXIBLE, COATED, GENERAL SPECIFICATION FOR

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME COMMANDER NAVAL SEA SYSTEMS COMMAND (56Z24)	b. TELEPHONE (Include Area Code) (1) Commercial: (703) 602-3123 (2) AUTOVON: (AV) 332-3123
c. ADDRESS (Include Zip Code) WASHINGTON, DC 20362-5101	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340