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PLAINTIFF'S EXHIBIT

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ELECTRICAL INSULATION

Its Application to Shipboard Electrical Equipment

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a thermosetting resin which has a very wide B stage. In the B stage it melts under heat and can later be made to solidify by polymerization. This property is used in the molding of slot portions of coils using shellac-coated paper spacers and molding mica V rings. Spirit varnishes and lacquers dry chiefly by evaporation of the solvent. Strictly speaking, varnishes are not solutions but are colloidal in nature; therefore, they present difficulties in filtration and clarification as well as in storage, being susceptible to temperature changes, humidity, contact with air, etc.

Air-drying varnishes are generally inferior to baking varnishes in most essential insulating properties. In spirit varnishes water is left in the film when the solvent evaporates. The gum may granulate, and the film is softer, holding small amounts of solvents for a considerable time. In addition, these "spirit" varnishes are practically useless as insulation, except in the role of stickers or binders for good insulating material, such as mica, treated paper, and cloth. In air-drying oil-gum varnishes, the very factor that causes their rapid hardening is ultimately the cause of failure. The driers, which are incorporated in the formula and produce rapid oxidation, do not stop the hardening at the best possible place but allow it to continue on until the film becomes brittle or weak. The same is true to a much less extent with the synthetic resin varnishes.

A drying oil is an extract from animal or fish fat or from a vegetable seed or nut. There are hundreds of such oils which bear a very close chemical resemblance, but most of them are glycerides, *i.e.*, a combination of glycerin with organic acids having high molecular weight and a long chain organic structure. These liquid glycerides are capable of taking up oxygen

from the air and drying to a solid film by the double process of oxidation and polymerization. This last term can be defined simply as a process where the glyceride changes by union of two or more of its molecules into a compound having the same elements in the same proportions but also having a higher molecular weight and different physical properties. The heat and oxygen produce the larger complex chemical structures which thicken to form a gelatinous or resinous mass. The degree to which the glycerides oxidize and polymerize depends on the type and constitution of the organic acids present.

Of the hundreds of drying oils which have been isolated, there are just a few which have been important for centuries in varnish and enamel making. The chief drying oils used in insulating varnishes are linseed, perilla, and tung (chinawood) oils. Linseed oil is the most familiar and the oldest in history. It is derived from flaxseed by pressing or solvent extraction. Tung oil comes from a large nut resembling a huge horse chestnut, the fruit of the Chinese tung tree. Linseed oil is much slower drying than tung oil and imparts flexibility and life to films, whereas tung oil gives toughness and improved water and chemical resistance. It is most important that tung oil has the almost unique property of setting up rapidly to a gelatinous mass throughout a very thick layer or film. This is, of course, a very useful property for coil-treating varnishes. Less oxygen and heat are required for this change than with linseed oil. Soybean oil is a newcomer to the field of paints and varnishes and may be expected to become increasingly important in this field.

The rate of drying of an oil is, of course, connected with the amount of oxygen it can absorb, but it is not dependent upon

this factor alone. The rate also depends upon temperature, light, moisture conditions, and small quantities of accelerating catalysts, called driers. Driers are used with drying oils to accelerate the conversion of liquid to solid form. They are most important for air-drying varnishes, since they bring about the setting of the film within a reasonable number of hours rather than days. Driers are organic salts of metals, such as cobalt, manganese, and lead, which act as oxygen carriers or catalysts and greatly speed up the polymerization. Very small amounts (a few tenths or thousandths of a percent) are sufficient for maximum effect. Too much drier often impairs durability and life of the film or may act as a retarder rather than an accelerator. Besides the drying oils, there are also the semidrying and nondrying oils, in which this property of picking up oxygen and drying to a hard film is less marked or nearly absent. These oils, of which castor oil is an example, are used largely in finishes, where they act as plasticizers or flexibilizers for the film.

The natural resins, or "gums," now fast being superseded by synthetic materials, include shellac, rosin, Kauri, Manila, Congo copal, and many others, most of which are found in India or the East Indies. They are gums or pitches which exude from trees, bugs (in the case of shellac), or fossil accumulations which come from fossilized trees. Shellacs and copals, especially, are graded according to hardness and solubility, but they vary considerably in the amount of dirt and impurities they contain and from lot to lot in properties and workability. It was this lack of uniformity and difficulty of handling which gave synthetic or chemically prepared resins their chance.

Rosin is a product of pine pitch from which turpentine is also obtained. It is a

hard, brittle resin which melts at 80 or 90 C. It has a wide range of application, but for varnishes its use alone is limited by its softness and lack of durability and its high acidity.

Ester gum, which stands midway between the natural and synthetic resins, is a product of the high-temperature reaction of rosin and glycerin. It is much less acid than rosin and more weather resistant and plastic.

In the last 25 years synthetic resin development has produced outstanding resins of several types which are replacing natural resins in most applications where quality, uniformity in composition and performance, and ease of manufacture are factors. The more important and successful types now in use are the phenol-formaldehyde type (of which Bakelite is perhaps the best known example) and the alkyd type. The chemistry of these resins is elaborate and complicated, but the simplest phenol-formaldehyde resins are made by combining a phenolic body, such as carbolic acid, with an aldehyde to form a hard resin. Proper choice of phenol and aldehyde gives a resin which can be blended, just as natural resins are, with drying oils. The simplest alkyd is a combination of glycerin with phthalic acid, but the more useful alkyd resins have drying oils combined chemically in the resin itself. Both of these type resins can be so formulated that application of heat causes a permanent hardening of the resin to an infusible state by the process known as heat polymerization.

Alkyd-type resins, especially those modified with drying oils, have developed during the past two decades into some of the most important synthetic raw materials for finishes and coating because of their outstanding gloss, adhesion, and durability. Especially important are the applications in metal priming and coating, outdoor

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ishes, automotive and structural finishes, light-colored enamels, and printing inks. Until recently, applications of alkyd for insulation were limited by the electrical properties and moisture and heat resistance as well as through-curing properties. These properties have been improved markedly, and greater use is constantly being made of alkyds as insulating materials to replace the old black varnishes and compounds.

Melamine resins are a new group of high-grade thermosetting compounds. They are used in very much the same manner as phenolic resins for making laminates and molded compounds. In their final polymerized form, these resins are not soluble in water or alcohol and are highly resistant to most organic solvents. Melamines are useful in imparting hardness and toughness, as well as fast-drying properties, to other varnishes. During the war, submarine fires caused deaths which were attributed to the toxic fumes from phenolic resins. Glass-melamine laminates were substituted on both control apparatus and rotating electrical machinery on a large scale. Melamine resins are also used in combination with asbestos as well as cotton fabrics and paper to make laminates and molded parts. These products combine good arc resistance with tracking, moisture resistance, thermal stability, and low inflammability. It is expected that this type of resin and products employing it will become increasingly useful in the electrical industry.

Other important synthetic resins include the Amberols and Cumar, both similar to the phenolic type. There is a rapidly growing list of synthetic resins, some of which hold promise for future developments. The field is so large that it cannot be covered in this manual. Some of the newer resins may be of interest, how-

ever, and they will be briefly mentioned below.

The vinyl resins are derivatives of ethylene and acetylene, with strongly polymerizing characteristics. These polymers are becoming increasingly important in the plastics and coatings field, including that of synthetic rubbers and rubber substitutes. Most of these materials are thermoplastics, do not set up or cure with heat alone, and many are very tough and chemically resistant.

The simplest vinyl compounds are the alcohol, the chloride, and the acetate. Polyvinyl chloride is highly insoluble and flame resistant. Polyvinyl acetate is soluble in the proper solvents and thermoplastic. So-called copolymers of these have all manner of intermediate properties. These resins have wide uses, from adhesives and chemical-resistant coatings for food containers (Gelvas, Vinylites) to rubber substitutes and artificial silk (Vinyon, Koroseal).

If polyvinyl acetate is hydrolyzed and treated with formaldehyde, a very useful group of resins results. These resins are insoluble in most solvents and chemically quite inert as well as being very tough and strong. Formvar is one of a class of resins called polyvinyl acetals. As a film-forming material it has the disadvantages of nitrocellulose and cellulose acetate. Its solutions have high viscosity, adhesion is poor, and the thermoplastic film dries by solvent evaporation only.

Vinyon is a synthetic silk made from the copolymers of vinyl chloride and acetate similar in properties to nylon, which is a complex material more closely related to the alkyds in structure but having many similar properties to the vinyl polymers.

Silicone resins are a recent development and are applicable to class H insulation, where high thermal endurance is required.

The chemical nature and background are given in more detail in Sec. 2-14. These varnishes are available in a wide range of properties. It is theoretically possible to reproduce the general characteristics of all the organic varnish types in the silicone type of varnish. **Silicone resins have good electrical properties to supplement their outstanding thermal endurance.** Their physical properties are usually somewhat inferior to their organic resin counterparts. This is partly attributable to their slow cure except at very high temperatures. Intensive activity is under way for further development and evaluation of silicone resins and varnishes containing them. However, those now available commercially have many uses when applied with knowledge of their properties and limitations.

Silicone resins have been developed in two general classes. One is the insulating type which is comparable in most properties to the oleoresinous varnishes so long generally used for electrical insulation. There are two varieties of this class. The first such varnish requires baking temperatures sufficiently high (200 to 250 C) as to prohibit its use on organic materials such as paper, cotton, and silk, and it should be used only on inorganic materials such as glass fiber, asbestos, mica, or ceramics. The second variety, which was developed later, is comparable in general properties but dries to a tack-free condition at 150 C. Complete cure, by chemical reaction, required further baking at temperatures of 200 to 225 C, which improves its film hardness and strength at elevated temperatures. Both varieties are being used to treat glass-covered magnet wire, to coat fiber-glass cloth, and as a binder for building up flexible mica-glass-laminated sheet. They are also used as the final impregnating and coating varnish to bind together the individ-

ual machine components and waterproof the complete assembly. Another type of silicone resin corresponds in general behavior to the organic thermosetting resins normally used to make rigid laminated insulating parts. These thermosetting silicone resins are being used to bond fibrous glass and asbestos laminated structures and to bond special coils requiring hardness and rigidity.

A simple but significant property of all silicone compounds is their resistance to moisture. Silicone varnish films transmit moisture vapor at about the same rate as organic varnishes, but water does not easily wet silicone-resin-treated surfaces. Therefore, conducting films of moisture are far less likely to form than under similar atmospheric conditions on conventional organic-resin-treated surfaces. The importance of this characteristic is hard to evaluate in general terms, but it is apparently of considerable significance on shipboard electrical equipment.

