3.1.6 Dielectric Removal (cont.)

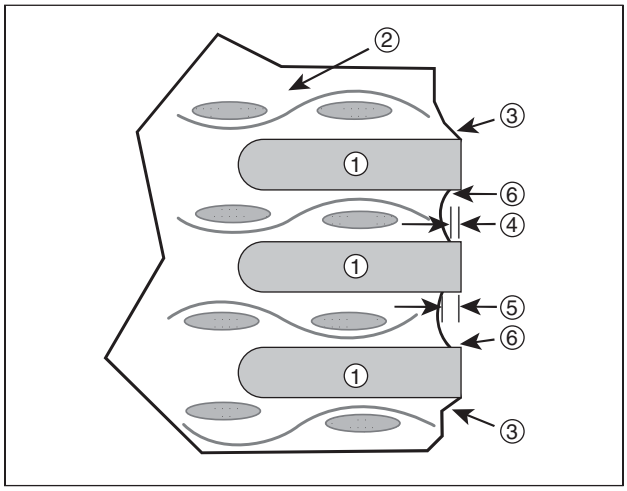

Figure 316b Measurement for Etchback

Note 1: Internal conductor.
Note 2: Dielectric (resin and/or glass fiber).
Note 3: Shadowing is permitted on one side of each land.
Note 4: Positive etchback measurement (minimum).
Note 5: Positive etchback measurement (maximum).
Note 6: The etchback **shall** be effective on at least the top or bottom surface of each internal conductor.

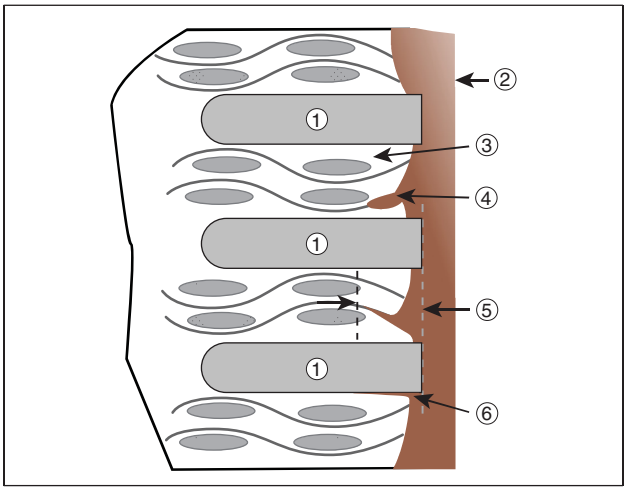

Figure 316c Measurement for Dielectric Removal

Note 1: Internal conductor.
Note 2: Copper plating.
Note 3: Dielectric (resin and/or glass fiber.
Note 4: Example of drill gouge or random ''tear outs.''
Note 5: Dielectric removal: Combined wicking allowance plus etchback or smear removal allowance (maximum) is measured from the drilled edge of the foil.
Note 6: Dielectric removal along the inner layer foil combined with copper penetration resulting from combined allowances for wicking plus etchback or smear removal allowance (maximum) as measured from the drilled edge of the foil.

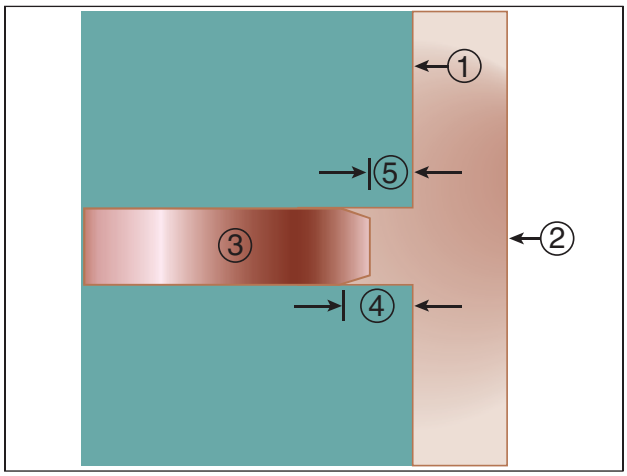

Figure 316d Measurement for Negative Etchback

Note 1: Drilled hole wall.
Note 2: Copper plating.
Note 3: Internal land.
Note 4: Distance ''Z'' depicts the least amount (20-30% of the total thickness) of etched internal copper foil.
Note 5: Distance ''X'' depicts the most prevalent amount (70-80% of the total thickness) of etched internal copper foil.

