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Quality and Reliability of E-Textile Wearables

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Quality and Reliability of E-Textile Wearables

Developed by the E-Textiles Wearables Standard Task Group (D-75a)
of the E-Textiles Committee (D-70) of IPC

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

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Table of Contents

Figures

Tables

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Quality and Reliability of E-Textile Wearables

1 SCOPE

This standard establishes criteria to assess the reliability of e-textile wearables through quality test methods. It enables the classification of the products against their reliable performance levels.

1.1 Purpose The purpose of this standard is to establish thresholds for minimum characteristic testing requirements for each product classification defined in this standard.

1.2 Classification IPC standards recognize that e-textile wearables are subject to classifications by intended end-item use. Three general end-product classes have been established to reflect differences in manufacturability, complexity, functional performance requirements, and verification (inspection/test/laundering) frequency. It should be recognized that there may be overlaps of product between classes.

CLASS 1 General Includes products suitable for application categories where the major requirement is function of the completed assembly.

CLASS 2 Dedicated Purpose 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 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.

1.2.1 Single-Use/Short-Term Use This standard also recognizes Class 2 and Class 3 products that may be designed to be disposable after one-time or short-time use. Requirements specific to these product use cases are identified in this standard.

1.3 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.

1.3.1 Shall Be Able to Withstand The phrase "**shall** be able to withstand," as applies to this standard, implies that the parameter chosen to assess the reliability of an e-textile wearable and characteristic does not exceed the defined threshold condition after testing. Threshold condition is not always a numerical value. The threshold conditions will be based on procurement documentation or other specifications for functional materials used as part of the system.

1.4 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.

This may or may not be a statistical process control system. The use of "statistical process control" (SPC) is optional and should be based on factors such as design stability, lot size, production quantities, and the needs of the manufacturer.

Process control methodologies **shall** be used in the planning, implementation and evaluation of the manufacturing processes used to produce soldered electrical and electronic assemblies. The philosophy, implementation strategies, tools and techniques may be applied in different sequences depending on the specific company, operation, or variable under consideration to relate process control and capability to end product requirements.

When a decision or requirement is to use a documented process control system, failure to implement process corrective action and/or the use of continually ineffective corrective actions **shall** be grounds for disapproval of the process and associated documentation.