

MIL-P-997D

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MILITARY SPECIFICATION

PLASTIC MATERIAL, LAMINATED, THERMOSETTING, ELECTRICAL INSULATION: SHEETS, GLASS CLOTH, SILICONE RESIN

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

1. SCOPE

1.1 This specification covers type GSG, class 180 plastic insulating material having fire and electrical arc resistance, heat resistance, and very good electrical insulation resistance and dielectric loss characteristics.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

FEDERAL

- UU-P-268 — Paper, Kraft, Untreated, Wrapping.
- PPP-B-591 — Boxes, Fiberboard, Wood-Cleated.
- PPP-B-601 — Boxes, Wood, Cleated-Plywood.
- PPP-B-621 — Boxes, Wood, Nailed and Lock-Corner.

- PPP-B-636 — Box, Fiberboard.
- PPP-B-640 — Boxes, Fiberboard, Corrugated, Triple-Wall.

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- MIL-P-116 — Preservation, Methods of.
- MIL-B-48291 — Box, Fireboard, Corrugated, Double-Wall, Weather-Resistant.

STANDARDS

FEDERAL

- FED-STD-406 — Plastics: Methods of Testing.

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- MIL-STD-106 — Sampling Procedures and Tables for Inspection by Attributes.

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

MIL-STD-130 — Identification Marking of U. S. Military Property.

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

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D149 — Tests for Dielectric Breakdown Voltage and Dielectric Strength of Electrical Insulating Materials at Commercial Power Frequencies.

D150 — Methods of Test for A-C Capacitance, Dielectric Constant and Loss Characteristics of Electrical Insulating Materials.

D256 — Methods of Test for Impact Resistance of Plastics and Electrical Insulating Materials.

D374 — Methods of Test for Thickness of Solid Electrical Insulation.

D495 — Methods of Test for High-Voltage, Low-Current Arc Resistance of Solid Electrical Insulating Materials.

D618 — Methods of Conditioning Plastics and Electrical Insulating Materials for Testing.

D790 — Methods of Test for Flexural Properties of Plastics.

D877 — Methods of Test for Dielectric Strength of Insulating Oils of Petroleum Origin using Metal Disk Electrodes.

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

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Qualification. Glass cloth, silicone resin, electrical insulating, thermosetting laminated plastic material furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.2 and 6.3).

3.2 Construction. The material shall consist of a glass cloth impregnated and coated with a silicone resin compound or binder and processed to conform to this specification.

3.3 Machinability. The material shall be such that it can be drilled, tapped, sawed, and machined in all directions in accordance with the manufacturer's recommended technique without cracking, splitting, or otherwise impairing the material for general use.

3.4 Color. The material shall be natural in color, which may vary from white to light brown. (Natural is the color produced by natural, undyed base or filler and the resin used.)

3.5 Surface defects. The material shall be free from blisters, wrinkles, or cracks, and reasonably free from other small defects such as scratches, dents, heat marks, etc.

3.6 Property values. The material shall conform to the property values specified in tables IV, and V (see 4.2, and 4.4). The values obtained for each set of specimens taken from the same sheet shall be averaged before comparison with the applicable table.

3.7 Uniformity. All sheets of corresponding thickness shall be uniform in texture, finish, and specified properties.

3.8 Surface finish. The surface finish of sheets shall be semigloss as produced by the laminating operation.

3.9 Marking. Each full-size sheet shall be legibly marked. Such markings shall not be obliterated by normal processing nor shall they affect the physical or electrical properties of the base material. The type designation and the manufacturer's code symbol markings shall be in accordance with MIL-STD-130.

3.10 Dimensions and tolerances.

3.10.1 Thicknesses. Sheets shall be furnished in the nominal thicknesses shown in table I, as specified (see 6.2). At least nine of the thickness readings (4.6.3) shall be within the permissible tolerance specified, table I, and no single reading shall exceed the individual tolerance.