Visual observations made on cross-sections only.

3.1.6.1 Etchback

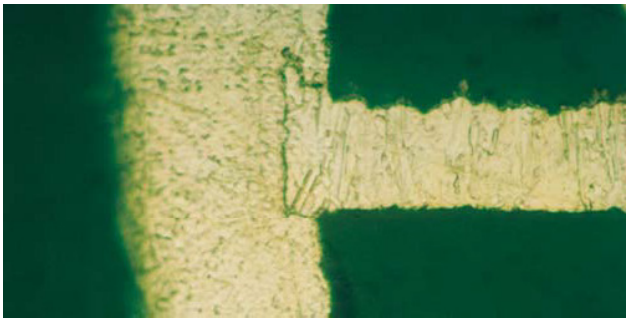

Figure 3161a

Target Condition – Class 1, 2, 3

- Uniform etchback to a preferred depth of 13 µm [512 µin].

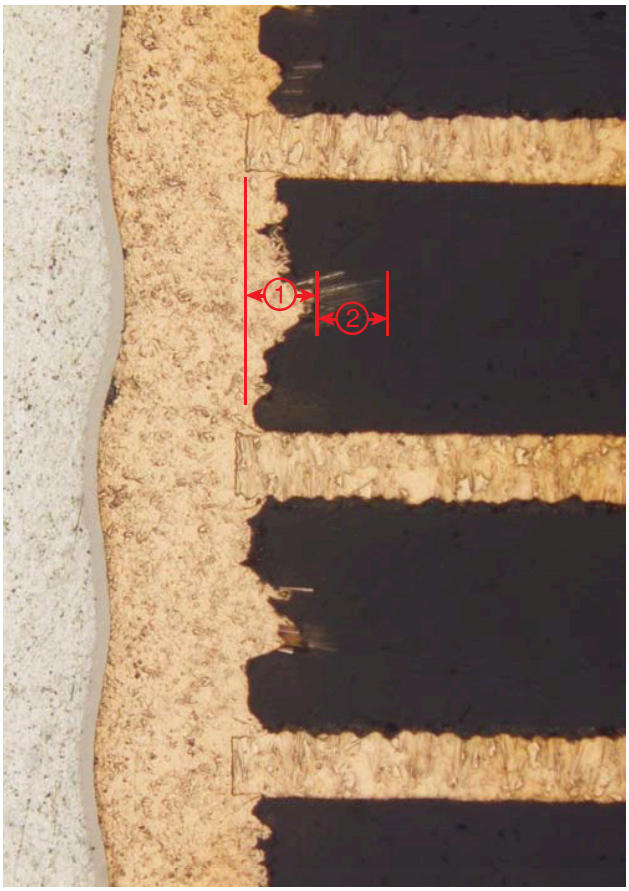

Figure 3161b
Note 1: Etchback measurement.
Note 2: Wicking measurement.

Acceptable – Class 1, 2, 3

- Etchback between 5 µm [197 µin] and 80 µm [3,150 µin].
- The combination of dielectric removal from etchback plus wicking allowance (wicking and random tears or drill gouges resulting from hole formation and/or hole cleaning) does not exceed the sum of the maximum allowable etchback removal and the maximum allowable wicking limits of 3.3.4. In no case can the individual maximum conditions of wicking or etchback be exceeded.
- Shadowing is permitted on one side only of each land.

Visual observations made on cross-sections only.

