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IPC-8413-1

Specification for Process Carriers Used to Handle Optical Fibers in Manufacturing

Developed by the Optoelectronic Fiber Handling and Carrier Task Group (5-25a) (initially formed as NEMI Technical Working Group on Optical Fiber Carriers and Handling) of IPC

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

Contact:

IPC
2215 Sanders Road
Northbrook, Illinois
60062-6135
Tel 847 509.9700
Fax 847 509.9798

Specification Hierarchy

This standard is a member of the family of IPC Standards and Guidelines for Optoelectronics.

IPC-0040 *Optoelectronic Assembly and Packaging Technology*
IPC-STD-8413-1 *Specification for Process Carriers Used to Handle Optical Fibers in Manufacturing*

FORWARD

In May 2001, at a joint meeting of IPC and NEMI, a technical interest group in Photonics Manufacturing was created. This group met twice in the summer of 2001 and identified several issues in photonics manufacturing that could be resolved by the creation of standards. At the same time, IPC began working on an overview standard for Optoelectronics, IPC-0040. This standard was largely educational in content and serves to provide an overarching framework for specific standards in optoelectronics, particularly in fiber optics. Out of these efforts, fiber handling and carriers for containing and controlling fiber in the component manufacturing process were identified as fundamental issues. The NEMI Technical Working Group was formed in September 2001, to address these issues. This standard is the result of that effort.

Table of Contents

1 SCOPE 1
1.1 Objective of This Standard 1
1.2 Specifications and Guidelines 1
1.3 Processes 1
1.4 Manufacturing Process Carriers 1
1.5 Additional Process Requirements 1
1.6 Optical Fibers 1

2 APPLICABLE DOCUMENTS 1
2.1 IPC-0040 – Optoelectronic Assembly and Packaging Technology 1
2.2 IPC-SMEMA Interface Standard 1.2 – SMEMA Mechanical Equipment Interface Standard 2
2.3 IPC-SMEMA 3.1 – SMEMA Fiducial Mark Standard 2
2.4 National Institute of Safety and Health (NIOSH) STD 94-110-b 2
2.5 ANSI/ESDS20.20-1999 – ESD Association Standard for Development of an Electrostatic Discharge Control Program 2
2.6 SEMI S8-0701 – Safety Guidelines for Ergonomic Engineering of Semiconductor Manufacturing Equipment 2
2.7 ISO-14644-1 – Classification of Air Cleanliness 2

3 REQUIREMENTS 2
3.1 Definitions 2
3.2 Requirements for Handling Optical Fiber 2
3.2.1 Buffer Jacket Damage 2
3.2.2 Bend Radius 2
3.2.3 Fiber Ends 3
3.2.4 Fiber Load and Stress Limits 3
3.3 Requirements for Optical Fiber Carriers 3
3.3.1 Form Factor 3
3.3.1.1 Carrier Size/Dimensions 3
3.3.1.2 Origin and Frame of Reference 3
3.3.1.3 Envelope 4
3.3.1.4 Weight 4
3.3.1.5 Ergonomics 4
3.3.1.6 Palletized Parts 5
3.3.1.7 Carrier Magazines 5
3.3.2 Materials and Process Environment Requirements 5
3.3.2.1 Carrier Material Tensile Strength 5
3.3.2.2 Temperature 5
3.3.2.3 Humidity 5
3.3.2.4 Cleanliness 5
3.3.2.5 Electrostatic Discharge 6
3.3.2.6 Chemical 6
3.3.3 Indexing Features 6
3.3.3.1 Carrier Fiducials 6
3.3.3.2 Contrast/Vision Requirements 6
3.3.3.3 Conveyor/Transport 6
3.3.4 Key Features 6
3.3.4.1 Identification Marks 6
3.3.4.2 Fiber End Location Zones 7
3.3.4.2.1 Fixed Fiber End Locations 7
3.3.4.2.2 Movable Fiber End Locations 7
3.3.5 Fiber Requirements 8
3.3.5.1 Fiber Length 8
3.3.5.2 Wrapping Considerations 8
3.3.5.3 Loading and Unloading of Fiber in the Fiber Carrier 8
3.3.5.4 Terminations 9
3.3.5.5 Requirements for Mid-Span Processing 9
3.3.6 Primary Carrier Requirements 9
3.3.7 Stacking Guidelines 9
3.3.8 Storage and Covers 9

