Designation: F 798 – 97 (Reapproved 2002)

Standard Practice for Determining Gettering Rate, Sorption Capacity, and Gas Content of Nonevaporable Getters in the Molecular Flow Region [1]

This standard is issued under the fixed designation F 798; 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.

1. Scope

1.1 This practice describes techniques for determining gettering rates, sorption capacity, and gas content of nonevaporable getters in the molecular flow region.

1.2 Procedures for activating getters and for determining gas evolution rates are also given.

1.3 The various tests described are mostly destructive in nature. In general, the tests are semiquantitative, but they can be expected to yield comparative information on a single laboratory basis. Multilaboratory reproducibility can be established only with round-robin testing. Single laboratory precision is ±15 % for gettering rate and sorption capacity. Multilaboratory reproducibility is estimated at ±50 %. Gas content measurements may have a substantially greater error due to the uncertainty of the temperature.

1.4 Adverse getter-device interactions such as contamination and poisoning can occur. Such problems are beyond the scope of this practice. The user and seller should establish criteria for controlling problems such as chemical reactions, loose particles, getter location, etc.

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 4.

2. Referenced Documents

2.1 *ASTM Standards:*

E 296 Practice for Ionization Gage Application to Space Simulators [2]

E 297 Test Method for Calibrating Ionization Vacuum Gage Tubes [3]

2.2 *American Vacuum Society Standards:*

Recommended Practice 2.3 Procedure for Calibrating Gas Analyzers of the Mass Spectrometer Type [4]

Recommended Practices 6.2, 6.4, and 6.5 Procedures for Calibrating Pressure Gages and Their Controls [4]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *nonevaporable getters*—materials not requiring evaporation, that are used to remove gases present after device exhaust. The gases may be generated during vacuum device processing or operation, or both.

3.1.2 *surface getter*—a getter where the surface is strictly dominant and the gettering rate and sorption capacity per unit area are essentially independent of the thickness at operating pressure and temperature.

3.1.3 *volume getter*—a getter where the gettering rate or sorption capacity per unit mass, or both is dependent on the thickness at operating pressure and temperature.

3.1.4 *activation*—the conditioning by thermal treatment of a getter to develop its gettering characteristics.

3.1.5 *reactivation*—any conditioning by thermal treatment of the getter subsequent to activation which at least partially restores its gettering characteristics.

3.2 *gas content*, GC, of a getter can be classified as:

3.2.1 *total gas content*, TGC—*of a getter*, the sum total of the gases in or on the getter, chemically or physically bound or in solution.

3.2.2 *total hydrogen content*, THC—*of a getter*, the total quantity of hydrogen in solution.

3.2.3 *hydrogen gas content*, HGC—the quantity of hydrogen evolved when a getter is heated from room temperature to its activation temperature.

3.3 *reactivation gas content*—the quantity of gas evolved from a getter on reactivation.

[1] This practice is under the jurisdiction of ASTM Committee F01 on Electronics and is the direct responsibility of Subcommittee F01.03 on Metallic Materials.

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[2] *Annual Book of ASTM Standards*, Vol 15.03.

[3] Discontinued. See 1983 *Annual Book of ASTM Standards*, Vol 15.03.

[4] Available from the American Vacuum Society, 120 Wall St., 32nd Fl., New York, NY 10005.

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