3.1.6.1 Etchback (cont.)

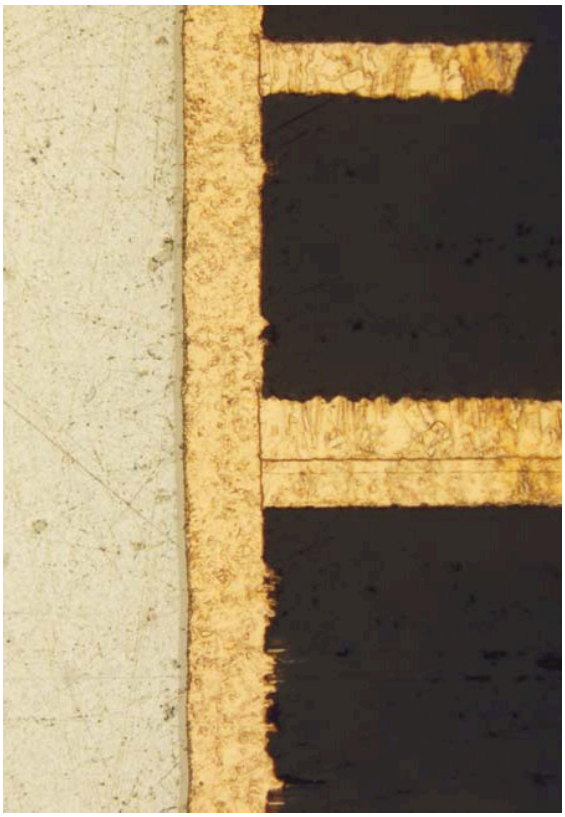

Figure 3161c

Figure 3161d

Nonconforming – Class 1, 2, 3

- Observed conditions either do not meet or exceed above criteria.

Visual observations made on cross-sections only.

