

INCH-POUND

MIL-I-24768/14  
25 February 1992

SUPERSEDING  
MIL-P-15035C  
10 January 1962  
MIL-P-79C  
15 June 1961

## MILITARY SPECIFICATION SHEET

### INSULATION, PLASTIC, LAMINATED, THERMOSETTING, COTTON-FABRIC-BASE, PHENOLIC-RESIN (FBG)

*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 suitable woven cotton fabric substrate impregnated and bonded with a phenolic-resin matrix and processed to meet the requirements of this specification.

**Intended use:** The laminated material covered by this specification is primarily intended for electrical applications that require good moisture resistance and a good degree of mechanical strength. It possesses fairly good dielectric properties and a medium dielectric loss.

**Forms:** Sheets, molded tubes, and rod 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 85 and an electrical strength test index of 85 for thicknesses up to 0.062 inch, and a mechanical strength test index of 125 and an electrical strength test index of 115 for thicknesses greater than 0.062 inch.

#### Dimensions and part numbers:

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

AMSC N/A

FSC 5970

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TABLE I. *Thickness of laminated sheets.*

Part number	Nominal thickness (inches)	Permissible variations ( $\pm$ inch)
M24768/14-S-1	0.025	0.005
M24768/14-S-2	0.031	0.0065
M24768/14-S-3	0.047	0.0075
M24768/14-S-4	0.062	0.0075
M24768/14-S-5	0.094	0.009
M24768/14-S-6	0.125	0.010
M24768/14-S-7	0.156	0.011
M24768/14-S-8	0.188	0.0125
M24768/14-S-9	0.219	0.014
M24768/14-S-10	0.250	0.015
M24768/14-S-11	0.312	0.017
M24768/14-S-12	0.375	0.020
M24768/14-S-13	0.438	0.022
M24768/14-S-14	0.500	0.024
M24768/14-S-15	0.625	0.027
M24768/14-S-16	0.750	0.029
M24768/14-S-17	0.875	0.031
M24768/14-S-18	1.000	0.033
M24768/14-S-19	1.125	0.035
M24768/14-S-20	1.250	0.037
M24768/14-S-21	1.375	0.039
M24768/14-S-22	1.500	0.041
M24768/14-S-23	1.625	0.043
M24768/14-S-24	1.750	0.045
M24768/14-S-25	1.875	0.047
M24768/14-S-26	2.000	0.049
M24768/14-S-27	$\frac{1}{2}$	$\frac{1}{2}$

<sup>1</sup>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: M24768/14-S-27-0.8125.

<sup>2</sup>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 molded round tubes:** The range of sizes for molded 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 molded round tube with an inside diameter of 0.250 inch and an outside diameter of 0.315 inch is: M24768/14-TMR-0.250/0.315. The wall thickness tolerances for molded round tubes with an inside diameter up to 3.875 inches shall be as specified in table III.

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TABLE II. *Range of sizes for molded 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	3.875	0.375	4.000	0.062	1.000	1/2

TABLE III. *Molded round tube wall thickness tolerances.*

Wall thickness (inch)	Tolerances ( $\pm$ inch)	
	Inside diameter (inches)	
	0.188-0.500	0.501 - Max.
0.062 to 0.125	0.015	0.015
0.126 to 0.250	0.020	0.020
0.251 to 0.500		0.020

**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 M24768/14-R-0.250.

TABLE IV. *Size and tolerances for rods.*

Diameter (inches)	Tolerances ( $\pm$ inch)
0.250 to 1.999	0.005
2.000 to 4.000	0.008

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

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

- Dissipation factor
- Dielectric constant
- Surface resistance
- Volume resistivity
- Silicone content

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- f. Thermal endurance**
- g. Tracking resistance**
- h. Arc resistance**
- i. Flammability.**

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

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TABLE V. Performance requirements for sheets.

TABLE 7.1 Performance requirements for sheets.

Requirement	Cond.	Test para.	Unit	Thickness (inches) <sup>1</sup>									
				0.031	0.062	0.094	0.125	0.188	0.250	0.500	0.750	1.000	1.001 – Max.
Dielectric breakdown voltage <sup>2</sup>	A D-48/50	4.6.4	Min. kV	35.0 2.5	35.0 2.5	35.0 2.5	35.0 2.5	35.0 2.5	35.0 2.5	35.0 2.5	35.0 2.5	35.0 2.5	25.0 2.5
Dielectric constant	A D-24/23	4.6.6	Max.										
Dissipation factor	A D-24/23	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. sec.										
Tracking resistance	A	4.6.10	Min. minutes										
Impact strength <sup>2</sup>			Min. ft-lbs. per inch										
Lengthwise:	E-48/50	4.6.11											
Crosswise:				1.60 1.40	1.60 1.40	1.60 1.40	1.60 1.40	1.60 1.40	1.60 1.40	1.60 1.40	1.60 1.40	1.60 1.40	1.60 1.40
Flexural strength													
Lengthwise:	A	4.6.12	Min. psi	16,500 14,000	16,500 14,000	16,500 14,000	16,500 14,000	16,500 14,000	16,500 14,000	15,500 13,500	15,500 13,500	14,500 13,000	14,500 13,000
Crosswise:													

See footnotes at end of table.

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TABLE V. Performance requirements for sheets - Continued.

Requirement	Cond.	Test para.	Unit	Thickness (inches) <sup>1</sup>									
				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:		4.6.13	Min. psi										
Bonding strength <sup>2</sup>	A	4.6.15	Min. pounds										
Water absorption	D <sub>1</sub> -24/23	4.6.17	Max. percent	4.5	2.20	1.80	1.60	1.30	1.10	0.75	0.70	0.65	0.65
Silicone content	E-168/185	4.6.18	Max. ppm										
Flame resistance													
Ignition time:	A	4.6.19	Min. sec.										
Burning time:			Max. sec.										

<sup>1</sup>For intermediate thicknesses, the value for the next smaller thickness shall apply.<sup>2</sup>Maximum thickness tested shall be 2.000 inches.

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TABLE VI. Performance requirements for molded tubes.

Requirement	Cond.	Test para.	Unit	Inside diameter (inches)	Wall thickness (inch)				
					0.062-0.093	0.094-0.124	0.125-0.187	0.188-0.249	0.250-0.499
Compressive strength	A	4.6.14	Min. psi	0.250 to 3.875	19,000	19,000	19,000	19,000	19,000
Specific gravity	A	4.6.16	Min.	0.125 to 3.875	1.25	1.25	1.25	1.25	1.25
Water absorption	D <sub>1</sub> -24/23	4.6.17	Max. percent	0.250 to 3.875	3.0	2.2	2.0	1.8	1.6
									1.2
									1.1

TABLE VII. Dielectric strength requirements for molded tubes.

Requirement	Cond.	Test para.	Unit	Inside diameter (inches)	Wall thickness (inch)	
					0.063-0.125	0.126-0.250
Dielectric strength	A	4.6.5	Min. volts per mil	0.250 to 3.875	175	125
						90

TABLE VIII. 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	13,000	13,000	13,000	20,000
Compressive strength	A	4.6.14	Min. psi	20,000	20,000	20,000	20,000
Specific gravity	A	4.6.16	Min.	1.26	1.26	1.26	1.26
Water absorption	D <sub>1</sub> -24/23	4.6.17	Max. percent	1.7	1.3	1.0	1.2

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**Custodians:**

Army – ER  
Navy – SH  
Air Force – 20

**Preparing Activity:**

Navy – SH  
(Project 5970-1015-14)

**Review Activities:**

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

**User Activities:**

Army – ME  
Navy – MC, AS