TABLE I. Thicknesses¹

Nominal thickness		Variation \pm	
	Decimal equivalent	Permissible	Individual
Inches	Inches	Inch	Inch
0.010	0.010	0.002	0.0025
.015	.015	.003	.0038
.020	.020	.004	.0050
.025	.025	.005	.0063
1/32	.031	.0065	.0081

TABLE I. Thicknesses¹—Continued

Nominal thickness		Variation \pm	
	Decimal equivalent	Permissible	Individual
2/64	.047	.0075	.0094
1/16	.0625	.0075	.0094
2/32	.094	.009	.0118
1/8	.125	.012	.0150
5/32	.156	.015	.0188
3/16	.1875	.019	.0238
7/32	.219	.021	.0263
1/4	.250	.022	.0275
5/16	.3125	.026	.0325
3/8	.375	.030	.0375
7/16	.438	.033	.0418
1/2	.500	.036	.0450
5/8	.625	.040	.0500
3/4	.750	.043	.0538
7/8	.875	.046	.0575
1	1.000	.049	.0618
1-1/8	1.125	.053	.0663
1-1/4	1.250	.055	.0688
1-3/8	1.375	.058	.0725
1-1/2	1.500	.061	.0763
1-5/8	1.625	.064	.0800
1-3/4	1.750	.067	.0838
1-7/8	1.875	.070	.0875
2	2.000	.073	.0918

¹ On sheets of nominal thickness not listed in table I, the permissible variations shall be the same as for the next greater thickness.

² Thicknesses less than 1/32-inch may use glass cloths of thinner weaves, but in no case shall the material consist of less than two plies of glass cloth.

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3.10.2 Dimensions and shape. Unless otherwise specified in the contract or order (see 6.2), each sheet shall contain at least 365 square inches and not more than 432 square inches, and shall be either square or rectangular in shape. Lengths between 20.5 and 36 inches, and widths between 11.5 and 19 inches will be acceptable. When particular sheet dimensions are specified (see 6.2), the permissible variations from the specified length or width shall be as specified in table II.

TABLE II. Permissible variations in length or width

Nominal thickness	Permissible variations in length or width (\pm)		
	6 inches and under	Over 6 to under 24 inches	24 inches and over
Inches	Inch	Inch	Inch
Up to $\frac{1}{4}$, inclusive	0.010	0.015	1/32
17/64 to $\frac{1}{2}$, inclusive	.012	.017	1/32
13/64 to 1, inclusive	.015	.020	1/32
1-1/64 to $1\frac{1}{2}$, inclusive	.018	.030	1/16
1-33/64 to 2, inclusive	.022	.040	1/8

3.11 Warp or twist. (Applicable only to standard size sheets (see 3.10.2). The warp or twist of material, as delivered, shall not exceed that specified in table III (see 4.6.11).

TABLE III. Warp or twist

Nominal thickness	Permissible variation on basis of 24-inch dimension (max.)
Inch	Percent
1/32 to under 1/16	5.00

¹ Application for Qualification tests shall be made in accordance with "Provisions Governing Qualification" (see 6.3 and 6.4).

TABLE III. Warp or twist—Continued

Nominal thickness	Permissible variation on basis of 24-inch dimension (max.)
1/16 to under $\frac{1}{4}$	2.50
$\frac{1}{4}$ to $\frac{1}{2}$, inclusive	1.50
Over $\frac{1}{2}$ up to and including $\frac{3}{4}$	0.50
Over $\frac{3}{4}$	0.25

3.12 Workmanship. The sheets shall be manufactured and processed in a careful and workmanlike manner.

4. QUALITY ASSURANCE PROVISIONS

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

4.2 Qualification tests.¹ Qualification tests shall be conducted at a laboratory satisfactory to the Naval Ship Engineering Center. Qualification tests shall consist of the tests specified in table IV.

4.2.1 Qualification test samples. The qualification test samples shall be of convenient shape and size, suitable for the preparation of specimens for the tests listed in table IV.