3.1.6.2 Smear Removal

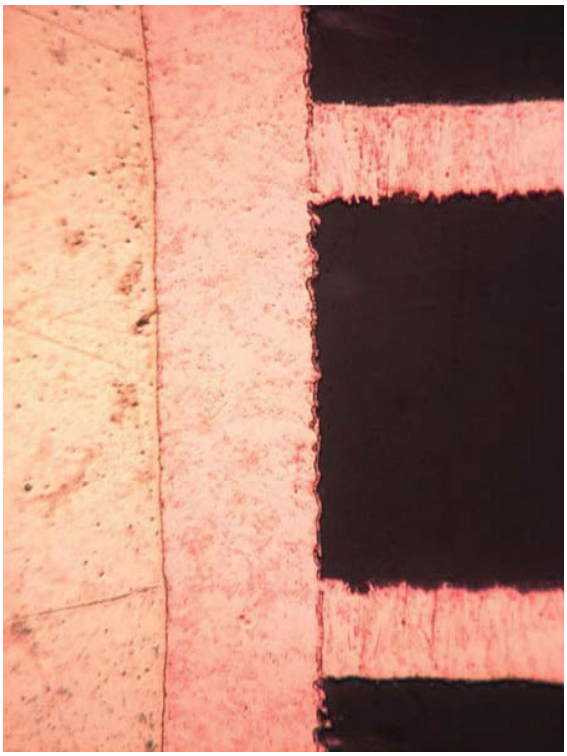

Figure 3162a

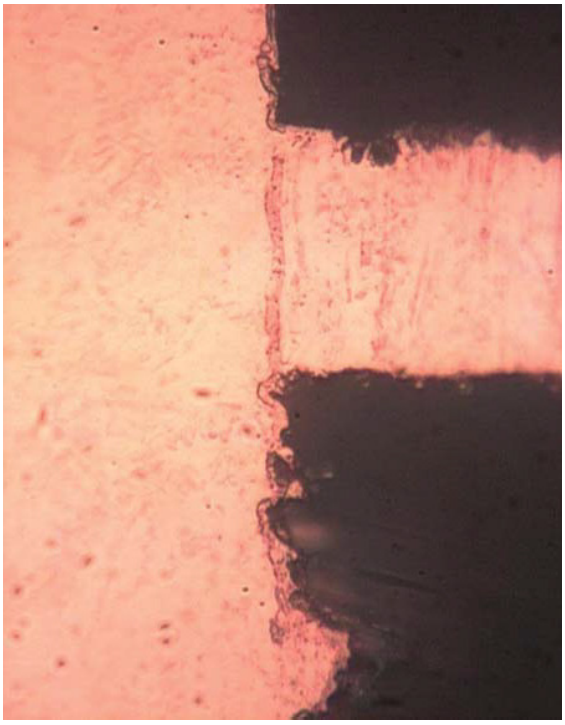

Figure 3162b

Acceptable – Class 1, 2, 3

- Smear removal has not been etched back greater than 25 µm [984 µin].
- The combination of smear removal, drill gouges, random tears and hole formation do not exceed the sum of the maximum allowable smear removal and the maximum allowable wicking limits of 3.3.4.
- Smear removal sufficiently meets the acceptability criteria for inner-layer plating separation (3.3.6).

Visual observations made on cross-sections only.

3.1.6.2 Smear Removal (cont.)

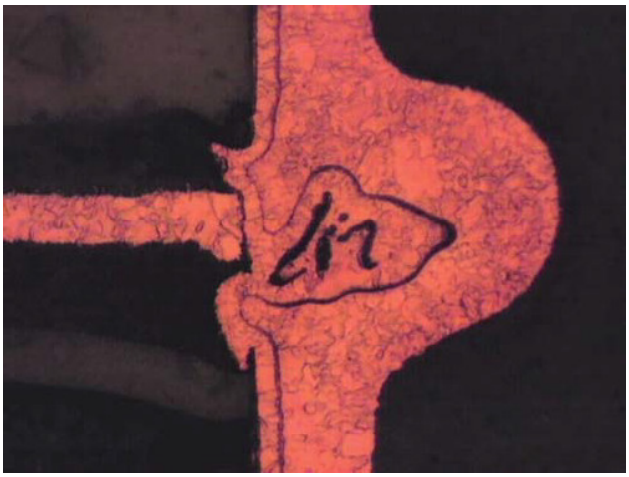

Figure 3162c

Figure 3162d

Nonconforming – Class 1, 2, 3

- Observed conditions either do not meet or exceed above criteria.

Visual observations made on cross-sections only.

3.1.6.3 Negative Etchback

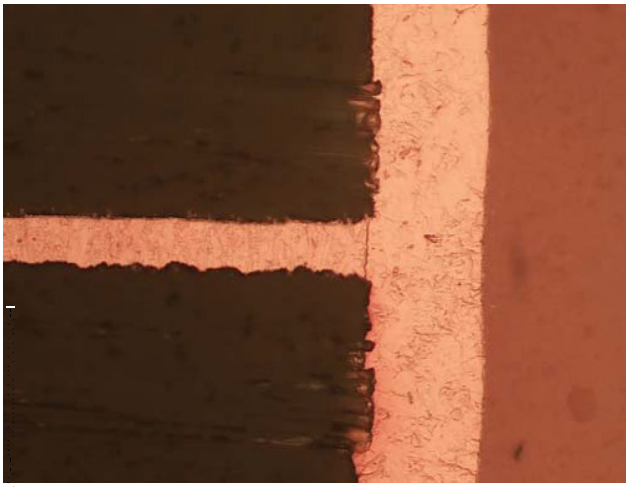

Figure 3163a

Target Condition – Class 1, 2, 3

- Uniform negative etchback of copper foil not exceeding 2.5 µm [98.4 µin].

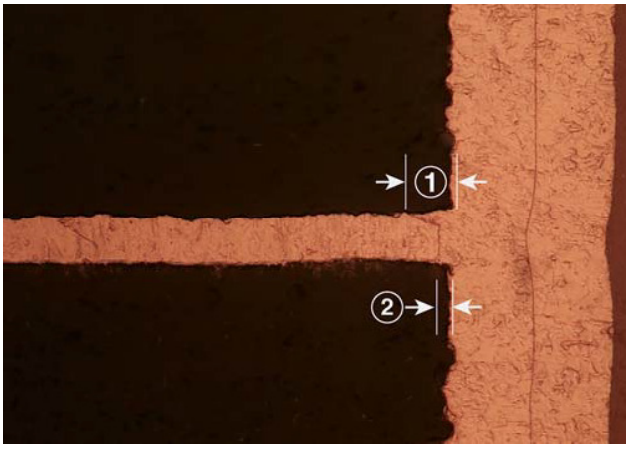

Figure 3163b
Note 1: Distance ''Z''
Note 2: Distance "X"

Acceptable – Class 3

- Negative etchback less than 13 µm [512 µin] for distance ''X.''
- Negative etchback less than 19.5 µm [768 µin] for distance ''Z.''