For black varnishes, the asphalts or pitches play the same role as the resins do in the case of the clear varnishes and may be used together with resins. Among naturally occurring asphalts (which are mined, much as rock minerals, from veins) are gilsonite, a hard brittle, substantially pure asphalt, and various softer, more plastic materials, such as the famous lake of asphalt in Trinidad. Various pitches are also available. These are the end products of the distillation of petroleum, coal tar, wood, and various vegetable oils and fats, chief of which is stearin pitch.

The pitches vary greatly in solubility and melting point or flow point. Some may be modified to give increased elasticity and stability by blowing with hot air. Their stability in a varnish blend depends greatly upon the cooking and upon the thinner used.

The literature abounds with contradictory statements as to the value of asphaltic materials. They are susceptible to oxidation and are affected by light and heat, failure occurring by the progressive development of fine cracks. When the film is intact, the asphalts are excellent in acid and moisture repellance **but are very soluble in oils.** When added to clear varnishes, asphalts retard the drying considerably unless they are used in sufficient quantity to give additional hardness themselves.

The correct terminology for paints and varnishes has been outlined in Fig. 2-3. One outstanding exception to those definitions should be noted. Varnishes used for coating wire are usually called "wire enamels" though they contain no pigment. Oleoresinous varnishes have been used for years for coating magnet wire.

Synthetic resin enamels have been developed which are fast displacing the drying-oil varnish-type wire enamel. An important synthetic wire enamel is a polyvinyl acetate which is hydrolyzed and treated with formaldehyde to produce a class of resins called polyvinyl acetals. This resin is insoluble in most solvents and is chemically inert as well as being tough and strong. It has a high viscosity in solution form, and the thermoplastic film dries by solvent evaporation only. This type of resin when used as a wire enamel produces a very tough insulation which can withstand severe winding abuse. It also has the great advantages of relative freedom from heat shock and good thermal endurance for a class A material. It is less susceptible to softening by varnish solvents than are conventional varnishes.

2-12. INSULATING COMPOUNDS

Under this heading are listed solid, plastic, or semiliquid materials which contain

little or no thinner. They may be resins, asphalts, waxes, or varnish bases or blends of these materials with or without fillers, such as talc, silica, quartz sand, mica dust, slate, asbestos, glass fibers, and whiting. They are generally classified as to their uses as sealing, filling, or treating compounds.

1. *Sealing and Filling Compounds.* Sealing and filling compounds are used for protection of windings and for filling cavities in metal, porcelain, and other materials to exclude moisture, dust, and dirt. They may be either solid compounds which are melted and poured in place, solidifying on cooling, or plastic or puttylike compounds such as are used in armature and field coils. These compounds gradually set to a firm condition, with or without heat, according to the particular compound. For filling cavities, etc., it is important that the shrinkage, especially at low temperatures, be as low as possible or as nearly as possible like that of the material with which the compound is in contact and that the adhesion be good and cracking eliminated. For sealing compounds used on windings, impact strength, thermal conductivity, and aging at elevated temperatures are also important requirements in certain applications.

2. *Treating Compounds.* Treating compounds find an extensive use in a solidified mass from which moisture and air are excluded. Coils from which all moisture has been exhausted by a vacuum process are filled with melted pitch compounds and rendered rigid and moistureproof. A compound for this application should be sufficiently tough to withstand rough handling and have a uniform flow point, a high degree of fluidity, and high penetration at the treating temperature.

Appendix I. ELECTRICAL INSULATING MATERIALS— DESCRIPTION AND STOCK LIST

This appendix lists available Navy insulating materials and gives general identifying information. It has been prepared for the purpose of assisting shop personnel in the selection of the correct electrical insulating materials for the maintenance and repair of electrical equipment.

All materials as listed have been taken from the General Stores Section of the Catalog of Navy Material as follows: Class 15, Group 4, Magnet Wire; Class 17, Group 22, Electrical Insulating Materials; Class 52, Insulating Varnishes.

As this appendix is to be used only as a guide and for ready reference purposes, all ordering of materials should be made from the Catalog of Navy Material, which contains the latest ordering information, stock number and item changes, and general instructions.

Insulation, Electrical, Sheet

An electrical insulation item consisting of (1) condensed fibers, natural or synthetic, in sheet form, such as paper, fibre, or glass (usually short fibers); (2) natural or synthetic rubber with or without reinforcement; or (3) a reinforced flat laminated (plastic) composite structure.

PAPER AND FIBRES

FISH PAPER (Slot Cell)

Spec: JAN-I-695

Insulation Class O

Type F. An extremely tough, strong, dense fish paper made from chemically treated cotton rag stock. Available in roll form, 100 pounds per roll, in widths from 36 to 60 inches and in sheet form 36 X 36 inches minimum to 60 X 88 inches maximum.

Unit of Issue: Pound

Approximate cost: \$0.50
per pound

Stock No.	Thickness, in.	Sq ft per lb
Type F, Form R (Rolls):		
G17-I-4500	0.005	28.12
G17-I-4505	0.007	20.08
G17-I-4510	0.010	14.06
G17-I-4520	0.015	9.56
Type F, Form S (Sheets):		
G17-I-4530	0.020	7.00
G17-I-4540	0.025	5.60
G17-I-4550	0.030	4.70

SHIPBOARD ELECTRICAL INSULATION

RAG PAPER

Spec: JAN-I-695

Insulation Class O

Type R. An extremely tough, dense, strong rag paper made from 100 percent selected cotton rag stock not chemically treated. Available in sheet form 36 × 36 inches minimum to 60 × 88 inches maximum.

Unit of issue: Pound

Approximate cost: \$0.70
per pound

Stock No.	Thickness, in.	Sq ft per lb
G17-I-4655-50	0.005	23.60
G17-I-4655-100	0.007	16.90
G17-I-4655-200	0.010	11.80
G17-I-4655-300	0.015	8.30
G17-I-4655-400	0.020	5.90
G17-I-4655-500	0.025	4.72
G17-I-4655-600	0.030	3.96

PRESSBOARD

Spec: JAN-I-545

Insulation Class O

A dense, flexible, easily worked pressboard material made from rag stock. Has 300 volts per mil average dielectric strength. Available in sheet form, 30 × 36 inches minimum to 36 × 42 inches maximum.

Unit of issue: Pound

Approximate cost: \$0.30
per pound

Stock No.	Thickness, in.	Sq ft per lb
G17-I-4660	0.010	16.00
G17-I-4610	0.015	10.66
G17-I-4620	0.020	8.00
G17-I-4630	0.025	6.40
G17-I-4640	0.030	5.33
G17-I-4650	0.060	2.66
G17-I-4650-125	0.125	1.33

HARD FIBRE

Spec: JAN-F-1148

Insulation Class O

Grade BH (Bone Hard). A high-density material

of chemically gelled paper stock having excellent machining qualities, arc resistance, and toughness and a specific gravity of not less than 1.30. Available in sheet form in sizes from 30 × 55 inches minimum to 60 × 84 inches maximum.

Unit of issue: Pound

Approximate cost: \$0.50
per pound

Stock No.	Thickness, in.	Lb per sq ft
G17-I-2130	1/32	0.212
G17-I-2140	1/16	0.423
G17-I-2150	3/32	0.635
G17-I-2160	1/8	0.846
G17-I-2170	3/16	1.269
G17-I-2180	1/4	1.692
G17-I-2190	3/8	2.538
G17-I-2200	1/2	3.384

VULCANIZED FIBRE

Spec: JAN-F-1148

Insulation Class O

Grade CH (Commercial or Vulcanized). A dense material of chemically gelled paper stock similar to bone hard except specific gravity is in the order of 1.10. Available in sheet form in sizes from 30 × 55 inches minimum to 60 × 88 inches maximum.

Unit of issue: Pound

Approximate cost: \$0.70
per pound

Stock No.	Thickness, in.	Lb per sq ft
G17-I-2320	5/8	3.148
G17-I-2330	3/4	4.102
G17-I-2340	7/8	4.785
G17-I-2350	1	5.47
G17-I-2360	1 1/8	6.152
G17-I-2361	1 1/4	6.8360
G17-I-2362	1 1/2	8.2029

LAMINATES

PAPER BASE, FORM S

Spec: MIL-P-3115A

Insulation Class A

Type P3E. A natural-color, paper-base, phenolic laminate for use in radio-frequency applications.

Has good electrical properties under high-humidity conditions. Arc resistance and fire resistance are poor. Available in sheets in sizes between 36 and 50 inches in width and between 36 and 96 inches in length.

APPENDIX I. DESCRIPTION AND STOCK LIST

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Type PBG. A general-purpose, natural-color, paper-base, phenolic laminate combining fairly good electrical and mechanical properties. Arc resistance and fire resistance are poor. Available in sheets in sizes between 36 and 50 inches in width and between 36 and 96 inches in length.

Unit of issue: Pound Approximate cost: \$1.00
per pound

Stock No.	Thick- ness, in.	Lb per sq ft
<i>Type PBE (Paper-base Electrical):</i>		
G17-I-5636-50	1/32	0.22
G17-I-5636-70	1/16	0.44
G17-I-5636-80	3/32	0.66
G17-I-5636-90	1/8	0.88
G17-I-5636-110	3/16	1.33
G17-I-5636-130	1/4	1.77
G17-I-5636-140	5/16	2.12
G17-I-5636-150	3/8	2.66
G17-I-5636-170	1/2	3.54
G17-I-5636-180	5/8	4.42
G17-I-5636-190	3/4	5.32
G17-I-5636-200	7/8	6.20
G17-I-5636-210	1	7.08
G17-I-5636-230	1 1/4	8.85
G17-I-5636-250	1 1/2	10.63
<i>Type PBG (Paper-base General):</i>		
G17-I-5700-50	1/32	0.22
G17-I-5700-70	1/16	0.44
G17-I-5700-80	3/32	0.66
G17-I-5700-90	1/8	0.88
G17-I-5700-110	3/16	1.33
G17-I-5700-130	1/4	1.77
G17-I-5700-140	5/16	2.12
G17-I-5700-150	3/8	2.66
G17-I-5700-170	1/2	3.54
G17-I-5700-180	5/8	4.42
G17-I-5700-190	3/4	5.32
G17-I-5700-200	7/8	6.20
G17-I-5700-210	1	7.08
G17-I-5700-230	1 1/4	8.85
G17-I-5700-250	1 1/2	10.63

FABRIC BASE, FORM S

Spec: MIL-P-3114A Insulation Class A

Type FBG. A general-purpose, natural-color, cotton-fabric-base, phenolic laminate combining fairly

good electrical and mechanical properties. Arc resistance and fire resistance are poor. Available in sheets in sizes between 36 and 50 inches in width and between 36 and 96 inches in length.