Appendix 10

Figures

Figure 3-1 The fiber carrier origin, frame of reference, and tooling holes. Note also the designation of the carrier edges. (dimensions are in mm [in]) 4
Figure 3-2 The carrier envelope. All components and fixtures attached to the carrier must be inside this space. (dimensions are in mm [in]) 5
Figure 3-3 Carrier fiducial mark. There may be one or more fiducials, located anywhere on the carrier. (dimensions are in mm [in]) 6
Figure 3-4 Carrier labeling zone. (dimensions are in mm [in]) 7
Figure 3-5 Fixed Fiber Location Zone (dimensions are in mm [in]) 8

Specification for Process Carriers Used to Handle Optical Fibers in Manufacturing

1 SCOPE

The purpose of the specification is to define standard practices for handling various kinds of optical fiber and to define the specifications and guidelines to be used in the design of carriers for these fibers in component manufacturing.

1.1 Objective of This Standard The objective of this standard is not to define a particular carrier design, but to define enough requirements and guidelines to facilitate the use of fiber carriers in fiber optic component manufacturing, particularly in automated or semiautomated processes. It is the expectation of the authors of this standard that, over time, a variety of carriers will be designed that meet this standard. The marketplace will determine the subset of these designs that best satisfies the needs of the industry. Additional requirements will also emerge. These factors will lead to a small number of industry standard carriers.

1.2 Specifications and Guidelines The fiber carrier requirements contained in this standard have a wide range of specificity. The authors were confronted with the challenge of creating a useful standard for optical fiber carriers when these carriers will be used in a wide range of processes and products where there are no standards. A primary goal of this standard is to facilitate the development of standard automated equipment for manufacturing processes where optical fiber is utilized. Thus, carrier requirements that bear directly on automation, such as the frame of reference, fiducial marks, tooling holes, and clearances, are specified rather precisely. On the other hand, requirements such as the carrier's construction, how it is loaded with fiber, how the fiber is protected and contained, and how the fiber ends are captured, are very product and process dependent. Therefore, they are not exactly specified. In these cases only guidelines, which should be considered when these carrier features are being designed, are given.

1.3 Processes In determining the handling and carrier requirements specified here, only the fiber optic component and module manufacturing processes were considered. Processes for fabricating the fiber, before component manufacturing, or for assembling the resulting component or module onto a printed circuit board (after component or module assembly and test) were not considered. The processes within the scope of this standard begin with the removal the fiber from its bulk spool, through component assembly and test, and ending with optoelectronics module assembly and test. Mounting of fiber optic components or modules on printed circuits boards, where fiber routing is required, was not considered as this is currently under consideration by another working group.

1.4 Manufacturing Process Carriers The carrier features specified here are for fiber carriers only. It is recognized that in component manufacturing, the fiber is one of several piece parts used. Often these other piece parts will have their own carriers. Also, there may be carriers used to hold the final assembly of which the fiber is part. This standard provides specifications and guidelines for fiber carriers. It also provides specifications and guidelines for features on other carriers that will facilitate the use of these other carriers with the fiber carrier. Features for piece part carriers or product carriers, unrelated to the fiber or its carrier, are not considered or specified.

1.5 Additional Process Requirements The requirements defined in this standard are not intended to meet the needs of all possible fiber optic component assembly processes. There are processes that have additional requirements beyond those given in the standard. For example, the requirements for temperature or chemical resistance given in this standard may be inadequate for certain processes. In these cases, it is expected that fiber carriers will be developed that meet the requirements given in this standard in most areas, but exceed them in others, to make that particular carrier design useful for these more specialized requirements. The working group recognized that burdening all carrier designs with the requirements for all possible processes would result in designs that are too expensive for many applications. The requirements picked here are those that the working group felt would meet most process needs.

1.6 Optical Fibers The specifications and guidelines in this standard are applicable to handling and carriers for the optical fibers with the following characteristics.

- Proof tested to >0.7 G Pa [100k psi]
- Primary buffer coat diameter >240 µm [0.009449 in]
- Overall jacket diameter <1.00 mm [0.03937 in]

2 APPLICABLE DOCUMENTS

The following documents are referred to in this standard.

2.1 IPC-0040 – Optoelectronic Assembly and Packaging Technology This is an overview standard, describing the state of the art and the technologies used in optoelectronic manufacturing.