

SEMI G75.1-0698 (Reapproved 0706)

TEST METHOD FOR MEASUREMENT OF IONIC IMPURITIES IN LEADFRAME TAPE

This standard was technically approved by the global Assembly & Packaging Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on May 16, 2006. It was available at www.semi.org in June 2006 and on CD-ROM in July 2006. Originally published June 1998.

1 Summary of Method

- 1.1 Ionic impurities are extracted from sample tape by water at 100°C or 121°C and quantitatively analyzed by ion chromatography and flame photometry or atomic absorption spectrometry. The pH and electrical conductivity of the extracted solutions are also measured.
- 1.2 If sample tape needs the cure before the extraction, vender should inform the customer of the necessity of curing and report the impurity data after cure.
- 1.3 Ion chromatography is used to determine the presence and concentration of the following ionic species: Na^+ , NH_4^+ , K^+ , NO_3^- , Cl^- , Br^- , SO_4^{2-} , PO_4^{3-} .
- 1.4 Flame photometry or atomic absorption spectrometry is used to determine the concentration of Na^+ and K^+ ions.
- 1.5 pH and conductivity measurements are also described.

2 Referenced Standards and Documents

2.1 SEMI Standards

SEMI G29 — Test Method for Trace Contaminants in Molding Compounds

SEMI G59 — Test Method for Measurement of Ionic Contamination on Leadframe Interleafing and the Contamination Transferred from the Interleafing to the Leadframes

2.2 ASTM Standards¹

ASTM D 1125 — Standard Test Methods for Electrical Conductivity and Resistivity of Water

ASTM D 1193 — Standard Specification for Reagent Water

ASTM D 4327 — Standard Test Method for Anions in Water by Ion Chromatography

ASTM E 70 — Standard Test Method for pH of Aqueous Solutions with the Glass Electrode

2.3 JIS Specifications²

JIS K 0121 — General Rules for Atomic Absorption Spectrochemical Analyses

JIS Z 8802 — Method for Determination of pH of Aqueous Solutions

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

3 Interferences

- 3.1 All the sample preparations and measurements must be carried out in clean containers which have been washed in deionized water in order to reduce any spurious readings.
- 3.2 Electrodes and syringes must be similarly cleaned before each test.
- 3.3 Contamination from the sampling process may also affect the results.

4 Equipment

- 4.1 Ion Extraction Vessels-Parr bomb with Teflon liner.
- 4.2 Ion chromatograph for anion and cation analysis (see SEMI G59).
- 4.3 Flame photometer or atomic absorption spectrometer.
- 4.4 Standard solution preparation vessels, balance and volumetric dispensers (see SEMI G29 and SEMI G59).

¹ American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428-2959, USA. Telephone: 610.832.9585, Fax: 610.832.9555; Website: www.astm.org

² Japanese Standards Association, 1-24, Akasaka 4 Chome, Minato-ku, Tokyo, Japan

4.5 pH meter.

4.6 Microconductivity cell and meter.

5 Reagents and Materials

5.1 Deionized water, conductivity of less than $1.0 \mu\text{S/cm}$ at 25°C per ASTM D 1193.

5.2 Eluents and regenerants for specific chromatograph columns prepared per chromatograph equipment manufacturer's recommendations so that the water peak can be separated from the ionic peaks.

5.3 *Compounds for Standard Solutions*

5.3.1 *Cations* — NaCl, NH_4Cl , KCl

5.3.2 *Anions* — NaCl, $\text{Na}_2\text{HPO}_4 \cdot 12\text{H}_2\text{O}$, NaBr, NaNO_3 , K_2SO_4

NOTE 1: All compounds to be reagent grade.

5.4 pH standard solutions.

6 Sampling

6.1 Personnel handling the tape must wear double-layered cotton gloves and polyethylene outer gloves in order to avoid additional sample contamination.

6.2 The sampling is one sample per one lot. The vendor must report the definition of lot, if customer requires it.

7 Preparation of Standard Solution and Equipment Calibration

7.1 *Preparation of Standard Solutions and Chromatograph Calibration*

7.1.1 Refer to SEMI G59, § 9 and ASTM D 4327.

7.2 *Preparation of Standard Solutions and Flame Photometer or Atomic Absorption Spectrometer Calibration*

7.2.1 Refer to SEMI G29 and JIS K 0121.

7.3 *Preparation of Standard Solutions and pH Meter Calibration*

7.3.1 Refer to ASTM E 70 or JIS Z 8802.

7.3.2 Using the standard pH solutions, calibrate the pH meter according to the manufacturer's instructions.

7.4 *Preparation of Standard Solutions and Conductivity Cell Calibration*

7.4.1 Refer to ASTM D 1125.

8 Measurement

8.1 *Procedure for Impurity Extraction*

8.1.1 Remove the protective film from the sample of tape. Cure the tape per tape manufacturer's recommendation, if necessary.

8.1.2 Cut the sample of tape so that it becomes smaller than $2 \times 2 \text{ cm}$.

8.1.3 Place 5 ± 0.1 grams of the tape sample into the Parr bomb, and add 50 ± 0.5 grams of deionized water.

8.1.3.1 In a second bomb, add deionized water only so that a blank solution may be obtained for measurement of the ionic contributed by the bomb.

NOTE 2: It may be necessary to perform the blank test on both bombs in order to leach out excessive extractable ionic species.

8.1.4 Seal the caps and heat the bombs in an oven set at $100 \pm 2^\circ\text{C}$, for 20 ± 0.25 hours.

NOTE 3: The oven temperature may be set at $121 \pm 2^\circ\text{C}$ for 20 hours, if specified.

8.1.5 Allow the bombs to reach room temperature.

8.1.6 Open the bombs just before the measurements are to be made. Measurements must be made within eight hours of the completion of the sample preparation.

8.2 *Quantitative Analysis by Ion Chromatography*

8.2.1 Prepare the chromatograph for operation by regenerating the columns according to the manufacturer's recommendations.

8.2.2 Run the eluent through the chromatograph until a stable baseline calibration is established.

8.2.3 Inject the recommended sample size of test solution into the chromatograph and record the ion chromatogram.