Unit of issue: Pound Approximate cost: \$1.20
per pound

Stock No.	Thickness, in.	Lb per sq ft
G17-I-5531-125	1/32	0.22
G17-I-5531-175	1/16	0.45
G17-I-5531-200	3/32	0.67
G17-I-5531-225	1/8	0.90
G17-I-5531-275	3/16	1.35
G17-I-5531-325	1/4	1.80
G17-I-5531-350	5/16	2.25
G17-I-5531-375	3/8	2.70
G17-I-5531-425	1/2	3.60
G17-I-5531-450	5/8	4.50
G17-I-5531-475	3/4	5.40
G17-I-5531-500	7/8	6.30
G17-I-5531-525	1	7.20
G17-I-5531-550	1 1/8	8.10
G17-I-5531-575	1 1/4	9.00
G17-I-5531-600	1 3/8	9.90
G17-I-5531-625	1 1/2	10.80
G17-I-5531-650	1 5/8	11.70
G17-I-5531-675	1 3/4	12.60
G17-I-5531-700	1 7/8	13.50
G17-I-5531-725	2	14.40

GLASS BASE, FORM S

Spec: MIL-P-15037 Insulation Class B

Type GMG. A general-purpose, glass-fabric-base, melamine resin laminate combining good electrical properties with high mechanical strength. Has excellent fire- and arc-resistance properties. Available in sheet in sizes between 36 and 50 inches wide and between 36 and 96 inches in length.

Unit of issue: Pound Approximate cost: \$2.40
per pound

Spec: MIL-P-997 Insulation Class H

Type GSG. A general-purpose, glass-fabric-base, silicone resin laminate combining excellent electrical properties with high-temperature resistance. Mechanical strength is good, and fire- and arc-resistant properties are high. Available in sheets in sizes between 36 and 50 inches wide and between 36 and 96 inches in length.

Unit of issue: Pound Approximate cost: \$7.50
per pound

SHIPBOARD ELECTRICAL INSULATION

Stock No.	Thick- ness, in.	Lb per sq ft	Stock No.	Thick- ness, in.	Lb per sq ft
Type GMG (Glass Melamine General):			Type GSG (Glass Silicone General):		
G17-I-5765-5	$\frac{1}{32}$	0.31	G17-I-5764-31	$\frac{1}{32}$	0.20
G17-I-5765-10	$\frac{1}{16}$	0.62	G17-I-5764-62	$\frac{1}{16}$	0.40
G17-I-5765-15	$\frac{3}{32}$	0.93	G17-I-5764-93	$\frac{3}{32}$	0.60
G17-I-5765-20	$\frac{1}{8}$	1.24	G17-I-5764-125	$\frac{1}{8}$	0.80
G17-I-5765-25	$\frac{3}{16}$	1.86	G17-I-5764-187	$\frac{3}{16}$	1.20
G17-I-5765-30	$\frac{1}{4}$	2.48	G17-I-5764-250	$\frac{1}{4}$	1.60
G17-I-5765-35	$\frac{5}{16}$	3.10	G17-I-5764-312	$\frac{5}{16}$	2.00
G17-I-5765-40	$\frac{3}{8}$	3.72	G17-I-5764-375	$\frac{3}{8}$	2.40
G17-I-5765-45	$\frac{1}{2}$	4.96	G17-I-5764-500	$\frac{1}{2}$	3.20
G17-I-5765-50	$\frac{5}{8}$	6.20	G17-I-5764-625	$\frac{5}{8}$	4.00
G17-I-5765-55	$\frac{3}{4}$	7.44	G17-I-5764-750	$\frac{3}{4}$	4.80
G17-I-5765-60	$\frac{7}{8}$	8.68	G17-I-5764-875	$\frac{7}{8}$	5.60
G17-I-5765-65	1	9.92	G17-I-5764-1000	1	6.40
G17-I-5765-70	$1\frac{1}{8}$	11.16	G17-I-5764-1125	$1\frac{1}{8}$	7.20
G17-I-5765-75	$1\frac{1}{4}$	12.40	G17-I-5764-1250	$1\frac{1}{4}$	8.00
G17-I-5765-80	$1\frac{3}{8}$	13.64	G17-I-5764-1375	$1\frac{3}{8}$	8.80
G17-I-5765-85	$1\frac{1}{2}$	14.88	G17-I-5764-1500	$1\frac{1}{2}$	9.60
G17-I-5765-90	$1\frac{5}{8}$	16.12	G17-I-5764-1625	$1\frac{5}{8}$	10.40
G17-I-5765-95	$1\frac{3}{4}$	17.36	G17-I-5764-1750	$1\frac{3}{4}$	11.20
G17-I-5765-100	$1\frac{7}{8}$	18.60	G17-I-5764-1875	$1\frac{7}{8}$	12.00
G17-I-5765-105	2	19.84	G17-I-5764-2000	2	12.80

PASTED MICA

Spec: HH-I-538

Insulation Class B

Class PM, Form S

Type PMF (pasted mica, flexible) is suitable for forming or being applied onto ordinary shapes without any application of heat. Average short-time dielectric strength, 525 volts per mil.

Type PMM (pasted mica, moldable) is capable of being molded into special shapes and forms when heated to a temperature of 135 C. The molded form is retained upon cooling to room temperature. Average short-time dielectric strength, 600 volts per mil.

Type PMR (pasted mica, rigid) is capable of being safely bent to an 18-inch radius of curvature with no detrimental effects. Average short-time dielectric strength, 600 volts per mil. Furnished in sheets 18 inches wide and 36 inches long.

Unit of issue: Pound

Approximate cost: \$3.00
per pound

Stock No.	Thickness, in.	Approx. sq ft per lb
Type PMF:		
G17-I-3340	0.005	16.48
G17-I-3350	0.010	9.00
G17-I-3360	0.015	6.12
G17-I-3370	0.020	4.74
G17-I-3380	0.025	3.90
G17-I-3390	0.030	3.10
G17-I-3400	0.035	2.68
G17-I-3410	0.0375	2.57
G17-I-3420	0.040	2.41
G17-I-3430	0.045	2.05
G17-I-3440	0.050	1.88
G17-I-3450	0.125	0.75

APPENDIX I. DESCRIPTION AND STOCK LIST

Stock No.	Thickness, in.	Approx. sq ft per lb	Stock No.	Thickness, in.	Approx. sq ft per lb
Type PMM:			Type PMR:		
G17-I-2650	0.005	16.95	G17-I-2920	0.020	6.43
G17-I-2660	0.010	8.47	G17-I-2940	0.025	5.14
G17-I-2670	0.015	5.65	G17-I-2950	0.030	4.28
G17-I-2680	0.020	4.10	G17-I-2960	0.035	3.67
G17-I-2690	0.025	3.22	G17-I-2970	0.040	3.21
G17-I-2700	0.030	2.60	G17-I-2973	0.045	2.85
G17-I-2710	0.035	2.45	G17-I-2976	0.050	2.57
G17-I-2720	0.0375	2.25			
G17-I-2730	0.040	1.95			
G17-I-2740	0.045	1.72			
G17-I-2750	0.050	1.51			
G17-I-2760	0.125	0.59			

MICA-GLASS COMBINATIONS

Spec: 17-I-62

Class B, Form S, with organic varnish

Class H, Form S, with silicone varnish

Type GMG (Glass-Mica-Glass). Consists of pasted mica sandwiched between single layers of glass cloth.

Type MG (Mica-Glass). Consists of pasted mica laminated with one layer of glass cloth.

Type PMG (Paper-Mica-Glass). Consists of pasted mica laminated with one layer of thin paper on one side (for mechanical support) and one layer of glass cloth on the other side.

The above three types of material are used for motor, generator, and transformer coils, slot liners, ground insulation, phase-to-phase insulation, primary and secondary separation, coil exteriors, cable splices, coil and cell wrappers, and similar uses. It has high dielectric strength.

Unit of issue: Square yard

Approximate cost:
\$10.00 per
square yard

Stock No.	Thickness, in.
Class B, Type GMG:	
G17-I-4235-320	0.012
Class B, Type MG:	
G17-I-4232-175	0.010
Class B, Type PMG:	
G17-I-4235-650	0.007
G17-I-4235-675	0.015
Class H, Type GMG:	
G17-I-4235-400	0.010
G17-I-4235-420	0.012
Class H, Type MG:	
G17-I-4232-150	0.007

Insulation, Electrical, Cloth

An electrical insulation item consisting of woven fabric of natural or synthetic fibers such as cotton, silk, rayon, glass, asbestos, or nylon, usually in widths of over 8 inches; may be plain, impregnated, or varnished.

CLOTH

COTTON FABRIC (UNTREATED)

Spec: MIL-I-3042

Insulation Class O

Type CFC. A cotton-fiber cloth, relatively clean and free of deleterious substances. Has a balance weave of not less than 68 or more than 72 threads

per inch and may be readily impregnated with insulating varnish. Available in 25- or 50-yard rolls of 35-inch width trimmed.

Unit of issue: Yard

Approximate cost: \$0.80
per yard

SHIPBOARD ELECTRICAL INSULATION

Stock No.	Thick- ness, in.	Oz per sq yd
Type CFU (Cotton Fiber Untreated):		
G17-I	0.005	2.40
G17-I	0.007	2.80
G17-I (numbers not available)	0.010	2.80
G17-I	0.012	2.80

VARNISHED CAMBRIC

Spec: 17-C-8

Insulation Class A

Type A. A uniform, square-woven, clean, cotton cloth coated with a high-grade slow-drying baking varnish. Has a smooth, high-gloss surface free from wrinkles and creases. Available in trimmed widths of 35 inches in rolls of 50 yards.

Unit of issue: Square yard

Approximate cost:
\$1.00 per yard

Stock No.	Thickness, in.	Dielectric strength, volts
Type A:		
G17-I-1620	0.007	5,600
G17-I-1640	0.010	8,000

ASBESTOS FABRIC (UNTREATED)

Spec: MIL-I-3053

Insulation Class C

Type 4PU (Plain, Untreated). An asbestos-fiber cloth made from high-grade, long-fiber asbestos uniformly woven and free from knots, lumps, and unsightly defects and containing not less than 85 percent by weight of pure asbestos. Available in rolls 36 inches wide.

