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IPC-4412A

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

Developed by the Woven Glass Reinforcement Task Group (3-12d) of the Strategic Components of Base Materials Subcommittee (3-12) 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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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.

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

1.3 Designation Appendix II 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 II also categorize fabrics by their current availability status.

2 APPLICABLE DOCUMENTS

2.1 IPC[1]

IPC-T-50 Terms and Definitions for Interconnecting and Packaging Electronic Circuits

IPC-9191 General Guidelines for Implementation of Statistical Process Control (SPC)

2.2 American Society for Testing and Materials (ASTM)[2]

ASTM-D578 Standard Specification for Glass Fiber Strands

ASTM-D1776 Standard Practice for Conditioning Testing Textiles

2.3 International Standards[3]

ISO 9001 Quality Management Systems - Requirements

2.4 National Conference of Standards Laboratories (NCSL)[4]

NCSL Z 540-1 General Requirements for Calibration Laboratories and Measuring and Test Equipment

3 REQUIREMENTS

3.1 Terms and Definitions The definition of terms shall be in accordance with IPC-T-50 and the following:

3.1.1 AQL (Acceptable Quality Level) Maximum number of defects per hundred units that can be considered satisfactory as a process average.

3.1.2 Bias Filling yarns are off-square to the warp ends.

3.1.3 Bow Filling yarns lie in an arc across the width of the fabric.

3.1.4 Creases A ridge in the fabric caused by a fold or wrinkle being placed under pressure.

3.1.5 Defects A substandard area in a fabric.

3.1.5.1 Major Defect A defect that is likely to result in failure, or to reduce materially the usability of the unit of product for its intended purpose.

3.1.5.2 Minor Defect A defect that is not likely to reduce materially the usability of the unit of product for its intended purpose.

3.1.5.3 Defect per Hundred Units

$$\frac{\text{Number of Defects}}{\text{Number of Units Inspected}} \times 100$$

3.1.6 E Glass (Electrical Grade Glass Fiber) E glass, which is to be used for PWB applications, is a continuous filament glass yarn with a chemical composition by weight that is within the following limits:

B_2O_3	5% - 10%
CaO	16% - 25%
Al_2O_3	12% - 16%
SiO_2	52% - 56%
MgO	0% - 5%
Na_2O and K_2O	0% - 2%
TiO_2	0% - 0.8%
Fe_2O_3	0.05% - 0.4%
F_2	0% - 1.0%

1. www.ipc.org
2. www.astm.org
3. www.iso.ch
4. www.ncsl-h9.org