TABLE IV. Qualification tests

Property to be tested	Test paragraph	Number of specimens for each thickness	Conditioning (see 4.5)	Unit of value	Values required for each sample thickness		
					1/16 in.	1/8 in.	1/4 in.
Dielectric breakdown parallel to laminations	4.6.4	1 (short time)	—	KV-Min	40.0	40.0	40.0
		4 (step-by-step)	48/50 water				
		1 (short time)					
		4 (step-by-step)					
Impact strength, tested otherwise Cut lengthwise Cut crosswise	4.6.5	4		48/50	Ft-lbs per in.-min.	—	9.0
		4					
		4					
		4					
Flexural strength, tested flatwise: At 23°C. Cut lengthwise Cut crosswise At 250°C. Cut lengthwise	4.6.6	4	—	psi-min.	27,000	25,000	20,000
		4					
		4					
		4					
		4					
		4					
Bonding strength	4.6.7	4	—	Lbs.-min.	—	—	650
		4					
Water absorption	4.6.8	4	1/106 + 24/23/ water	%-max.	0.30	0.20	0.18
Dielectric constant at 1 megacycle	4.6.9	4	24/23 water	— -max.	—	4.2	—
Dissipation factor at 1 megacycle	4.6.9	4	24/23 water	— -max.	—	0.018	—
Arc resistance	4.6.10	4	48/50 water	Sec.-min.	180	180	180

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4.3 Sampling for quality conformance inspection. Sampling for quality conformance inspection shall be performed in accordance with the provisions set forth in MIL-STD-105, except where otherwise indicated. For purposes of sampling, an inspection lot for examination and tests shall consist of all material of the same type, submitted for delivery at one time.

4.3.1 Inspection of laminate.

4.3.1.1 Examination. Examination of the laminate shall be made in accordance with the classification of defects, inspection levels and acceptable quality levels (AQLs) set forth below. The lot size, for purpose of determining the sample size in accordance with MIL-STD-105 shall be expressed in units of sheets, for examination 4.3.1.1.1, 4.3.1.1.2 and in units of shipping containers for examination in 4.3.1.1.3.

4.3.1.1.1 Examination of the laminate for defects in appearance and workmanship. A unit for this examination shall be one full sheet.

Examine	Defect
Appearance	Not uniform texture or finish. Blisters, wrinkles, cracks or holes. Excessive number of scratches, dents, heat marks. Presence of dirt, foreign material, imbedded particles.
Workmanship	Not semi-gloss finish. Not natural color. Laminations exposed, not uniformly spaced.
Markings	Not marked as specified (see 3.9).

4.3.1.1.2 Examination of laminate for dimensional defects. A unit for this examination shall be one full sheet.

Examine	Defect
Length and width (standard sizes) (see 3.10.2).	Less than minimum dimension or greater than maximum dimension specified (see 3.10.2).

Examine	Defect
Length and width (cut sizes)	Varies by more than tolerance indicated in table II.
Thickness	Varies by more than the tolerances indicated in table I. (At least nine of the thickness readings shall be within the permissible tolerance specified table I, and no single reading shall exceed the individual tolerance.)
Area—Square Inches (standard sizes) (see 3.10.2)	Less than minimum or greater than maximum area specified (see 3.10.2).

4.3.1.1.3 Examination of preparation for delivery. An examination shall be made to determine that packaging, packing and marking complies with the requirements of Section 5 of this specification. A unit for this examination shall be one shipping container fully packed, selected just prior to the closing operation. Shipping containers fully prepared for delivery shall be examined for closure defects.

Examine	Defect
Packaging	Not level specified. Sheets not unit wrapped or interleaved. Protective wrapping not as specified.
Packing	Not level specified. Construction and material not as specified. Container not as specified. Closures not made by specified or required methods or materials.
Count	Less than specified or indicated quantity of sheets.
Weight	Gross weight exceeds specified requirements.
Markings	Interior or exterior markings (as applicable) omitted, illegible, incorrect, incomplete or not in accordance with contract requirements.

