INCH-POUND

MIL-I-24768/18
25 February 1992

MILITARY SPECIFICATION SHEET

INSULATION, PLASTIC, LAMINATED, THERMOSETTING, GLASS-CLOTH, PHENOLIC-RESIN (GPG)

This specification is approved for use by all departments and agencies of the Department of Defense.

The requirements for acquiring the insulation material described herein shall consist of this specification sheet and the issue of the following specification listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation: MIL-I-24768.

REQUIREMENTS:

Construction: The material shall consist of a woven glass cloth properly impregnated and bonded with phenolic-resin matrix and processed to conform to this specification.

Intended use: The laminated material covered by this specification is a material with high impact and flexural strength. It has good electrical properties under dry conditions. It is used for motor insulation and in other applications where high strength and good electrical properties are required, even at fairly high temperatures.

Forms: Sheets, rolled tubes, and rods are recommended forms of laminated material covered by this specification.

Temperature indices: The laminated material covered by this specification has a mechanical strength test index of 170, and an electrical strength test index of 140.

Dimensions and part numbers:

Thickness of sheets: The thickness of sheets, permissible variations, and the applicable part number shall be as specified in table I.

AMSC N/A FSC 5970

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

TABLE I. *Thickness of laminated sheets.*

Part number	Nominal thickness (inches)	Permissible variations (± inch)
M24768/18-S-1	0.010	0.002
M24768/18-S-2	0.015	0.003
M24768/18-S-3	0.020	0.004
M24768/18-S-4	0.025	0.005
M24768/18-S-5	0.031	0.065
M24768/18-S-6	0.047	0.0075
M24768/18-S-7	0.062	0.0075
M24768/18-S-8	0.094	0.009
M24768/18-S-9	0.125	0.012
M24768/18-S-10	0.156	0.015
M24768/18-S-11	0.188	0.019
M24768/18-S-12	0.219	0.021
M24768/18-S-13	0.250	0.022
M24768/18-S-14	0.312	0.026
M24768/18-S-15	0.375	0.030
M24768/18-S-16	0.438	0.033
M24768/18-S-17	0.500	0.036
M24768/18-S-18	0.625	0.040
M24768/18-S-19	0.750	0.043
M24768/18-S-20	0.875	0.046
M24768/18-S-21	1.000	0.049
M24768/18-S-22	1.125	0.053
M24768/18-S-23	1.250	0.055
M24768/18-S-24	1.375	0.058
M24768/18-S-25	1.500	0.061
M24768/18-S-26	1.625	0.064
M24768/18-S-27	1.750	0.067
M24768/18-S-28	1.875	0.070
M24768/18-S-29	2.000	0.073
M24768/18-S-30	2.125	0.079
M24768/18-S-31	2.500	0.085
M24768/18-S-32	2.750	0.091
M24768/18-S-33	3.000	0.097
M24768/18-S-34	3.500	0.110
M24768/18-S-35	4.000	0.122
M24768/18-S-36	4.500	0.134
M24768/18-S-37	5.000	0.142
M24768/18-S-38	5.500	0.156
M24768/18-S-39	6.000	0.172
M24768/18-S-40	6.500	0.180
M24768/18-S-41	7.000	0.195
M24768/18-S-42	7.500	0.210
M24768/18-S-43	8.000	0.216
M24768/18-S-44	8.500	0.232
M24768/18-S-45	9.000	0.240
M24768/18-S-46	9.500	0.255
M24768/18-S-47	10.000	0.270
M24768/18-S-48	_[1]	_[2]

See footnotes on next page.

[1]For part numbers of sheets not listed in this table, the thickness shall be included after the part number. Example of this for a 0.8125 inch thick sheet is: M24768/18-S-48-0.8125.
[2]On sheets of nominal thickness not listed in this table, the permissible variations shall be the same as for the next greater thickness.

Diameter of rolled round tubes: The range of sizes for rolled round tubes shall be as specified in table II. The inside diameter and outside diameter shall be included in the part number. An example of a part number for a rolled round tube with an inside diameter of 0.125 inch and outside diameter of 0.156 inch is: M24768/18-TRR-0.125/0.156. The wall thickness tolerances for rolled round tubes with an inside diameter up to 4 inches shall be as specified in table III.

TABLE II. *Range of sizes for rolled round tubes.*

Inside diameter (inches)		Outside diameter (inches)		Wall thickness (inch)		Maximum ratio of wall thickness to inside diameter
Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	
0.250	48.000	0.281	50.000	0.016	1.000	1/2

TABLE III. *Wall thickness tolerances.*

Wall thickness (inch)	Tolerances (± inch)
0.010 to 0.015	–
0.016 to 0.030	0.006
0.031 to 0.061	0.008
0.062 to 0.124	0.009
0.125 to 0.249	0.011
0.250 to 0.500	0.013

Diameter of rods: The range of sizes and tolerances for rods shall be as specified in table IV. The outside diameter of the rod shall be included in the part number. An example of a part number for a rod with an outside diameter of 0.250 inch is: M24768/18-R-0.250.

