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Specification for Finished Fabric Woven from "E" Glass for Printed Boards

IPC-4412B WAM3
December 2018

An international standard developed by IPC

Association Connecting Electronics Industries

IPC

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Standards Should:

- Show relationship to Design for Manufacturability (DFM) and Design for the Environment (DFE)
- Minimize time to market
- Contain simple (simplified) language
- Just include spec information
- Focus on end product performance
- Include a feedback system on use and problems for future improvement

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- Inhibit innovation
- Increase time-to-market
- Keep people out
- Increase cycle time
- Tell you how to make something
- Contain anything that cannot be defended with data

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Specification for Finished Fabric Woven from "E" Glass for Printed Boards

Developed by the IPC Woven Glass Reinforcement Task Group (3-12d) of the Printed Board Base Materials Committee (3-10) of IPC

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Users of this publication are encouraged to participate in the development of future revisions.

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Specification for Finished Fabric Woven from "E" Glass for Printed Boards

1 SCOPE

This specification covers finished fabrics woven from ''E'' glass electrical grade glass fiber yarns that are intended as a reinforcing material in laminated plastics for electrical and electronic use. All fabrics covered by this specification are plain weave.

1.1 Purpose This specification determines the nomenclature, definitions, general and chemical requirements for the glass, and physical requirements for finished woven glass fiber fabrics.

1.2 Designation Appendix A provides the user with a cross reference between the IPC-4412 requirements and ISO specifications applicable to woven glass. Appendix B of this standard provides a style designator for each finished fabric glass style, with specifications on yarn, fabric count, thickness and weight in both SI and US system. Fabrics listed in Appendix B also categorize fabrics by their current availability status.

1.3 Classification

CLASS 1 General Electronic Products

Includes products suitable for applications where the major requirement is function of the completed assembly.

CLASS 2 Dedicated Service Electronic Products

Includes products where continued performance and extended life is required, and for which uninterrupted service is desired but not critical. Typically, the end-use environment would not cause failures.

CLASS 3 High Performance/Harsh Environment Electronic Products

Includes products where continued high performance or performance on-demand is critical, equipment downtime cannot be tolerated, end-use environment may be uncommonly harsh, and the equipment must function when required, such as life support or other critical systems.

1.4 Measurement Units This Standard uses International System of Units (SI) units per ASTM SI10, IEEE/ASTM SI 10, Section 3 [Imperial English equivalent units are in brackets for convenience]. The SI units used in this Standard are millimeters (mm) [in] for dimensions and dimensional tolerances, Celsius (°C) [°F] for temperature and temperature tolerances, grams (g) [oz] for weight, and lumens (lm) [footcandles] for illuminance.

Note: This Standard uses other SI prefixes (ASTM SI10, Section 3.2) to eliminate leading zeroes (for example, 0.0012 mm becomes 1.2 µm) or as an alternative to powers-of-ten (3.6 x 103 mm becomes 3.6 m).

1.5 Definition of Requirements The words **shall** or **shall not** are used in the text of this document wherever there is a requirement for materials, preparation, process control or acceptance. The word "should" reflects recommendations and is used to reflect general industry practices and procedures for guidance only. Line drawings and illustrations are depicted herein to assist in the interpretation of the written requirements of this Standard. The text takes precedence over the figures.

1.6 Process Control Requirements The primary goal of process control is to continually reduce variation in the processes, products, or services to provide products or processes meeting or exceeding User requirements. Process control tools such as IPC-9191, JESD557 or other User-approved system may be used as guidelines for implementing process control.

Manufacturers of Class 3 products **shall** develop and implement a documented process control system.

A documented process control system, if established, **shall** define process control and corrective action limits. For Class 1 and 2 products, the use of "statistical process control (SPC)" **shall** be optional and should be based on factors such as design stability, lot size, production quantities, and the needs of the manufacturer, See paragraph 4.1 for the quality assurance section regarding SPC.

1.7 Order of Precedence

The contract **shall** take precedence over this Standard, referenced standards and drawings.

In the event of conflict, the following order of precedence applies:

1) Procurement as agreed and documented between customer and supplier.
2) Master drawing reflecting the customer's detailed requirements.
3) When invoked by the customer or per contractual agreement, this standard.