4.3.1.1.4 *Inspection levels and acceptable quality levels (AQLs) for examinations.* The inspection levels for determining the sample size and the acceptable quality levels (AQLs) expressed as defects per 100 units shall be as follows:

<i>Examination Paragraph</i>	<i>Inspection Level</i>	<i>AQL</i>
4.3.1.1.1	II	1.5
4.3.1.1.2	S-4	2.5
4.3.1.1.3	S-2	4.0

4.4 Composite testing. The tests to be conducted under this specification shall be for the following purposes:

4.4.1 *Qualification testing.* Qualification testing shall consist of all tests specified in table IV.

4.4.2 *Quality conformance testing.* Quality conformance testing shall be conducted in accordance with table V for the characteristics indicated on each lot submitted. A sample unit shall be one sheet of the plastic material. The wrap and twist test, as applicable, shall be made on the full size sheet of the sample unit. The sample size shall be S-1 except that no less than three sample units shall be randomly selected throughout the lot. The acceptable quality level shall be 4.0 expressed in defects per 100 units. The lot sizes shall be expressed in units of sheets.

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TABLE V. Quality conformance tests

Property to be tested	Test paragraph	Number of specimens for each sample	Conditioning (see 4.5)	Unit of value	Values required for each sample thickness range ¹ (inches)						
					0.031 or less	0.032 to 0.034	0.035 to 0.112	0.113 to 0.350	0.351 to 0.400	0.401 to 1.000	1.001 to 2.000
Dielectric breakdown parallel to laminations	4.6.4	1 (short-time)	—	KV-Min	40.0	40.0	40.0	40.0	40.0	40.0	25.0
		4 (step-by-step)	—	KV-Min	40.0	40.0	40.0	40.0	40.0	40.0	40.0
Flexural strength tested flatwise at 23C Cut lengthwise Cut crosswise	4.6.6	4	—	PSI-Min	12,000	27,000	25,000	22,000	20,000	20,000	18,000
		4	—	PSI-Min	9,000	23,000	21,000	19,000	16,000	16,000	15,000
Bonding Strength	4.6.7	4	—	Lbs-Min	—	—	—	—	—	—	650
Wrap or twist	4.6.11	1	—	Percent	—	—	—	—	—	—	650

See table III

¹ These ranges are for nominal thicknesses subject to the tolerances specified in table I.² Not required for sizes under 0.031 inch or less.

4.5 Conditioning of test specimens.

4.5.1 *Nomenclature.* The designations indicating conditioning of test specimens shall be in accordance with ASTM D618.

4.5.2 *Time tolerances for conditioning.* The time tolerance for conditioning shall be as specified in Table VI.

TABLE VI. *Time tolerance for conditioning*

Conditioning		Cooling		Comments
Condition	Time Tolerance	Time	Time Tolerance	
48/50	-0 hours +2 hours	16 hours or more	-0 hours	Cool in a dry desiccator. Start test within ½ hour after removing specimen from desiccator.
48/50/ WATER 24/23/ WATER	{ -0 hours + ½ hour	1 hour	-0 hours +2 hours	Cool by immersion in a sufficient quantity of distilled water to reduce the temperature to 23°C within 1 hour. Remove individually as needed, and wipe surface water off with a cloth. Start test within 1 minute after removing specimen from water.
1/105	-0 minutes +6 minutes	2 hours or more	-0 hours	See water-absorption test (4.6.8).
24/23/water	-0 hours +2 hours	—————	—————	See water-absorption test (4.6.8).

4.5.3 *Temperature and relative humidity tolerances.* The conditioning temperature and relative humidity tolerances shall be in accordance with ASTM D618.