TABLE IV. *Size and tolerances for rods.*

Diameter (inches)	Tolerances (± inch)
0.250 to 1.999	0.005
2.000	0.008

Performance requirements: Performance requirements for laminated materials shall be as specified in tables V, VI, and VII.

The following performance requirements do not apply to this plastic laminate:

a. Dielectric breakdown voltage
b. Dielectric strength
c. Surface resistance
d. Volume resistivity
e. Silicone content
f. Arc resistance
g. Thermal endurance
h. Flammability
i. Tracking resistance
j. Dielectric constant
k. Dissipation factor.

Testing: The laminated material covered by this specification shall be tested under first article inspection requirements.

TABLE V. *Performance requirements for sheets.*

Requirement	Cond.	Test para.	Unit	Thickness (inches)[1]									
				0.031	0.062	0.094	0.125	0.188	0.250	0.500	0.750	1.000	1.001 – Max.
Dielectric breakdown voltage	A D-48/50 D-336/50	4.6.4	Min. kV										
Dielectric strength	A D-48/50	4.6.5	Min. volts per mil										
Dielectric constant	A D-24/23 D-48/50	4.6.5	Max.										
Dissipation factor	A D-24/23 D-48/50	4.6.6	Max.										
Volume resistivity	C-96/35/90	4.6.7	Min. megohm cm										
Surface resistance	C-96/35/90	4.6.8	Min. megohm										
Arc resistance	D-48/50	4.6.9	Min. seconds										
Tracking resistance	A	4.6.10	Min. minutes				6.5 5.5	6.5 5.5	6.5 5.5	6.5 5.5	6.5 5.5	6.5 5.5	6.5 5.5
Impact strength[2] Lengthwise: Crosswise:	E-48/50	4.6.11	Min. ft-lbs. per inch										
Flexural strength Lengthwise: Crosswise:	A	4.6.12	Min. psi	18,000 16,000	20,000 18,000	20,000 18,000	20,000 18,000	20,000 18,000	20,000 18,000	20,000 18,000	19,000 17,000	17,000 15,300	17,000 15,300

See footnotes a end of table.

TABLE V. *Performance requirements for sheets – Continued.*

Requirement	Cond.	Test para.	Unit	Thickness (inches)[1]									
				0.031	0.062	0.094	0.125	0.188	0.250	0.500	0.750	1.000	1.001 – Max.
Thermal endurance													
Flexural strength:	E-200/150	4.6.13	Min psi										
Bonding strength[2]	D D-48/50	4.6.15	Min. pounds							850 700	850 700	850 700	850 700
Water absorption	D_1-24/23	4.6.17	Max. percent	4.20	2.70	2.30	2.00	1.90	1.80	1.50	1.25	1.00	1.00
Silicone content	E-168/18	4.6.18	Max. ppm										
Flame resistance													
Ignition time:	A	4.6.19	Min. sec.										
Burning time:			Max. sec.										

[1]For intermediate thicknesses, the value for the next smaller thickness shall apply.
[2]Maximum thickness tested shall be 2.000 inches.

TABLE VI. *Performance requirements for rolled tubes.*

Requirement	Cond.	Test para.	Unit	Wall thickness (inches) with inside diameter 0.125–8.000 inches					
				0.031–0.047	0.048–0.062	0.063–0.094	0.095–0.125	0.126–0.188	0.189–0.250
Dielectric strength	A D-48/50	4.6.5	Min. volts per mil						
Compressive strength	A	4.6.14	Min. psi						
Specific gravity	A	4.6.16	Min.						
Water absorption	D_1-24/23	4.6.17	Max. percent						

TABLE VI. *Performance requirements for rolled tubes – Continued.*

Requirement	Cond.	Test para.	Unit	Wall thickness (inches) with inside diameter 0.125–8.000 inches				
				0.251–0.375	0.376–0.500	0.501–0.750	0.751–1.000	1.001 Max.
Dielectric strength	A D-48/50	4.6.5	Min. volts per mil					
Compressive strength	A	4.6.14	Min. psi					
Specific gravity	A	4.6.16	Min.					
Water absorption	D_1-24/23	4.6.17	Max. percent					

TABLE VII. *Performance requirements for rods.*

Requirement	Cond.	Test para.	Unit	Diameter (inches)			
				0.250–0.499	0.500–0.999	1.000	1.001–2.000
Flexural strength	A	4.6.12	Min. psi				
Compressive strength	A	4.6.14	Min. psi				
Specific gravity	A	4.6.16	Min.				
Water absorption	D_1-24/23	4.6.17	Max. percent				

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

Review activities:
Army – MI, AR, EA
Navy – EC, OS
Air Force – 85

User activities:
Army – ME
Navy – MC, AS

Preparing activity:
Navy – SH
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