



Designation: F 1374 – 92 (Reapproved 1999)

Standard Test Method for Ionic/Organic Extractables of Internal Surfaces-IC/GC/FTIR for Gas Distribution System Components¹

This standard is issued under the fixed designation F 1374; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

Semiconductor clean rooms are serviced by high-purity gas distribution systems. This test method presents a procedure that may be applied for the evaluation of one or more components considered for use in such systems.

1. Scope

1.1 This test method establishes a procedure for testing components used in ultra-high-purity gas distribution systems for ionic and organic surface residues.

1.2 This test method applies to in-line components containing electronics grade materials in the gaseous form.

1.3 Limitations:

1.3.1 This test method is limited by the sensitivity of the detection instruments and by the available levels of purity in extracting solvents. While the ion and gas chromatographic methods are quantitative, the Fourier transform infrared spectroscopy (FTIR) method can be used as either a qualitative or a quantitative tool. In addition, the gas chromatography (GC) and FTIR methods are used to detect hydrocarbons and halogenated substances that remain as residues on component internal surfaces. This eliminates those materials with high vapor pressures, which are analyzed per the total hydrocarbons test, from this test method.

1.3.2 This test method is intended for use by operators who understand the use of the apparatus at a level equivalent to twelve months of experience.

1.4 The values stated in SI units are to be regarded as the standards. The inch-pound units given in parentheses are for information only.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* Specific hazard statements are given in Section 6.

2. Referenced Documents

2.1 ASTM Standards:

E 1151 Practice for Ion Chromatography Terms and Relationships²

2.2 Union Carbide Standard:

Techniques for Measuring Trace Gas Impurities in High Purity Gases³

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *spool piece*—a null component, consisting of a straight piece of electropolished tubing and appropriate fittings, used in place of the test component to establish the baseline.

3.1.2 *standard conditions*—101.3 kPa, 0.0°C (14.73 psia, 32.0°F).

3.1.3 *test component*—any device being tested, such as a valve, regulator, or filter.

3.1.4 *test fluid blank*—a volume of test solvent adequate for analysis.

3.1.4.1 *Discussion*—This is used to determine the background impurity concentrations in the test fluid. This fluid is drawn at the same time as the fluid that is used to fill the spool piece and test component. It must be held in a container that does not contaminate the fluid blank.

3.2 Abbreviations: Abbreviations:

3.2.1 *FTIR*—Fourier transform infrared spectroscopy.

3.2.2 *GC*—gas chromatography.

3.2.3 *IC*—ion chromatography.

3.2.4 *IPA*—isopropanol (2-propanol).

3.2.5 *MS*—mass spectrometry.

3.2.6 *ppbv*—parts per billion by volume (such as nL/L).

¹ This test method is under the jurisdiction of ASTM Committee F-1 on Electronics and is the direct responsibility of Subcommittee F01.10 on Processing Environments.

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² *Annual Book of ASTM Standards*, Vol 14.02.

³ Available from Linde Division Union Carbide, 175 E. Park Drive, Tonawanda, NY 14151.