Type 4RU (Reinforced, Untreated). Same as type 4PU except stronger.

Unit of issue: Square yard

Approximate cost:
\$2.00 per square
yard

Stock No.	Thickness, in.	Oz per sq yd
Type 4PU (Plain, Un- treated):		
G17-I-1500-20	0.025	15
G17-I-1500-80	0.035	18
G17-I-1500-140	0.045	20

Stock No.	Thickness, in.	Oz per sq yd
Type 4RU (Reinforced, Untreated):		
G17-I-1500-30	0.025	15
G17-I-1500-90	0.035	18
G17-I-1500-150	0.045	20

GLASS FABRIC (UNTREATED)

Spec: MIL-I-1140 A

Insulation Class C

Type GFU. A high-grade electrical cloth made from either continuous filament or staple fiber glass furnished in rolls 50 to 300 yards long in 38-inch widths.

Unit of issue: Square yard

Approximate cost:
\$1.50 per square
yard

Stock No.	Cloth No.	Thick- ness, in.	Oz per sq yd
Class CF, Continuous Filament:			
G17-I-2644-300	108	0.002	1.43
G17-I-2644-305	113	0.003	2.46
G17-I-2644-310	128	0.007	6.00
G17-I-2644-315	141	0.010	8.70
G17-I-2644-320	164	0.015	12.60
Class SF, Staple Fiber:			
G17-I-2644-400	261	0.015	10.32
G17-I-2644-405	294	0.023	14.70

VARNISHED GLASS CLOTH

Spec: 17-I-45

Insulation Class B

Group GFV, Grade O, Form C. A high-grade, varnished glass cloth using continuous-filament glass cloth and an organic insulating varnish. A general-purpose insulating material available in 25-linear-yard rolls, 36 inches wide trimmed.

Unit of issue: Square yard

Approximate cost:
\$2.00 per square
yard

APPENDIX I. DESCRIPTION AND STOCK LIST

Stock No.	Thickness, in.	Dielectric strength, volts
Grade O, Form C:		
G17-I-2641-905	0.005	6,250
G17-I-2641-915	0.007	8,750
G17-I-2641-925	0.010	11,000
G17-I-2641-935	0.012	12,000

SILICONE GLASS CLOTH

Spec: 17-I-45

Insulation Class H

Group GFV, Grade S, Form C. A high-grade, silicone-varnished glass cloth using continuous-filament glass cloth and a silicone varnish. A general-purpose,

high-temperature insulating material available in 25-linear-yard rolls, 36 inches wide trimmed.

Unit of issue: Square yard

Approximate cost:

\$4.00 per square yard

Stock No.	Thickness, in.	Dielectric strength, volts
Grade S, Form C:		
G17-I-2642-40	0.004	4,400
G17-I-2642-70	0.007	7,000
G17-I-2642-100	0.010	8,000
G17-I-2642-120	0.012	8,500

Insulation, Electrical, Tape

An electrical insulation item consisting of tape of any kind but usually consisting of woven fabric (less than 8 inches wide), slit film, or sheet material. Tape may be plain, impregnated, or varnished.

TAPE

COTTON TAPE, LINEN FINISH

Spec: JAN-T-638

Insulation Class O

Type I (Plain). A high-grade, uniformly woven cotton tape with a linen finish free from unsightly defects, lumps, knots, etc. Available in 72-yard rolls.

Unit of issue: Roll

Approximate cost: \$0.40 per roll

Stock No.	Thickness, in.	Width, in.
G17-T-1300	0.005	½
G17-T-1310	0.005	¾
G17-T-1305	0.007	½
G17-T-1315	0.007	¾
G17-T-1320	0.007	1
G17-T-1330	0.007	1½

VARNISHED CAMBRIC TAPE

Spec: 17-C-8

Insulation Class A

Type B (Bias Cut). A closely and uniformly woven cotton fabric treated with a high-grade, slow-baking organic varnish for general insulating purposes. Furnished in 36- and 72-yard rolls.

Unit of issue: Roll

Approximate cost: \$0.80 per roll

Stock No.	Thickness, in.	Width, in.
36-Yard rolls:		
G17-T-1118	0.007	¾
G17-T-1120	0.007	1
G17-T-1124	0.007	1¼
G17-T-1122	0.010	1
G17-T-1126	0.010	1¼
G17-T-1128	0.010	1½
G17-T-1130	0.012	1½
72-Yard rolls:		
G17-T-1170	0.007	¾
G17-T-1175	0.007	1
G17-T-1185	0.007	1¼
G17-T-1180	0.010	1
G17-T-1190	0.010	1¼
G17-T-1195	0.010	1½
G17-T-1200	0.012	1½

SHIPBOARD ELECTRICAL INSULATION

FRICTION TAPE

Spec: HH-T-101

Insulation Class A

A general-purpose tape made from cotton sheeting, evenly and firmly woven from good cotton, free from defects, lumps, or twist. The fabric is thoroughly impregnated and evenly coated on both sides with a friction rubber compound. Available in rolls of 85 feet. Nominal thickness 0.015 inch. Dielectric strength 1,000 volts.

Unit of issue: Roll Approximate cost: \$0.40 per roll

Stock No.	Width, in.
G17-T-805	$\frac{3}{4}$
G17-T-810	1
G17-T-815	$1\frac{1}{2}$

RUBBER TAPE

Spec: HH-T-111

Insulation Class A

A general-purpose rubber adhesive tape of uniform width; evenly, smoothly, and well calendered; free from surface holes. Nominal thickness 0.027 inch. Dielectric strength 350 volts per mil.

Unit of issue: Roll Approximate cost: \$0.40 per roll

Stock No.	Width, in.	Ft per roll
G17-T-1445	$\frac{3}{4}$	30
G17-T-1460	2	15

GLASS TAPE (UNTREATED)

Spec: MIL-I-1140A

Insulation Class C

Group GFU. A high-grade uniformly woven glass-fiber tape having high insulation resistance, high dielectric strength, and low moisture pickup. Tape furnished in 36-yard rolls except 0.003-inch tape, which is furnished in 72-yard rolls.

Unit of issue: Roll Approximate cost: \$0.80 per roll

Stock No.	Thickness, in.	Width, in.	Yd per lb
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Class CFC, ECC-11B, Continuous Filament, Close Weave

G17-I-2645-2	0.003	$\frac{3}{8}$	558
G17-I-2645-4	0.003	$\frac{1}{2}$	403
G17-I-2645-6	0.003	$\frac{3}{4}$	271
G17-I-2645-8	0.003	1	198
G17-I-2645-12	0.003	$1\frac{1}{2}$	117
G17-I-2645-14	0.005	$\frac{3}{8}$	268
G17-I-2645-16	0.005	$\frac{1}{2}$	208
G17-I-2645-18	0.005	$\frac{3}{4}$	143
G17-I-2645-20	0.005	1	109
G17-I-2645-24	0.005	$1\frac{1}{2}$	74
G17-I-2645-26	0.007	$\frac{3}{8}$	222
G17-I-2645-28	0.007	$\frac{1}{2}$	172
G17-I-2645-30	0.007	$\frac{3}{4}$	118
G17-I-2645-32	0.007	1	90
G17-I-2645-36	0.007	$1\frac{1}{2}$	61

Class CFM, ECC-11A, Continuous Filament, Medium Weave

G17-I-2645-64	0.005	$\frac{1}{2}$	248
G17-I-2645-66	0.005	$\frac{3}{4}$	178
G17-I-2645-68	0.005	1	135
G17-I-2645-72	0.005	$1\frac{1}{2}$	91
G17-I-2645-76	0.007	$\frac{1}{2}$	172
G17-I-2645-78	0.007	$\frac{3}{4}$	123
G17-I-2645-80	0.007	1	93
G17-I-2645-84	0.007	$1\frac{1}{2}$	64
G17-I-2645-88	0.010	$\frac{1}{2}$	128
G17-I-2645-90	0.010	$\frac{3}{4}$	86
G17-I-2645-92	0.010	1	65
G17-I-2645-96	0.010	$1\frac{1}{2}$	43
G17-I-2645-100	0.015	$\frac{1}{2}$	91
G17-I-2645-102	0.015	$\frac{3}{4}$	63
G17-I-2645-104	0.015	1	48
G17-I-2645-108	0.015	$1\frac{1}{2}$	32

APPENDIX I. DESCRIPTION AND STOCK LIST

per lb

5,

58

03

71

98

17

58

98

43

09

74

22

72

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51

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35

71

72

23

73

54

28

36

55

43

71

53

48

32

Stock No.	Thickness, in.	Width, in.	Yd per lb
CLASS SFM, ESS-13A, Staple Fiber, Medium Weave			
G17-I-2645-120	0.010	½	127
G17-I-2645-122	0.010	¾	83
G17-I-2645-124	0.010	1	65
G17-I-2645-128	0.010	1½	42
G17-I-2645-130	0.015	½	90
G17-I-2645-132	0.015	¾	60
G17-I-2645-134	0.015	1	45
G17-I-2645-138	0.015	1½	29
G17-I-2645-140	0.020	½	68
G17-I-2645-142	0.020	¾	49
G17-I-2645-144	0.020	1	36
G17-I-2645-148	0.020	1½	25
G17-I-2645-150	0.025	½	63
G17-I-2645-152	0.025	¾	44
G17-I-2645-154	0.025	1	32
G17-I-2645-158	0.025	1½	18

GLASS TAPE (VARNISHED)

Spec: 17-I-45

Insulation Class B

Group GFV, Grade O, Form T. A high-grade, varnished glass tape using continuous-filament glass and treated with organic varnish. A general-purpose tape available in 36-linear-yard rolls.

Unit of issue: Roll Approximate cost: \$1.00 per roll

Stock No.	Thickness, in.	Width, in.
Grade O, Form T, Yellow:		
G17-I-2641-2500	0.005	½
G17-I-2641-2510	0.005	¾
G17-I-2641-2520	0.005	1
G17-I-2641-2530	0.005	1½
G17-I-2641-2600	0.007	½
G17-I-2641-2610	0.007	¾
G17-I-2641-2620	0.007	1
G17-I-2641-2630	0.007	1½
G17-I-2641-2700	0.010	½
G17-I-2641-2710	0.010	¾
G17-I-2641-2720	0.010	1
G17-I-2641-2730	0.010	1½
G17-I-2641-2800	0.012	½
G17-I-2641-2810	0.012	¾
G17-I-2641-2820	0.012	1
G17-I-2641-2830	0.012	1½

SILICONE GLASS TAPE

Spec: 17-I-45

Insulation Class H

Group GFV, Grade S, Form T. A high-grade glass tape treated with silicone varnish for high-temperature and extreme-moisture applications. Available in 36-linear-yard rolls.