4.6 Test procedures.

4.6.1 *Definitions.* In conducting tests, the term "lengthwise" shall be interpreted to mean that sheet direction known to be stronger in flexure. "Crosswise" shall then be the sheet direction known to be the weaker in flexure.

4.6.2 *Test conditions.* Unless otherwise specified, tests on the conditioned specimens shall be made at a room temperature of 23C, plus or minus 3C.

4.6.3 *Thickness.* Thickness shall be measured in accordance with D374 at 10 points distributed over area of sheet. On test specimens, the dead weight dial micrometer, Method C, shall be used. On large sheets, Method B, shall be used. Using a micrometer with a yoke of sufficient size and rigidity to permit accurate measurements in the center of the sheet.

4.6.4 *Dielectric breakdown parallel to laminations (step-by-step).*

4.6.4.1 *Specimens.* The test specimens shall be 2 by 3 inches by the thickness of the sheet. American standard tapered pins, such as Morse, Brown and Sharpe, or Pratt and Whitney, or their equivalent, having a taper

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of $\frac{1}{4}$ inch per foot, shall be used. For test specimens having a thickness up to $\frac{1}{2}$ inch, inclusive, No. 3 American standard tapered pins ³ inches long and having a diameter at the large end of $\frac{7}{32}$ inch shall be used. Drill two $\frac{3}{16}$ inch diameter holes, centrally located, 1 inch apart, center to center, and perpendicular to the faces of the specimen. Ream holes, using a tapered reamer, to a sufficient depth to allow the pins to extend approximately $1\frac{1}{2}$ inches from the small end of the hole. For test specimens having a thickness over $\frac{1}{2}$ up to 2 inches, inclusive, No. 4 American standard tapered pins 4 inches long and having a diameter at the large end of $\frac{1}{4}$ inch shall be used. Drill two $\frac{3}{16}$ inch diameter holes, centrally located, 1 inch apart, center to center, and perpendicular to the faces of the specimen. Ream holes, using a tapered reamer, to a sufficient depth to allow the pins to extend approximately 1 inch from the small end of the hole. The pins shall be inserted after the conditioning of the test specimen. Spheres having a $\frac{1}{2}$ inch diameter, when placed on the extremities of the tapered pins, will decrease the tendency to flashover.

4.6.4.2 Electrical apparatus. Step-up transformer, circuit breaker, voltage control and voltmeter shall be in accordance with ASTM D149. Power supply frequency shall be not greater than 60 cycles per second, the transformer shall have a rating of not less than 5KVA.

4.6.4.3 Procedure. All tests shall be made under oil, at commercial power frequency of 60 cycles. One specimen only shall be tested by the short-time method for the purpose of providing a basis for the initial voltage applied in the step-by-step test. In the short-time test, starting at zero, the testing voltage shall be increased as uniformly as possible at a rate of 500 volts per second. On the remaining specimens, the step-by-step method shall be used. The initial voltage

applied in the step-by-step test shall be 50 percent of the short-time breakdown voltage. The initial voltage in the step-by-step tests, determined as specified in 4.6.4.1 shall be applied for 1 minute and the voltage shall then be increased in increments as follows, holding the voltage at each step for 1 minute:

Breakdown voltage by short-time method (kilovolts)	Increments of increase for step-by-step methods (kilivolts)
12.5 or less	0.5
12.5 to 25	1.0
25 to 50	2.5
50 to 100	5.0

4.6.4.4 Oil medium breakdown. If the specimen should appear to fail below a specified minimum failure voltage and there is doubt as to whether the breakdown occurred in the oil or in the specimen, the oil itself shall be tested as specified in ASTM D877. If the breakdown voltage of the oil, tested at room temperature, is found to be less than 22KV, the oil shall be changed or reconditioned so that its breakdown voltage is not less than 22KV.

4.6.4.5 Report. The breakdown voltage shall be reported in kilovolts, and the time required to break each specimen shall be reported in seconds.