Acceptable – Class 1, 2

- Negative etchback less than 25 µm [984 µin] for distance ''X.''
- Negative etchback less than 37.5 µm [1,476 µin] for distance ''Z.''

Visual observations made on cross-sections only.

3.1.6.3 Negative Etchback (cont.)

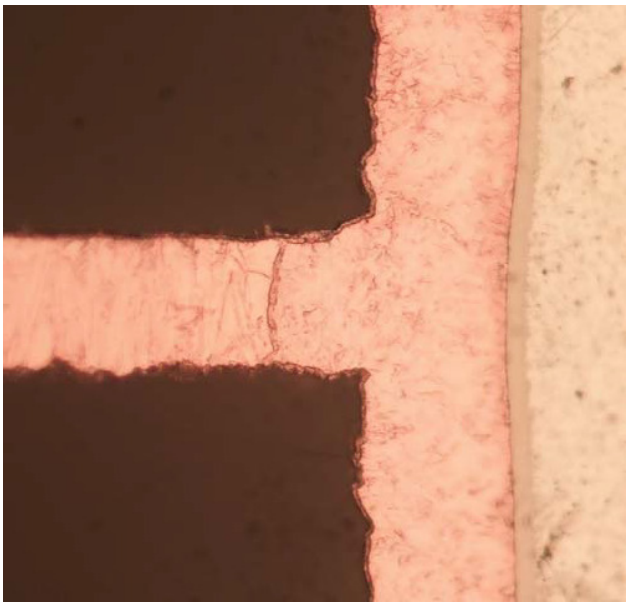

Figure 3163c

Nonconforming – Class 1, 2, 3

- Observed conditions either do not meet or exceed above criteria.

Visual observations made on cross-sections only.

3.1.7 Layer-to-Layer Spacing

Minimum dielectric thickness is the maximum material condition used for the electrical voltage dielectric strength requirements.

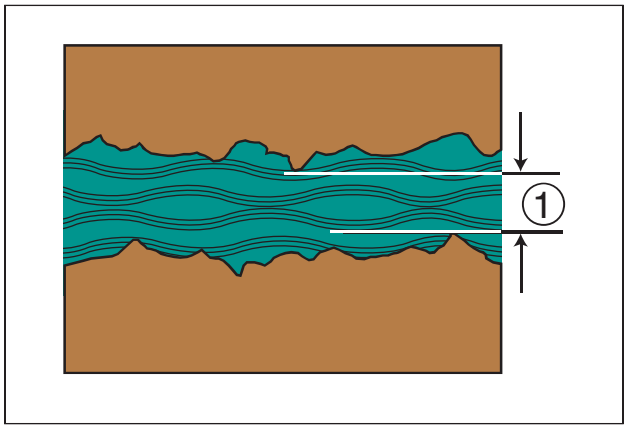

Figure 317a Measurement of Minimum Dielectric Spacing
Note 1: Minimum Dielectric Spacing

Target Condition – Class 1, 2, 3

- The minimum dielectric thickness meets the requirements of the procurement documentation.