Unit of issue: Roll Approximate cost: \$2.00 per roll

Stock No.	Thickness, in.	Width, in.
Grade S, Form T:		
G17-I-2642-5450	0.004	½
G17-I-2642-5475	0.004	¾
G17-I-2642-5500	0.004	1
G17-I-2642-5550	0.004	1½
G17-I-2642-5750	0.007	½
G17-I-2642-5775	0.007	¾
G17-I-2642-5800	0.007	1
G17-I-2642-5850	0.007	1½
G17-I-2642-6050	0.010	½
G17-I-2642-6075	0.010	¾
G17-I-2642-6100	0.010	1
G17-I-2642-6150	0.010	1½
G17-I-2642-6350	0.012	½
G17-I-2642-6375	0.012	¾
G17-I-2742-6400	0.012	1
G17-I-2642-6450	0.012	1½

MICA-GLASS COMBINATIONS

Spec: 17-I-62

Class B, Form T, with organic varnish

Class H, Form T, with silicone varnish

Type GMG (Glass-Mica-Glass). Consists of pasted mica sandwiched between single layers of glass cloth.

Type MG (Mica-Glass). Consists of pasted mica laminated with one layer of glass cloth.

Type PMG (Paper-Mica-Glass). Consists of pasted mica laminated with one layer of thin paper on one side (for mechanical support) and one layer of glass cloth on the other side.

This material is used for generator, motor, and transformer coils; slot liners; ground insulation; phase-to-phase insulation; primary-secondary separation; coil exteriors; cable splices; coil and cell wrappers; and similar uses. It has high dielectric strength.

Unit of issue: Roll Approximate cost: \$8.00 per square yard

SHIPBOARD ELECTRICAL INSULATION

Stock No.	Thickness, in.	Width, in.
Class B, Type PMG:		
G17-I-4235-800	0.007	1/2
G17-I-4235-820	0.007	3/4
G17-I-4235-840	0.007	1
Class H, Type GMG:		
G17-I-4235-500	0.010	1/2
G17-I-4235-520	0.010	3/4
G17-I-4235-540	0.010	1
Class H, Type MG:		
G17-I-4235-100	0.0035	1/2
G17-I-4235-120	0.0035	3/4
G17-I-4235-140	0.0035	1
G17-I-4235-200	0.007	1/2
G17-I-4235-220	0.007	3/4
G17-I-4235-240	0.007	1

ASBESTOS TAPE (UNTREATED)

Spec: MIL-I-3053 Insulation Class C

Class 4, Type 4PU. A medium-quality asbestos tape where electrical properties are of secondary importance. Furnished in 36-yard rolls. Minimum dielectric strength 25 volts per mil.

Unit of issue: Roll Approximate cost: \$1.00 per roll

Stock No.	Thickness, in.	Width, in.
G17-I-1545-10	0.015	1/2
G17-I-1545-40	0.015	3/4
G17-I-1545-70	0.015	1
G17-I-1545-100	0.015	1 1/4
G17-I-1545-130	0.015	1 1/2
G17-I-1545-160	0.020	1
G17-I-1545-190	0.025	1/2
G17-I-1545-220	0.025	3/4
G17-I-1545-250	0.025	1
G17-I-1545-280	0.025	1 1/4
G17-I-1545-310	0.025	1 1/2
G17-I-1545-340	0.030	1 1/4

SYNTHETIC FIBER, WOVEN (UNTREATED)

Spec: 17-I-34 Insulation Class O

Group SFU, Form T. A woven synthetic fiber tape

for general-purpose insulation use. Furnished in 36-yard rolls.

Unit of issue: Roll Approximate cost: \$1.00 per roll

Stock No.	Thickness, in.	Width, in.
Type HMHR (High Mechanical and Heat Resistance)		
G17-T-1736-100	0.003	3/8
G17-T-1736-105	0.003	1/2
G17-T-1736-110	0.003	5/8
G17-T-1736-130	0.005	3/8
G17-T-1736-135	0.005	1/2
G17-T-1736-140	0.005	5/8

Type MMHR (Medium Mechanical and Heat Resistance)

G17-T-1737-100	0.003	3/8
G17-T-1737-105	0.003	1/2
G17-T-1737-110	0.003	5/8
G17-T-1737-130	0.005	3/8
G17-T-1737-135	0.005	1/2
G17-T-1737-140	0.005	5/8

SYNTHETIC FIBER, WOVEN (TREATED)

Spec: 17-I-34 Insulation Class A

Group SFT, Form T. A woven, synthetic fiber tape treated with an organic varnish and used for general insulation applications. Furnished in nonbonding (class 2) only and in 36-yard rolls.

Unit of issue: Roll Approximate cost: \$1.00 per roll

Stock No.	Thickness, in.	Width, in.
G17-I-5776-300	0.003	3/8
G17-I-5776-305	0.003	1/2
G17-I-5776-310	0.003	5/8
G17-I-5776-350	0.004	3/8
G17-I-5776-355	0.004	1/2
G17-I-5776-360	0.004	5/8
G17-I-5776-400	0.005	3/8
G17-I-5776-405	0.005	1/2
G17-I-5776-410	0.005	5/8

APPENDIX I. DESCRIPTION AND STOCK LIST

SYNTHETIC RESIN

Spec: JAN-I-631

Insulation Class A

Type F, Grade A, Form T. A high-elongation elastic material with good electrical properties suitable as an alternate for rubber tape. Furnished in black only in rolls 4½ inches in diameter for hand taping.

Unit of issue: Roll

Approximate cost: \$1.50 per roll

Stock No.	Thickness, in.	Width, in.
Type F, Grade A:		
G17-I-5797-50	0.010	½
G17-I-5797-55	0.010	¾
G17-I-5797-60	0.010	1
G17-I-5797-61	0.010	1¼
G17-I-5797-62	0.010	1½
G17-I-5797-65	0.020	½
G17-I-5797-70	0.020	¾
G17-I-5797-75	0.020	1

SYNTHETIC RESIN (ADHESIVE)

Spec: 17-T-28

Insulation Class A

Type VF. A pressure-sensitive adhesive, vinyl chloride-acetate backing, black tape 0.010 inch thick. Furnished in 36-yard rolls.

Unit of issue: Roll

Approximate cost: \$0.40 per roll

Stock No.	Thickness, in.	Width, in.
G17-T-1745-35	0.010	½
G17-T-1745-60	0.010	¾
G17-T-1745-200	0.010	1
G17-T-1745-250	0.010	1¼
G17-T-1745-300	0.010	1½

Insulation, Electrical, Rod

An electrical insulation item consisting of a solid bar, usually circular and long in proportion to its breadth and thickness.

FIBRE

FIBRE RODS

Spec: JAN-F-1148

Insulation Class O

Grade BH. Extra-hard dense stock commonly referred to as "bone hard."

Unit of issue: Foot

Approximate cost: \$0.15 per foot

Grade CH. A hard fibre stock commonly referred to as "commercial" or "vulcanized."

Unit of issue: Foot

Approximate cost: \$0.50 per foot

Stock No.	Diameter, in.
Grade BH:	
G17-I-1799-950	⅜
G17-I-1799-975	½
G17-I-1800	⅝
G17-I-1810	¾
G17-I-1820	⅞
G17-I-1830	1
G17-I-1840	1½
Grade CH:	
G17-I-1950	⅝
G17-I-1960	¾
G17-I-1970	⅞
G17-I-1980	1
G17-I-1990	1⅝
G17-I-2000	1¾
G17-I-2010	1½
G17-I-2020	1¾
G17-I-2030	2

SHIPBOARD ELECTRICAL INSULATION

PLASTICS

PAPER BASE, FORM R

Spec: MIL-P-79

Insulation Class A

Type PBG. A general-purpose material having fair electrical and mechanical properties. Has poor fire and arc resistance. Supplied in natural color in length of approximately 36 inches.

Unit of issue: Foot

Approximate cost: \$0.70
per foot

Stock No.	Diameter, in.
Type PBG:	
G17-I-5683-610	$\frac{1}{4}$
G17-I-5683-630	$\frac{5}{16}$
G17-I-5683-640	$\frac{3}{8}$
G17-I-5683-655	$\frac{1}{2}$
G17-I-5683-670	$\frac{5}{8}$
G17-I-5683-685	$\frac{3}{4}$
G17-I-5683-700	$\frac{7}{8}$
G17-I-5683-715	1

FABRIC BASE, FORM R

Spec: MIL-P-79

Insulation Class A

Type FBE. A linen-fabric-base, laminated rod having fairly good electrical properties suitable for fine machining operations. Supplied in natural color in lengths of approximately 36 inches.

Unit of issue: Foot

Approximate cost: \$0.90
per foot

Stock No.	Diameter, in.
G17-I-5478-500	$\frac{3}{8}$
G17-I-5478-510	$\frac{1}{4}$
G17-I-5478-520	$\frac{7}{8}$
G17-I-5478-530	1
G17-I-5478-570	$1\frac{1}{2}$
G17-I-5478-635	2

GLASS BASE, FORM R

Spec: MIL-P-79

Insulation Class B

Type GMG. A fire- and arc-resistant laminated rod with good electrical properties and excellent mechanical strength. Supplied in natural color only.

Unit of issue: Foot

Approximate cost: \$2.00
per foot

Stock No.	Diameter, in.
G17-I-5762-975	$\frac{3}{16}$
G17-I-5763-45	$\frac{1}{4}$
G17-I-5763-50	$\frac{5}{16}$
G17-I-5763-65	$\frac{3}{8}$
G17-I-5763-80	$\frac{1}{2}$
G17-I-5763-95	$\frac{5}{8}$
G17-I-5763-110	$\frac{3}{4}$
G17-I-5763-125	$\frac{7}{8}$
G17-I-5763-140	1
G17-I-5763-145	$1\frac{1}{8}$
G17-I-5763-150	$1\frac{1}{4}$
G17-I-5763-155	$1\frac{1}{2}$
G17-I-5763-170	2
G17-I-5763-190	$2\frac{1}{4}$
G17-I-5763-250	3

Insulation, Electrical, Cordage

An electrical insulation item consisting of (1) a twisted yarn of organic or inorganic fibers or (2) an extruded synthetic plastic flexible rod, usually less than $\frac{1}{8}$ inch diameter.