4.6.5 Impact strength (tested edgewise). The impact test shall be performed in accordance with ASTM D256, Method A.

4.6.6 Flexural strength (tested flat wise). The flexural strength test at room temperature, ASTM D229 shall be used. Specimens shall be heated at the test temperature for 30 ± 5 minutes prior to test.

4.6.7 Bonding strength.

³ For information on tapered pins, see Kents Mechanical Engineers Handbook, 12th Edition, Design and Production page 15-14. (This handbook may be obtained from John Wiley and Sons, Inc., 440-4th Ave., New York, N.Y. 10016)

4.6.7.1 Specimens. Specimens shall be 1 inch square by 0.500 ± 0.005 inch thick. Specimens from sheets over $\frac{1}{2}$ inch nominal thickness shall be formed by machining down both surfaces.

4.6.7.2 Procedure. The thickness of the specimens shall be recorded. The test machine shall be fitted with a head containing a steel ball 10 millimeters in diameter. After the specimen has been conditioned, it shall be placed on edge and centered accurately beneath the steel ball so that the load is applied in the lengthwise direction of the specimen. The load shall be applied to the specimen until failure occurs. The speed of the test shall be 0.050 inch per minute.

4.6.7.3 Report. The bonding strength shall be reported in pounds.

4.6.8 Water absorption.

4.6.8.1 Specimens. The specimens shall be 3 by 1 inch by thickness.

4.6.8.2 Procedure. The specimens shall be subjected to a temperature of 105°C . for 1 hour, cooled in desiccator for at least 2 hours, and weighed (W_1). The specimens shall then be immersed in distilled water for 24 hours at 23°C . They shall be removed individually as needed, all surfaces wiped off with a dry cloth, and then reweighed immediately (W_2). The test shall begin not more than 1 minute after removal of the specimens from the water and shall be completed as rapidly as consistent with accuracy. Specimens $\frac{1}{16}$ inch or less in thickness shall be placed in a weighing bottle immediately after wiping and shall be weighed in the bottle. No correction shall be made for water-soluble matter.

4.6.8.3 Calculations. The percentage of water absorption shall be calculated as follows:

$$\text{Percentage of water absorption in 24 hours} = \frac{W_2 - W_1 \times 100}{W_1}$$

4.6.9 Dielectric constant and dissipation factor.

4.6.9.1 Test equipment. Bridge, generator and detector shall be as described in ASTM D150.

4.6.9.2 Specimens. The specimens for dielectric constant and dissipation factor tests shall be 4 inch squares cut from sheets $\frac{1}{8}$ inch in thickness.

4.6.9.3 Procedure. Specimens shall be removed from the water bath individually as needed and all surfaces wiped dry with a cloth. Metal foil electrodes 0.001 inch thick shall be immediately applied to both sides of the specimen using a thin layer of petrolatum as an adhesive. Top electrode shall be $2\frac{5}{8}$ inches in diameter and the bottom elec-

trode shall be 3 inches in diameter carefully rolled on to exclude air bubbles. Measurements shall be completed within $\frac{1}{2}$ hour after removal from the water.

4.6.9.4 Calculations. Calculations shall be made in accordance with the procedures outlined in ASTM D150.

4.6.10 Arc resistance. The arc resistance test shall be performed in accordance with ASTM D495 using tungsten rod electrodes.

4.6.11 Warp and twist. The warp and twist of the sheets shall be measured in accordance with method 6051 of FED-STD-406 (see 3.11).

5. PREPARATION FOR DELIVERY

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5.1 Packaging. Packaging shall be level A or C, as specified (see 6.2).

5.1.1 *Level A.* Sheets shall be packaged Method III in accordance with MIL-P-116 as follows: Wrap or interleave each sheet to protect them from abrasion, using not less than 80 pound basis weight (24" x 36" - 500) kraft paper conforming to UU-P-268, or equivalent.

5.1.2 *Level C.* Each sheet shall be preserved and packaged in a manner that will afford adequate protection against corrosion, deterioration and damage during shipment from the supply source to the first receiving activity.