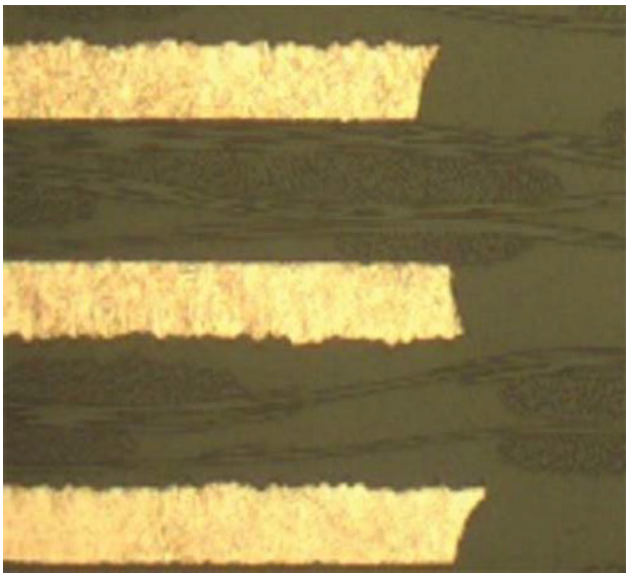

Figure 317b

Visual observations made on cross-sections only.

3.1.7 Layer-to-Layer Spacing (cont.)

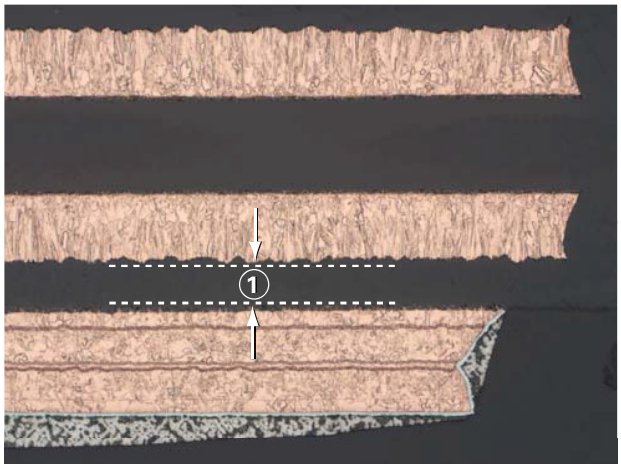

Figure 317c
Note 1: Minimum Dielectric Spacing

Acceptable – Class 1, 2, 3

- The minimum dielectric thickness meets the minimum requirements of the procurement documentation.
- When the minimum dielectric spacing and/or the number of reinforcing layers are not specified, the dielectric spacing is ≥ 0.09 mm [0.0035 in] and the number of reinforcing layers are selected by the supplier. For nominal spacings < 0.09 mm [0.0035 in], see Notes 2 and 3 below.
- Low profile copper foils should be used with dielectrics below 0.09 mm [0.0035 in].

Nonconforming – Class 1, 2, 3

- Observed conditions either do not meet or exceed above criteria.

Notes:

1: Products designed for transmission line impedance applications may have special requirements and measurement method specified on procurement documentation.
2: When the nominal dielectric thickness on the drawing is less than 90 µm [3,543 µin], the minimum dielectric spacing is 25 µm [984 µin] and the number of reinforcing layers may be selected by the supplier.
3: Core layers of 25 µm [984 µin] nominal or less dielectric spacing are excluded from the above requirement.

Visual observations made on cross-sections only.

3.1.8 Resin Recession

Resin Recession: A separation between the plated barrel of the hole and the dielectric material on the hole wall.