GLASS FIBER

TWISTED CORD

Spec: MIL-I-1140A

Insulation Class C

Group GFU, Class CF. An untreated, continuous-element, twisted glass-fiber cord with high tensile strength suitable for wire-tying purposes.

Unit of issue: Pound

Approximate cost: \$0.85
per pound

Stock No.	Cord No.	Diameter, in.	Yd per lb
G17-I-2644-500	EC5-1-U	$\frac{1}{64}$	3,533
G17-I-2644-505	EC5-2-U	$\frac{1}{32}$	750
G17-I-2644-510	EC5-3-U	$\frac{3}{64}$	410
G17-I-2644-515	EC5-4-U	$\frac{1}{16}$	192
G17-I-2644-520	EC5-5-U	$\frac{5}{64}$	156
G17-I-2644-525	EC5-6-U	$\frac{3}{32}$	130
G17-I-2644-535	EC5-8-U	$\frac{1}{8}$	92

APPENDIX I. DESCRIPTION AND STOCK LIST

Insulation, Electrical, Sleeving

A flexible electrical insulation item consisting of a hollow cylindrical plastic extrusion or a round woven fabric.

SLEEVING

COTTON, BRAIDED (UNTREATED)

Spec: MIL-I-3042

Insulation Class O

Type CFU. A braided cotton sleeving which

readily absorbs insulating varnish. Flexible and suitable for insulating bare wire, leads, and rods.

Unit of issue: Pound

Approximate cost: \$1.80 per pound

Stock No.				ID, in.	Wall thickness, in.	Approx. yd per lb	Covers AWG (bare) wire
Black	Blue	Gray	Red				
G17-S-8300	G17-S-8465	G17-S-8630	G17-S-8800	0.031	0.014	720	18-20
G17-S-8310	G17-S-8475	G17-S-8640	G17-S-8810	0.064	0.016	280	13-18
G17-S-8315	G17-S-8480	G17-S-8645	G17-S-8815	0.081	0.017	250	11-12
G17-S-8325	G17-S-8490	G17-S-8655	G17-S-8825	0.128	0.018	225	9-10
G17-S-8330	G17-S-8495	G17-S-8660	G17-S-8830	0.162	0.017	125	6-7
G17-S-8335	G17-S-8500	G17-S-8665	G17-S-8835	0.204	0.018	100	4-5
G17-S-8345	G17-S-8510	G17-S-8675	G17-S-8845	0.258	0.018	80	2-3
G17-S-8350	G17-S-8515	G17-S-8680	G17-S-8850	0.289	0.018	75	1-2
G17-S-8355	G17-S-8520	G17-S-8685	G17-S-8855	0.325	0.018	65	0-1
G17-S-8360	G17-S-8525	G17-S-8690	G17-S-8860	0.375	0.018	60	00-0
G17-S-8365	G17-S-8530	G17-S-8695	G17-S-8865	0.438	0.018	50	000-00

ASBESTOS, BRAIDED (UNTREATED)

Spec: MIL-I-3053

Insulation Class C

Class 4, Type 4PU (Plain, Untreated). A braided asbestos fiber sleeving which readily absorbs insulating varnish. Flexible and suitable for insulating bare wire, leads, and rods.

Unit of issue: Pound

Approximate cost: \$3.00 per pound

Stock No.	ID, in.	Approx. yd per lb	Covers AWG (bare) wire
Class 4, Type 4PU:			
G17-I-1530-80	$\frac{3}{32}$	61	9-10
G17-I-1530-140	$\frac{1}{8}$	45	
G17-I-1530-200	$\frac{3}{16}$	30	4-5
G17-I-1530-260	$\frac{7}{32}$	26	
G17-I-1530-320	$\frac{1}{4}$	23	2-3
G17-I-1530-380	$\frac{9}{32}$	22.6	1-2
G17-I-1530-440	$\frac{5}{16}$	20	0-1
G17-I-1530-500	$\frac{3}{8}$	17	00-0
G17-I-1530-560	$\frac{7}{16}$	13	000-00

SHIPBOARD ELECTRICAL INSULATION

GLASS, BRAIDED (UNTREATED)

Spec: MIL-I-1140A

Insulation Class C

Group GFU, Class CF. A heavy braided, glass-fiber sleeving which readily absorbs insulating var-

nish. Flexible with high mechanical strength. Suitable for insulating bare wire, leads, and rods.

Unit of issue: Yard

Approximate cost: \$0.10 per yard

Stock No.	ID, in.	Wall thickness, in.	Approx. yd per lb	Covers AWG (bare) wire
Group GFU, Class CF:				
G17-I-2644-700	$\frac{1}{16}$	0.0070	221	13-18
G17-I-2644-705	$\frac{1}{8}$	0.0090	100	9-10
G17-I-2644-710	$\frac{3}{16}$	0.0090	83	
G17-I-2644-715	$\frac{1}{4}$	0.0085	65	2-3
G17-I-2644-720	$\frac{5}{16}$	0.0085	52	0-1
G17-I-2644-725	$\frac{3}{8}$	0.0085	44	00-0
G17-I-2644-730	$\frac{1}{2}$	0.0075	32	000-00

BRAIDED FABRIC SLEEVING (VARNISHED)

Spec: MIL-I-3190

Insulation Class A

Class A-A-1. A braided cotton, rayon, or nylon fabric treated with a continuous film of oleoresinous varnish. It has high dielectric strength and good flexibility. Furnished in 3-foot lengths.

Unit of issue: Foot

Approximate cost: \$0.35 per foot

Stock No.	ID, in., min	For wire size, AWG
Class A-A-1:		
G17-I-1715-600	0.020	24
G17-I-1715-605	0.032	20
G17-I-1715-610	0.040	18
G17-I-1715-615	0.045	17
G17-I-1715-620	0.051	16
G17-I-1715-625	0.057	15
G17-I-1715-630	0.064	14
G17-I-1715-635	0.072	13
G17-I-1715-640	0.081	12
G17-I-1715-645	0.091	11
G17-I-1715-650	0.102	10
G17-I-1715-655	0.114	9
G17-I-1715-660	0.129	8
G17-I-1715-665	0.144	7
G17-I-1715-670	0.162	6
G17-I-1715-675	0.182	5
G17-I-1715-680	0.204	4
G17-I-1715-685	0.229	3
G17-I-1715-690	0.258	2
G17-I-1715-695	0.289	1
G17-I-1715-700	0.325	0
G17-I-1715-705	0.375	$\frac{3}{8}$ in.
G17-I-1715-710	0.438	$\frac{7}{16}$ in.
G17-I-1715-715	0.500	$\frac{1}{2}$ in.
G17-I-1715-720	0.625	$\frac{5}{8}$ in.
G17-I-1715-725	0.750	$\frac{3}{4}$ in.
G17-I-1715-730	0.875	$\frac{7}{8}$ in.
G17-I-1715-735	1.000	1 in.

APPENDIX I. DESCRIPTION AND STOCK LIST

BRAIDED GLASS SLEEVING (VARNISHED)
 Spec: MIL-I-3190 Insulation Class B
Class B-A-1. A braided glass fabric treated with a continuous film of oleoresinous varnish. It has high dielectric strength and good flexibility. Furnished in 3-foot lengths.
 Unit of issue: Foot Approximate cost: \$0.60 per foot

Stock No.	ID, in., min	For wire size, AWG
Class B-A-1:		
G17-I-2641-300	0.020	24
G17-I-2641-305	0.032	20
G17-I-2641-310	0.040	18
G17-I-2641-315	0.045	17
G17-I-2641-320	0.051	16
G17-I-2641-325	0.057	15
G17-I-2641-330	0.064	14
G17-I-2641-335	0.072	13
G17-I-2641-340	0.081	12
G17-I-2641-345	0.091	11
G17-I-2641-350	0.102	10
G17-I-2641-355	0.114	9
G17-I-2641-360	0.129	8
G17-I-2641-365	0.144	7
G17-I-2641-370	0.162	6
G17-I-2641-375	0.182	5
G17-I-2641-380	0.204	4
G17-I-2641-385	0.229	3
G17-I-2641-390	0.258	2
G17-I-2641-395	0.289	1
G17-I-2641-400	0.325	0
G17-I-2641-405	0.375	3/8 in.
G17-I-2641-410	0.438	1/2 in.
G17-I-2641-415	0.500	5/8 in.
G17-I-2641-420	0.625	3/4 in.
G17-I-2641-425	0.750	7/8 in.
G17-I-2641-430	0.875	1 in.
G17-I-2641-435	1.000	1 in.

BRAIDED GLASS SLEEVING (SILICONE)
 Spec: MIL-I-3190 Insulation Class H
Class H-A-1. A braided glass fabric treated with a continuous film of silicone varnish. It has high dielectric strength and good flexibility. Furnished in 3-foot lengths.
 Unit of issue: Foot Approximate cost: \$0.75 per foot

Stock No.	ID, in., min	For wire size, AWG
Class H-A-1:		
G17-I-2642-3200	0.020	24
G17-I-2642-3205	0.032	20
G17-I-2642-3210	0.040	18
G17-I-2642-3215	0.045	17
G17-I-2642-3220	0.051	16
G17-I-2642-3225	0.057	15
G17-I-2642-3230	0.064	14
G17-I-2642-3235	0.072	13
G17-I-2642-3240	0.081	12
G17-I-2642-3245	0.091	11
G17-I-2642-3250	0.102	10
G17-I-2642-3255	0.114	9
G17-I-2642-3260	0.129	8
G17-I-2642-3265	0.144	7
G17-I-2642-3270	0.162	6
G17-I-2642-3275	0.182	5
G17-I-2642-3280	0.204	4
G17-I-2642-3285	0.229	3
G17-I-2642-3290	0.258	2
G17-I-2642-3295	0.289	1
G17-I-2642-3300	0.325	0
G17-I-2642-3305	0.375	3/8 in.
G17-I-2642-3310	0.438	1/2 in.
G17-I-2642-3315	0.500	5/8 in.
G17-I-2642-3320	0.625	3/4 in.
G17-I-2642-3325	0.750	7/8 in.
G17-I-2642-3330	0.875	1 in.
G17-I-2642-3335	1.000	1 in.

