ASSOCIATION CONNECTING
ELECTRONICS INDUSTRIES®

IPC-DR-572A

Drilling Guidelines for Printed Boards

Developed by the Drilling and Routing Subcommittee (4-12)
of the Fabrication Processes Committee (4-10) of IPC

Supersedes:
IPC-DR-572 - April 1988

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

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1 SCOPE

This document is intended to provide guidelines for generating good quality holes in printed circuit boards (PCBs) made from a wide variety of materials.

2 APPLICABLE DOCUMENTS

2.1 IPC[1]

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

IPC-DR-570 General Specification for 1/8 Inch Diameter Shank Carbide Drills for Printed Boards

IPC-PE-740 Troubleshooting for Printed Board Manufacture and Assembly

IPC-6012 Qualification and Performance Specification for Rigid Printed Boards

IPC-6013 Qualification and Performance Specification for Flexible Printed Boards

IPC-TM-650 Test Methods Manual[2]

2.1.1 Microsectioning

2.4.24 Glass Transition Temperature and Z-Axis Thermal Expansion by TMA

2.4.25 Glass Transition Temperature and Cure Factor by DSC

3 TERMS AND DEFINITIONS

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

3.1 Aspect Ratio for Stack Drilling

$$\text{Aspect Ratio} = \frac{\text{Stack Height}}{\text{Drill Bit Diameter}}$$

3.2 Backup Material A sheet of material placed on the exit side of a stack to terminate the drilling stroke and to prevent the formation of exit burr.

3.3 Bird Nesting A condition that occurs when drilling debris wraps and remains around a drill bit.

3.4 Burr A defect characterized by a ridge left on the copper of a drilled interface. It may occur at the entry or exit surfaces of a drilled hole. It may be localized or generalized over the entire drilled surface.

3.5 Chip Load The depth or distance through a stack that a drill bit travels for each revolution it turns. Chip load is typically measured in mils or inches per revolution (IPR), or micrometer per revolution (µm/rev).

$$\text{Chip Load (IPR)} = \frac{\text{Feed Rate (IPM)}}{\text{Spindle Speed (RPM)}}$$

$$\text{Chip Load (µm/rev)} = \frac{\text{Feed Rate (m/min)} \times 10^6}{\text{Spindle Speed (RPM)}}$$

3.6 Connector Array A series of holes related to one connector.

3.7 Cutting Speed The distance a point on the circumference of the drill bit travels over a period of time. Typically, it is expressed as ''V'' and measured in surface feet per minute (SFPM or SFM) or meters per min (m/min).

$$\text{Cutting Speed (SFM)} = \text{Spindle Speed (RPM)} \times \pi \times \frac{\text{Diameter (in)}}{12}$$

$$\text{Cutting Speed (m/min)} = \text{Spindle Speed (RPM)} \times \pi \times \frac{\text{Diameter (mm)}}{1000}$$

3.8 Debris Usually called drilling debris. Chips and residue left from the drilling operation.

3.9 Debris Packing Debris deposited tightly in holes, cavities, and tool flutes.

3.10 Drill Bit Wander The deviation of an exit location from the entry location.

3.11 Drill Construction The composition/construction of a drill bit commonly used for drilling printed circuit boards. The types of composition/construction are described as one of the following: Solid Carbide, Composite, Carbide flute with steel shank, Carbide-to-Carbide, Staked construction or Brazed construction.

3.12 Drilled Hole Size (DHS) The diameter of a hole prior to plating.

3.13 Dwell Time The period of time between a downward and upward motion of a drilling stroke, or the delay prior to a downward stroke allowing the table to stabilize after positioning.

1. www.ipc.org
2. Current and revised IPC Test Methods are available on the IPC Web site (www.ipc.org/html/testmethods.htm)