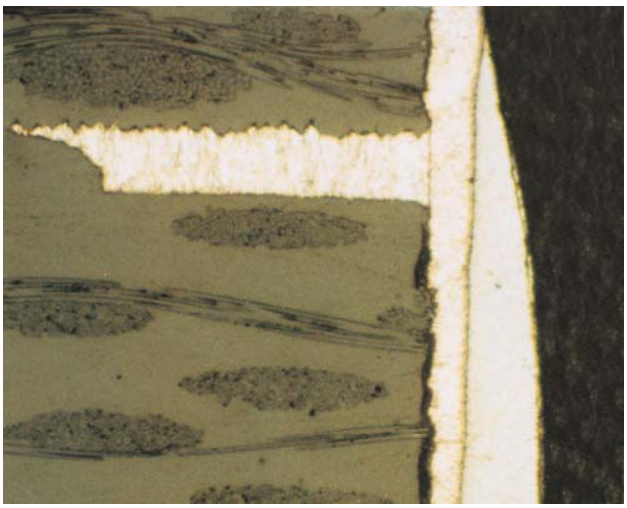

Figure 318a

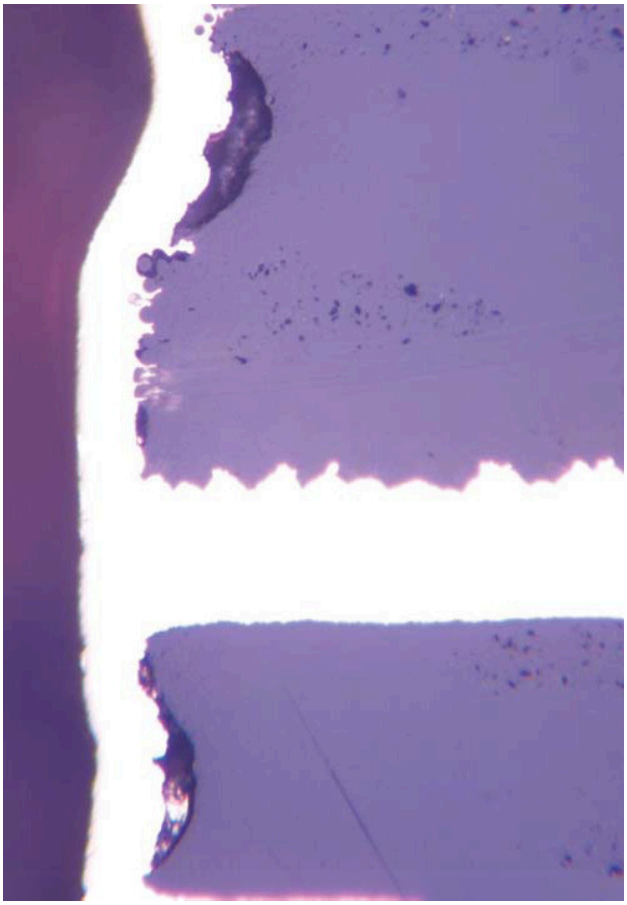

Figure 318b

Acceptable – Class 1, 2, 3

- Resin recession is acceptable following thermal stress testing.

Visual observations made on cross-sections only.

3.1.9 Hole Wall Dielectric/Plated Barrel Separation (Hole Wall Pullaway)

Figure 319a

Acceptable – Class 1, 2, 3

- Dimensional and plating requirements of IPC-6010 performance series are met.

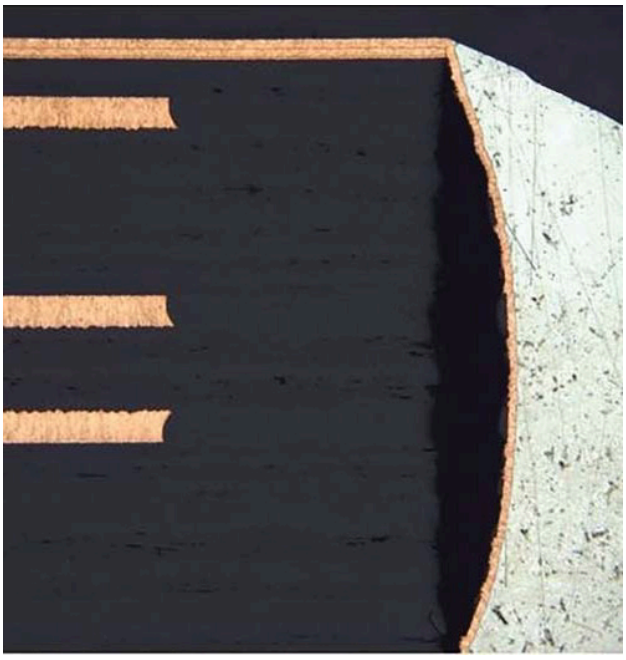

Figure 319b

Nonconforming – Class 1, 2, 3

- Observed conditions either do not meet or exceed above criteria.

Visual observations made on cross-sections only.