



IPC-TM-650 TEST METHODS MANUAL

1.0 Scope This method is designed to determine dimensional conformance to specification of production-cut panels of laminate or prepreg for length, width, and perpendicularity.

2.0 Applicable Documents

IPC-PC-90

3.0 Test Specimens

3.1 Size Production cut panels in the dimensions intended for shipment shall be used.

3.2 Sampling Sampling rates shall be in accordance with the applicable specification. (Also see 6.1.)

4.0 Apparatus or Material Unless otherwise specified, precision of measurement apparatus shall be in accordance with the applicable specification.

4.1 Vernier calipers capable of measuring up to 914 ± 6.4 mm [36.0 ± 0.25 in] or equivalent.

4.2 Tape measure capable of measuring up to 1829 mm [72.0 in]

4.3 Carpenters square, or equivalent

4.4 Pin gauges, dial indicators or equivalent

5.0 Procedure

5.1 Length Measure the length of the edges of the panel that are parallel to the grain direction using a vernier caliper.

5.2 Width Measure the length of the edges of the panel that are perpendicular to the grain direction using a vernier caliper.

5.3 Perpendicularity

5.3.1 Method A: by diagonals

5.3.1.1 Measure the diagonals of the panel using vernier caliper or tape measure.

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5.3.1.2 Calculate perpendicularity as follows:

$$D = D1 - D2 \text{ (Maximum allowable difference in diagonals)}$$

Where:

$$D1 = \sqrt{(L + T)^2 + W^2}$$

$$D2 = \sqrt{(L - T)^2 + W^2}$$

L = Nominal length of panel [ins]

W = Nominal width of panel [ins]

Tii = Tolerance in inches per inch for perpendicularity shown in the procurement document.

T = Tii x W (Tolerance in inches)

5.3.1.3 Calculate the actual difference in the diagonals from the measurements taken.

5.3.1.4 Compare the actual difference to the allowable maximum.

5.3.2 Method B: By carpenters square ("Right Angle" Square)

5.3.2.1 Place the panel in the carpenters square, contacting the square by at least two corners.

5.3.2.2 Using suitable means (see 4.4) measure the distance of the panel's corner that does not contact the square.

5.3.2.3 Calculate the perpendicularity by dividing the distance by the length of the longest dimension of the panel.

5.4 Evaluation Compare the measurements with dimensional requirements of the applicable specification. Record the number of panels that do not comply. Record the number of noncomplying panels for each dimension—length, width, and perpendicularity.

5.5 Report the number of panels, specifying which dimension, that do not comply with the applicable specification.

6.0 Notes

6.1 Sampling may also be determined by IPC-PC-90 on materials produced by continuous processing.