SYNTHETIC RESIN SLEEVING
 Spec: JAN-I-631 Insulation Class A
Form U, Flexible
Type A. A high-dielectric-strength, low-loss-factor, extruded sleeving. Intended primarily for high-frequency circuits. Polystyrene and polyethylene are typical materials of this type.
Type F, Grade A. A moderate-mechanical-strength, extruded sleeving with good electrical properties suitable as an alternate for rubber insulating tape in cable and other applications where sleeving may be used. Polyvinyl chloride and vinyl acetate are typical materials of this type.
 Unit of issue: Foot Approximate cost: \$0.07 per foot

SHIPBOARD ELECTRICAL INSULATION

Stock No.	Stock No.	ID, in.	OD, in.	Stock No.	Stock No.	ID, in.	OD, in.
Type PBG, Tr:	Type PBE, Tr:			Type GMG, Tr:	Type GMG, Tr:		
G17-I-5708	G17-I-5644	$\frac{1}{8}$	$\frac{3}{8}$	G17-I-5765-300	G17-I-5765-600	$\frac{1}{4}$	$\frac{3}{8}$
G17-I-5709	G17-I-5645	$\frac{1}{4}$	$\frac{1}{2}$	G17-I-5765-310	G17-I-5765-610	$\frac{1}{4}$	$\frac{1}{2}$
G17-I-5710	G17-I-5646	$\frac{1}{4}$	$\frac{5}{8}$	G17-I-5765-320	G17-I-5765-620	$\frac{1}{4}$	$\frac{5}{8}$
G17-I-5711	G17-I-5647	$\frac{5}{16}$	$\frac{1}{2}$	G17-I-5765-330	G17-I-5765-630	$\frac{3}{8}$	$\frac{1}{2}$
G17-I-5712	G17-I-5648	$\frac{3}{8}$	$\frac{5}{8}$	G17-I-5765-340	G17-I-5765-640	$\frac{3}{8}$	$\frac{5}{8}$
G17-I-5713	G17-I-5649	$\frac{1}{2}$	$\frac{3}{4}$	G17-I-5765-350	G17-I-5765-650	$\frac{1}{2}$	$\frac{3}{4}$
G17-I-5714	G17-I-5650	$\frac{1}{2}$	$\frac{3}{4}$	G17-I-5765-360	G17-I-5765-660	$\frac{1}{2}$	$\frac{3}{4}$
G17-I-5715	G17-I-5651	$\frac{1}{2}$	$\frac{3}{8}$	G17-I-5765-370	G17-I-5765-670	$\frac{3}{8}$	1
G17-I-5716	G17-I-5652	$\frac{5}{16}$	$1\frac{1}{16}$	G17-I-5765-380	G17-I-5765-680	$\frac{1}{2}$	$1\frac{1}{8}$
G17-I-5717	G17-I-5653	$\frac{5}{8}$	$\frac{3}{8}$	G17-I-5765-400	G17-I-5765-690	1	$1\frac{1}{4}$
G17-I-5718	G17-I-5654	$\frac{3}{4}$	$\frac{7}{8}$	G17-I-5765-425	G17-I-5765-720	$1\frac{3}{16}$	$1\frac{1}{2}$
G17-I-5719	G17-I-5655	$\frac{3}{4}$	1	G17-I-5765-445	G17-I-5765-730	$1\frac{3}{4}$	$1\frac{1}{2}$
G17-I-5720	G17-I-5656	$\frac{7}{8}$	$1\frac{1}{8}$	G17-I-5765-450	G17-I-5765-740	$1\frac{3}{4}$	$1\frac{3}{8}$
G17-I-5721	G17-I-5657	1	$1\frac{1}{4}$		G17-I-5765-750	$1\frac{5}{16}$	$1\frac{1}{2}$
G17-I-5722	G17-I-5658	$1\frac{1}{16}$	$1\frac{3}{16}$	G17-I-5765-460	G17-I-5765-760	$1\frac{3}{8}$	$1\frac{5}{8}$
G17-I-5723	G17-I-5659	$1\frac{1}{16}$	$1\frac{1}{4}$	G17-I-5765-475	G17-I-5765-770	$1\frac{3}{2}$	$1\frac{3}{4}$
G17-I-5724	G17-I-5660	$1\frac{3}{16}$	$1\frac{3}{8}$	G17-I-5765-490	G17-I-5765-780	$1\frac{3}{4}$	2
G17-I-5725	G17-I-5661	$1\frac{3}{16}$	$1\frac{1}{2}$		G17-I-5765-790	$1\frac{13}{16}$	2
G17-I-5726	G17-I-5662	$1\frac{1}{4}$	$1\frac{1}{2}$		G17-I-5765-800	2	$2\frac{1}{4}$
G17-I-5727	G17-I-5663	$1\frac{1}{4}$	$1\frac{3}{8}$		G17-I-5765-810	$2\frac{1}{4}$	$2\frac{1}{2}$
G17-I-5728	G17-I-5664	$1\frac{3}{8}$	$1\frac{3}{8}$		G17-I-5765-820	$2\frac{1}{2}$	$2\frac{3}{4}$
G17-I-5729	G17-I-5665	$1\frac{1}{2}$	$1\frac{3}{4}$		G17-I-5765-830	$2\frac{3}{4}$	3
G17-I-5730	G17-I-5666	$1\frac{3}{4}$	2		G17-I-5765-840	$2\frac{3}{4}$	$3\frac{1}{2}$

Insulation, Electrical, Mica

An electrical insulation consisting of natural mica in the form of blocks or splittings. When pasted or built up with binders or reinforcement, the composite mica structure should be classified as Insulation, sheet, tape, or tubing.

NATURAL MICA

MICA (MUSCOVITE)

Spec: HH-I-538

Insulation Class C

Class NM, Form S. Trimmed, uncut, natural mica in sheet form. Because of high cost and limited availability, only two types are shown here: type NMHs (heavily stained) and NMSt (stained). Where a higher quality type is required, justification

for its use shall be furnished the Bureau concerned along with the request or requisition. Minimum dielectric strength, 1,000 volts per mil. Sheets are not less than 0.004 inch or more than 0.050 inch in thickness. Approximate weight, 0.101 pound per cubic inch.

Unit of issue: Pound

Approximate cost: \$3.00 per pound

APPENDIX I. DESCRIPTION AND STOCK LIST

Stock No.	Grade	Size rectangle	
		Min area, sq in.	Min size, in.
Type NMHs (Heavily Stained):			
G17-I-3843	A-1	36	4.0
G17-I-3843-10	1	24	3.0
G17-I-3843-20	2	15	2.0
G17-I-3843-30	3	10	2.0
G17-I-3843-40	4	6	1.5
G17-I-3843-50	5	3	1.0
G17-I-3843-60	5½	2½	1.0
G17-I-3843-70	6	1	0.75

Stock No.	Grade	Size rectangle	
		Min area, sq in.	Min size, in.
Type NMSt (Stained):			
G17-I-3847	A-1	36	4.0
G17-I-3847-10	1	24	3.0
G17-I-3847-20	2	15	2.0
G17-I-3847-30	3	10	2.0
G17-I-3847-40	4	6	1.5
G17-I-3847-50	5	3	1.0
G17-I-3847-60	5½	2½	1.0
G17-I-3847-70	6	1	0.75

Insulation, Electrical, Film-thin

An electrical insulation item consisting of a nonreinforced synthetic plastic extrusion or shaved thin film usually less than 1/8 inch thick and wider than 8 inches.

SYNTHETIC RESIN

CELLULOSE ACETATE

Spec: JAN-I-631

Insulation Class A

Type C, Form S. A transparent, cellulose acetate, thin-film plastic intended for use as electrical insulation. Possesses good electrical properties, a fair degree of moisture resistance, fairly low loss factor, and a higher degree of fire resistance than most plastic film materials. Minimum dielectric strength, 7,500 volts. Furnished in rolls 30 inches wide, 20 yards long.

Unit of issue: Yard

Approximate cost: \$0.30 per yard

Stock No.	Thickness, in.
Type C, Form S:	
G17-I-5778-500	0.005

Insulation, Electrical, Liquid, Dielectric

An electrical insulation item consisting of a natural or synthetic resinous substance in liquid form having dielectric properties.

VARNISH

INSULATING VARNISH

Spec: JAN-V-1137

Insulation Class A

Type N. Material for application by Naval personnel.

Grade BA, black, air drying, insulating.

Grade BB, black, baking, insulating.

Grade CA, clear, air drying, insulating.

Grade CB, clear, baking, insulating.

Grade CF, clear, finishing.

The above grades of insulating varnish are suitable

for application to the electrical windings and other parts of motors, generators, and transformers and to electrical apparatus in general. Grade CB, clear baking varnish, in most instances, gives maximum protection to the windings from moisture, oil, sea water, and other deleterious substances.

These grades are usually designated as class A insulation when applied over windings using resin-covered wire, cotton, or paper or similar insulation material. When the above grades of varnish are applied over windings using glass-served wire, with

SHIPBOARD ELECTRICAL INSULATION

glass, mica, asbestos, and other similar insulating materials, the resulting structure is designated as class B insulation.

Unit of issue: Gallon Approximate cost: \$2.00 per gallon

Stock No.	Container
Grade BA:	
G52-V-1100	1-gal can
G52-V-1105	5-gal can
Grade BB:	
G52-V-1145	1-gal can
G52-V-1150	5-gal can
Grade CA:	
G52-V-1240	1-pt can
G52-V-1255	1-gal can
G52-V-1260	5-gal can
Grade CB:	
G52-V-1300	1-gal can
G52-V-1305	5-gal can
Grade CF:	
G52-V-1345	1-gal can
G52-V-1350	5-gal can

INSULATING VARNISH (SILICONE)

Spec: (Refer to BuShips) Insulation Class H

Type N. Material for application by Naval personnel.

Grade HTB, a high-temperature baking type of silicone varnish suitable for application to electrical windings. Bakes at temperature of 250 C (482 F). Two grades, Dow Corning Corporation DC993 and General Electric Company 9989-1, are available. These varnishes should not be mixed together, as precipitation may occur.

Grade LTB, a low-temperature baking type of silicone varnish suitable for application to electrical windings. Bakes at temperature of 150 C (302 F). One grade, Dow Corning Corporation DC996, is available.

