



IPC-TM-650 TEST METHODS MANUAL

1.0 Scope This test method is designed to measure the Resin Flow Percent by weight in prepreg.

2.0 Applicable Documents None

3.0 Test Specimens

3.1 Size and Configuration A specimen shall consist of multiple plies of prepreg cut 102 ± 0.25 mm [4.0 ± 0.010 in] by 102 ± 0.25 mm [4.0 ± 0.010 in]. If the reinforcement is a continuous fiber woven fabric, the sides shall be cut on a bias to the fabric weave. Unless otherwise specified, the test specimen shall have four plies. (Note: an alternative specimen configuration commonly used is a stack that weighs approximately 20 g.)

3.2 Quantity and Sampling Unless otherwise specified, the number of specimens tested shall be as follows: for qualification testing, 3 specimens shall be tested with the pieces for each specimen taken from areas of the prepreg that represents the center and both sides of the material as impregnated. For lot testing, one specimen shall be tested, with the pieces randomly taken. Pieces shall be taken no closer to the selvage (or cut edge) than a distance equal to one-tenth of the width of the roll.

4.0 Apparatus or Material

4.1 Laminating Press Unless otherwise specified, laminating press capable of maintaining a temperature of $171 \pm 3^\circ\text{C}$ [$340 \pm 5^\circ\text{F}$] and capable of providing a pressure of 1380 ± 70 kPa [200 ± 10 psi] on the test specimen (see 6.1).

4.2 Analytical Balance Analytical balance capable of weighing to the nearest 0.001 gram.

4.3 Plates Caul plates approximately 3.2 mm [0.125 in] thick and at least 152 mm x 152 mm [6.0 in x 6.0 in], but no larger than the press platen size, and made from type 304 steel, or equivalent.

4.4 Circle Punch A punch or die set capable of cutting a circle 81.1 mm [3.192 in] in diameter.

4.5 Desiccator Desiccation chamber capable of maintain-

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ing an atmosphere of less than 30% R.H. at 23°C [73°F].

4.6 Release Material The release material shall be Tedlar, Type MR, (polyvinyl fluoride, PVF) or equivalent, cut at least as large as the caul plates.

5.0 Procedure

5.1 Specimen Preparation

5.1.1 The prepreg shall be cut to conform with the specimen size and configuration, see 3.1.

5.1.2 For referee purposes only, specimens shall be desiccated for a minimum of 4 hours.

5.2 Measurement

5.2.1 Determine the weight of each specimen to the nearest 0.005 gram. Record this as the original weight, or W_o .

5.2.2 Stack the plies of prepreg for one specimen with the grain of the cloth aligned in the same direction and place between two pieces of release film. Place this package between two caul plates that are at room temperature.

5.2.3 Place specimen and caul plates in a preheated laminating press maintained at the specified temperature and immediately apply pressure such that the specified pressure is achieved within 5 seconds after press closure. Unless otherwise specified, the temperature shall be $171 \pm 3^\circ\text{C}$ [$340 \pm 5^\circ\text{F}$] and the pressure shall be 200 ± 10 psi [1380 ± 70 kPa].

5.2.4 Maintain the specified pressure for $10 + 6, - 0$ minutes.

5.2.5 Open press, remove specimen, and allow to cool to room temperature.

5.2.6 If applicable, post cure the test specimen in accordance with the manufacturer's post cure method (in order to prevent specimen damage by cutting).

5.2.7 Using the punch and die set, remove a circular disc measuring 81.1 mm [3.192 in] in diameter from the center of the specimen.

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5.2.8 Weigh the circular specimen on the analytical balance to the nearest 0.005 gram. Record this as the disc weight, or W_D .

5.3 Calculation The resin flow is calculated as follows:

$$\text{Resin Flow, Percent} = \left(\frac{W_O - 2 W_D}{W_O} \right) \times 100$$

W_O = Original weight of the specimen

W_D = Disc weight of the specimen (cut from the specimen after pressing)

5.4 Report The resin flow, percent, for each specimen tested and the average of all specimens tested shall be reported.

6.0 Notes None

6.1 Other resins may require different temperature settings to achieve flow. Pressure may also be dependent on the resin chemistry. Agreement of temperature and pressure by supplier and user other than as specified should be included in the report, see 5.4.

6.2 Desiccator Conditions The Test Methods Task Group determined that a great majority of test laboratories are unable to consistently hold the Relative Humidity in a desiccator to less than 20%. Based on data from participating company lab management, the lowest practically feasible RH for use with the affected IPC Test Methods is 30% maximum.