5.2 Packing. Packing shall be level A, B, or C as specified (see 6.2).

5.2.1 *Level A.* Sheets, packaged as specified (see 6.2), shall be packed in snug-fitting containers conforming to any one of the following specifications at the option of the contractor.

<i>Specification</i>	<i>Type or class</i>
PPP-B-591	Overseas type
PPP-B-621	Class 2
PPP-B-601	Overseas type
PPP-B-636	Class Weather-resistant
PPP-B-640	Class Weather-resistant
MIL-B-43291	Class 2

Boxes shall be provided with fiberboard pads and liners to protect edges and surfaces of sheets. The gross weight of boxes shall not exceed 200 pounds, unless the weight of a single sheet exceeds 200 pounds in which case sheets shall be packed one to a box.

5.2.2 *Level B.* Sheets, packaged as specified (see 6.2), shall be packed in snug-fitting

containers conforming to any one of the following specifications at the option of the contractor.

<i>Specification</i>	<i>Type or class</i>
PPP-B-591	Domestic type
PPP-B-601	Domestic type
PPP-B-621	Class 1.
PPP-B-636	Class - Domestic
PPP-B-640	Class 2

Boxes shall be provided with fiberboard pads and liners to protect edges and surfaces of sheets. Box closure shall be as specified in the applicable box specification or appendix thereto. The gross weight of boxes shall not exceed 200 pounds, unless the weight of a single sheet exceeds 200 pounds in which case sheets shall be packed one to a box.

5.2.3 *Level C.* Sheets shall be packed in shipping containers in a manner that will afford adequate protection against damage to the package and its contents during shipment from the supply source to the first receiving activity. Shipping containers shall comply with the rules and regulations of the common carrier as applicable to the mode of transportation.

5.3 *Marking.* In addition to any special marking required by the contract or order, interior packages and exterior shipping containers shall be marked for shipment in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use.

6.1.1 *Class 180.* This material is used for Class 180 transformers, radio transmitter parts, low loss high frequency radio and radar insulators, motor slot wedges, slot

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liners, and similar uses. The highest temperature (limiting "hottest spot" temperature) to which Class 180 insulation may be subjected to continuously with normal life-expectancy is 180C.

6.2 Ordering data. Procurement documents should specify the following.

- (a) Title, number, and date of this specification.
- (b) Sheet size and thickness required (see 3.10).
- (c) Whether sheets smaller in dimension than specified in the procurement document, due to cutting specimens for lot acceptance tests, are acceptable (see 3.10.2).
- (d) Applicable level of packaging and packing required (see 5.1 and 5.2).

6.3 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 applicable Qualified Products List QPL-997 whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, 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 orders for the products covered by this specification. The ac-

tivity responsible for the qualified products list is the Naval Ship Engineering Center, Department of the Navy, Washington, D. C. 20360, 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" (see 6.4).

6.4 Copies of "Provisions Governing Qualification" may be obtained upon application to Commanding Officer, Naval Supply Depot, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

6.5 Fabricated parts or equipment. Requirements, applicable to fabricated parts or equipment incorporating glass-cloth, silicone-resin, laminated material should be specified in separate specifications or as part of contracts or orders.

6.6 Certain provisions of this specification are the subject of international standardization agreement (ABC-NAVY-STD-17). When amendment, revision or cancellation of this specification is proposed, the departmental custodians will inform their respective Departmental Standardization Offices so that appropriate action may be taken respecting the International agreement concerned.

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

Custodians:

Army--EL

Navy--SH

Air Force--11

Preparing activity:

Navy--SH

(Project No. 5970-0138)

CODE "C"

MIL-P-997D

Review activities:

Army—KI, MI, MU

Navy—SH

Air Force—11, 17, 85

User activities:

Army—MO, MU

Navy—AS, MC, OS, YD

International interest (see section 6).

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