IPC/WHMA-A-620E

Requirements and Acceptance for Cable and Wire Harness Assemblies

If a conflict occurs between the English language and translated versions of this document, the English version will take precedence.

Developed by the IPC Task Group (7-31f) of the Product Assurance Subcommittee (7-30) and WHMA

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

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Tables

1.0 General

1.1 Scope This standard prescribes practices and requirements for the manufacture of cable, wire and harness assemblies. This standard does not provide criteria for cross-section or X-ray evaluation. For X-ray guidelines, see Appendix D X-Ray Guidelines.

If a conflict occurs between the English and translated versions of this document, the English version will take precedence.

The illustrations in this document portray specific points noted in the title of each section. The development committee recognizes that different parts of the industry have different definitions for some terms used herein. For the purposes of this document, the terms cable and wire harness are used interchangeably.

IPC/WHMA-A-620 can be used as a stand-alone document for purchasing products, however it does not specify frequency of in-process inspection or frequency of end product inspection. No limit is placed on the number of process indicators or the number of allowable repair/rework of defects. Such information should be developed with a statistical process control plan (see IPC-9191).

1.2 Purpose This standard describes materials, methods, tests and acceptability criteria for producing crimped, mechanically secured, or soldered interconnections and the related assembly activities associated with cable and harness assemblies.

The intent of this document is to rely on process control methodology to ensure consistent quality levels during the manufacture of products.

Any method that produces an assembly conforming to the acceptability requirements described in this standard may be used.

Standards may be updated at any time, including with the use of amendments. The use of an amendment or newer revision is not automatically required. The revision in effect **shall [D1D2D3]** be as specified by the User.

1.3 Classification Use of this standard requires agreement on the Class to which the product belongs. The User has the ultimate responsibility for identifying the Class to which the assembly is evaluated. If the User does not establish and document the acceptance Class, the Manufacturer may do so. Criteria defined in this standard reflect three Product Classes, which are as follows:

Class 1 General Electronic Products
Includes products suitable for applications where the major requirement is the 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 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 systems and other critical systems.

1.4 Measurement Units and Applications This document uses the International System of Units (SI) in accordance with IEEE/ASTM SI 10, American National Standard for Metric Practice (Section 3). Imperial English equivalent units follow in brackets. The derived SI units used in this document are millimeters (mm) [in] for dimensions and dimensional tolerances, Celsius (°C) [°F] for temperature and temperature tolerances, grams (g) [oz] for weight, and lux (lx) [foot-candles] for illuminance.

1.4.1 Verification of Dimensions Where not specifically invoked by this standard, actual measurements, e.g., of specific solder fillet dimensions, determination of damage and wrap percentages, are not required except for referee purposes.

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, process or acceptance of cable, wire and harness assemblies.

Where the words ‘‘**shall**’’ or “**shall not**” indicates a requirement for at least one Class, the requirements for each Class are in brackets next to the ‘‘**shall**’’ or “**shall not**” requirement.

N = No requirement has been established for this Class

A = Acceptable

P = Process Indicator

D = Defect

Examples:
[A1P2D3] is Acceptable Class 1, Process Indicator Class 2 and Defect Class 3

[N1D2D3] is Requirement Not Established Class 1, Defect Classes 2 and 3

1.0 General (cont.)

[A1A2D3] is Acceptable Classes 1 and 2, Defect Class 3

[D1D2D3] is Defect for all Classes.

Unless specifically stated otherwise, a defect for a Class 1 product means that the characteristic is also a defect for Class 2 and 3. A defect for a Class 2 product means that the characteristic is also a defect for a Class 3 product, but may not be a defect for a Class 1 product where less demanding criteria may apply.

The word ‘‘should’’ reflects recommendations and is used to reflect general industry practices and procedures for guidance only.

Many of the examples (figures) shown are grossly exaggerated to clearly depict the condition being described. Line drawings and illustrations are depicted herein to assist in the interpretation of the written requirements of this standard, many of these examples (figures) are grossly exaggerated to clearly depict the condition being described.

In the case of a discrepancy, the written description or written criteria always takes precedence over the illustrations.

1.5.1 Inspection Conditions The inspector **shall not [D1D2D3]** select the Product Class for the assembly under inspection. Documentation that specifies the applicable Class for the assembly under inspection **shall [D1D2D3]** be provided to the inspector. Criteria are given for each Product Class in three conditions: Acceptable, Defect or Process Indicator.

1.5.1.1 Acceptable This characteristic indicates a condition that, while not necessarily perfect, will maintain the integrity and reliability of the assembly in its service environment.

1.5.1.2 Defect A defect is a condition that fails to meet the acceptance criteria of this document or negatively affects the form, fit or function of the assembly in its end use environment. The Manufacturer **shall [N1D2D3]** document and disposition each defect.

It is the responsibility of the Manufacturer to identify defects that are unique to the assembly process. It is the responsibility of the User to define unique defect categories applicable to the product.

1.5.1.2.1 Disposition Disposition is the determination of how defects should be treated. Dispositions include, but are not limited to, rework, use as is, scrap or repair.

User concurrence **shall [N1D2D3]** be required for use as is and **shall [N1N2D3]** be required for repair dispositions.

1.5.1.3 Process Indicator A process indicator is a condition that identifies a characteristic that does not affect the form, fit, function or reliability of a product. A process indicator is not a defect.

- Such condition is a result of material, design and/or operator/machine related causes that create a condition that neither fully meets the acceptance criteria nor is a defect.
- Process indicators should be monitored as part of the process control system. If the number of process indicators indicates an abnormal variation in the process, identifies an undesirable trend, or displays other conditions that indicate the process is (or is approaching) out of control, the process should be analyzed. This may result in action to reduce the variation and improve yields.
- Disposition of individual process indicators is not required and affected product should be used as is.
- Not all process indicators are specified by this standard.
- It is the responsibility of the Manufacturer to identify process indicators that are unique to the assembly process.

1.5.1.4 Conditions Not Specified Conditions that are not specified are considered acceptable unless it can be established that the condition affects end user defined form, fit, function or reliability.

1.5.1.5 Uncommon or Specialized Designs IPC/WHMA-A-620, as an industry consensus document, cannot address all of the possible product design combinations. However, the standard does provide criteria for commonly used technologies. Where uncommon or specialized technologies are used, it may be necessary to develop unique acceptance criteria. The development should include User involvement. The acceptance criteria **shall [N1N2D3]** have User agreement. Requirements for specialized processes and/or technologies not specified herein **shall [N1D2D3]** be performed in accordance with documented procedures which are available for review.

Whenever possible, new criteria or criteria on specialized products should be submitted, using the Standard Improvement Form included in this standard, to the IPC Technical Committee to be considered for inclusion in upcoming revisions of this standard.