Unit of issue: Gallon Approximate cost: \$12.00 per gallon

Stock No.	Container
Grade HTB-993:	
G52-V-1361-10	1-gal can
G52-V-1361-20	5-gal can
G52-V-1361-100	55-gal drum
Grade HTB-9989-1:	
G52-V-1361-510	1-gal can
G52-V-1361-520	5-gal can
G52-V-1361-600	55-gal drum
Grade LTB-996:	
G52-V-1360-10	1-gal can
G52-V-1360-20	5-gal can
G52-V-1360-100	55-gal drum

Wire, Magnet, Insulated

A solid copper conductor, usually round, of small diameter, and insulated with a synthetic resin or a fibrous filler material combined with a resin.

MAGNET WIRE, ROUND, RESIN-COVERED

Spec: JAN-W-583 Insulation Class A

Type R, Single. A solid conductor insulated with one coat of insulating resin.

Type R2, Double. A solid copper conductor insu-

lated with two coats of insulating resin.

Type R4, Quadruple. A solid copper conductor insulated with four coats of insulating resin.

Unit of issue: Pound Approximate cost: \$0.40 to \$1.70 per pound

APPENDIX I. DESCRIPTION AND STOCK LIST

Stock No.	Wire size, AWG	Ft per lb	Stock No.	Wire size, AWG	Ft per lb
Type R, Single:			Type R2, Double:		
G15-W-62018	40	32,600	G15-W-59250	40	31,700
G15-W-62019	39	25,800	G15-W-59275	39	25,200
G15-W-62020	38	20,500	G15-W-59280	38	20,100
G15-W-62021	37	16,296	G15-W-59285	37	15,900
G15-W-62022	36	12,850	G15-W-59290	36	12,650
G15-W-62023	35	10,200	G15-W-59295	35	10,050
G15-W-62024	34	8,160	G15-W-59300	34	7,940
G15-W-62025	33	6,430	G15-W-59305	33	6,330
G15-W-62026	32	5,120	G15-W-59310	32	5,050
G15-W-62027	31	4,050	G15-W-59315	31	3,990
G15-W-62028	30	3,220	G15-W-59320	30	3,160
G15-W-62029	29	2,550	G15-W-59325	29	2,520
G15-W-62030	28	2,030	G15-W-59330	28	2,000
G15-W-62031	27	1,610	G15-W-59335	27	1,580
G15-W-62050	26	1,280	G15-W-59500	26	1,260
G15-W-62055	25	1,010	G15-W-59505	25	1,000
G15-W-62060	24	805	G15-W-59510	24	794
G15-W-62065	23	639	G15-W-59520	23	633
G15-W-62070	22	507	G15-W-59525	22	503
G15-W-62075	21	402	G15-W-59530	21	398
G15-W-62080	20	319	G15-W-59535	20	315
G15-W-62085	19	256	G15-W-59540	19	253
G15-W-62090	18	201	G15-W-59545	18	200
G15-W-62095	17	159	G15-W-59550	17	158
G15-W-62100	16	127	G15-W-59555	16	126
G15-W-62110	15	99.9	G15-W-59560	15	99.5
G15-W-62115	14	78.6	G15-W-59565	14	79.4
G15-W-62120	13	63.0	G15-W-59570	13	62.9
G15-W-62125	12	50.0	G15-W-59575	12	50.0
G15-W-62130	11	39.8	G15-W-59580	11	39.7
G15-W-62135	10	31.5	G15-W-59585	10	31.4
G15-W-62140	9	25.2	G15-W-59590	9	25.2
G15-W-62145	8	20.0	G15-W-59595	8	19.8
			Type R4, Quadruple:		
			G15-W-62015-100	23	612
			G15-W-62015-110	22	491
			G15-W-62015-120	21	389
			G15-W-62015-130	20	310
			G15-W-62015-140	19	247
			G15-W-62015-150	18	197
			G15-W-62015-160	17	156
			G15-W-62015-170	16	124
			G15-W-62015-180	15	98.6

SHIPBOARD ELECTRICAL INSULATION

MAGNET WIRE, ROUND, COTTON-COVERED

Spec: JAN-W-583

Insulation Class A

Type C, Single. A solid copper conductor insulated with a single serving of cotton yarn.

Type C2, Double. A solid copper conductor insulated with two servings of cotton yarn with each ply of yarn served in opposite directions.

Unit of issue: Pound

Approximate cost: \$0.27 to \$3.40 per pound

Stock No.	Wire size, AWG	Ft per lb
<i>Type C, Single:</i>		
G15-W-63035	40	20,400
G15-W-63040	39	17,500
G15-W-63045	38	14,900
G15-W-63050	37	12,000
G15-W-63055	36	10,100
G15-W-63060	35	8,330
G15-W-63065	34	6,900
G15-W-63070	33	5,470
G15-W-63075	32	4,470
G15-W-63080	31	3,630
G15-W-63085	30	2,930
G15-W-63090	29	2,340
G15-W-63095	28	1,870
G15-W-63100	27	1,505
G15-W-63105	26	1,210
G15-W-63110	25	972
G15-W-63115	24	775
G15-W-63120	23	617
G15-W-63125	22	493
G15-W-63130	21	392
G15-W-63135	20	312
G15-W-63140	19	249
G15-W-63145	18	197
G15-W-63150	17	157
G15-W-63155	16	125
G15-W-63160	15	99
G15-W-63165	14	78.8
G15-W-63170	13	62.5
G15-W-63175	12	49.8
G15-W-63180	11	39.6
G15-W-63185	10	31.5
G15-W-63190	9	25.0
G15-W-63195	8	19.8
G15-W-63200	7	15.7
G15-W-63205	6	12.5
G15-W-63210	5	9.90
G15-W-63215	4	7.88

Stock No.	Wire size, AWG	Ft per lb
<i>Type C2, Double:</i>		
G15-W-59020	36	7,750
G15-W-59025	35	6,620
G15-W-59030	34	5,610
G15-W-59035	33	4,570
G15-W-59040	32	3,800
G15-W-59045	31	3,130
G15-W-59050	30	2,570
G15-W-59055	29	2,080
G15-W-59060	28	1,703
G15-W-59065	27	1,385
G15-W-59070	26	1,122
G15-W-59075	25	900
G15-W-59080	24	925
G15-W-59085	23	585
G15-W-59090	22	470
G15-W-59095	21	376
G15-W-59100	20	301
G15-W-59105	19	241
G15-W-59110	18	192
G15-W-59115	17	153
G15-W-59120	16	122
G15-W-59125	15	97.1
G15-W-59130	14	77.6
G15-W-59135	13	61.7
G15-W-59140	12	49.1
G15-W-59145	11	39.1
G15-W-59150	10	31.1
G15-W-59155	9	24.7
G15-W-59160	8	19.6
G15-W-59165	7	15.6
G15-W-59170	6	12.4
G15-W-59175	5	9.80
G15-W-59180	4	7.81
G15-W-59185	3	6.17
G15-W-59190	2	4.92
G15-W-59195	1	3.91
G15-W-59200	0	3.10

MAGNET WIRE, ROUND, GLASS-COVERED

Spec: JAN-W-583

Insulation Class B

Type GV, Single. A solid copper conductor insulated with a single serving of glass yarn and impregnated with organic varnish.

Type G2V, Double. A solid copper conductor insulated with two servings of glass yarn with each ply of yarn served in opposite directions and impregnated with organic varnish.

APPENDIX I. DESCRIPTION AND STOCK LIST

Unit of issue: Pound

Approximate cost: \$0.52
to \$1.50 per pound

Stock No.	Wire size, AWG	Ft per lb
Type GV, Single:		
G15-W-63240-38	25	935
G15-W-63240-40	24	752
G15-W-63240-42	23	588
G15-W-63240-44	22	474
G15-W-63240-46	21	380
G15-W-63240-48	20	305
G15-W-63240-50	19	245
G15-W-63240-52	18	195
G15-W-63240-54	17	154
G15-W-63240-56	16	123
G15-W-63240-58	15	99.0
G15-W-63240-60	14	78.1
G15-W-63240-62	13	62.1
G15-W-63240-64	12	49.5
G15-W-63240-66	11	39.3
G15-W-63240-68	10	31.2
G15-W-63240-70	9	24.8
G15-W-63240-72	8	19.6
Type G2V, Double:		
G15-W-59225	25	870
G15-W-59226	24	710
G15-W-59227	23	550
G15-W-59228	22	446
G15-W-59229	21	362
G15-W-59230	20	293
G15-W-59231	19	236
G15-W-59232	18	189
G15-W-59233	17	149
G15-W-59234	16	120
G15-W-59235	15	96.2
G15-W-59236	14	77.0
G15-W-59237	13	61.0
G15-W-59238	12	48.6
G15-W-59239	11	38.8
G15-W-59240	10	30.8
G15-W-59241	9	24.5
G15-W-59242	8	19.4

MAGNET WIRE, ROUND, GLASS-COVERED (SILICONE)
Spec: MIL-W-16072 (Ships) Insulation Class H

Type GH, Single. A solid copper conductor in-

sulated with a single serving of glass yarn and im-
pregnated with a high-temperature silicone varnish.

Type G2H, Double. A solid copper conductor in-
sulated with a double serving of glass yarn and
impregnated with a high-temperature silicone com-
pound.

Unit of issue: Pound

Approximate cost: \$0.80
to \$3.60 per pound

Stock No.	Wire size, AWG	Ft per lb
Type GH, Single:		
G15-W-63235-50	36	9,060
G15-W-63235-70	34	6,180
G15-W-63235-90	32	4,160
G15-W-63235-110	30	2,717
G15-W-63235-120	29	2,214
G15-W-63235-130	28	1,772
G15-W-63235-140	27	1,411
G15-W-63235-150	26	1,140
G15-W-63235-160	25	935
G15-W-63235-170	24	752
G15-W-63235-180	23	588
G15-W-63235-190	22	474
G15-W-63235-200	21	380
G15-W-63235-210	20	305
G15-W-63235-220	19	245
G15-W-63235-230	18	195
G15-W-63235-240	17	154
G15-W-63235-250	16	123
G15-W-63235-260	15	99.0
G15-W-63235-270	14	78.1
Type G2H, Double:		
G15-W-59212-130	26	1,060
G15-W-59212-140	25	870
G15-W-59212-150	24	710
G15-W-59212-160	23	550
G15-W-59212-170	22	446
G15-W-59212-180	21	362
G15-W-59212-190	20	293
G15-W-59212-200	19	236
G15-W-59212-210	18	187
G15-W-59212-220	17	149
G15-W-59212-230	16	120
G15-W-59212-240	15	96.2
G15-W-59212-250	14	77.0
G15-W-59212-260	13	61.0
G15-W-59212-270	12	48.6