Designation: F 111 – 96 (Reapproved 2002)

Standard Practice for Determining Barium Yield, Getter Gas Content, and Getter Sorption Capacity for Barium Flash Getters[1]

This standard is issued under the fixed designation F 111; 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 the determination of evaporated barium yield, getter gas content, and getter carbon monoxide sorption capacity for barium flash getters used in electron devices. Test conditions are chosen to approximate use conditions.

1.2 Auxiliary procedures for cleaning, for determining vacuum system leak-up rates, for flashing getters, and for determining barium content in both getter fill and films are also given.

1.3 The various tests described are destructive in nature. In general the tests are semiquantitative but they can be expected to yield comparative information on a single-laboratory basis to the precision indicated. No information relative to multilaboratory reproducibility is available.

1.4 *List of Methods Described*:

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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 whoever uses this standard to consult and 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:*

D 1193 Specification for Reagent Water[2]

3. Terminology

3.1 *Definitions of Terms Specific to this Standard:*

3.1.1 *barium flash getters*—used to remove residual gases present after exhaust or generated during device operation by sorption with a barium film produced by heating the getter.

3.1.2 *barium yield, M*—the weight of barium in milligrams evaporated when a getter is flashed. Flash conditions are specified in terms of start time and total time.

3.1.2.1 *start time,* t_s—the interval in seconds between the application of heating power and the onset of barium evaporation. This value depends on the power applied.

3.1.2.2 *total time,* t_t—the full interval in seconds during which heating power is applied to the getter.

3.1.3 *carbon monoxide sorption capacity, C*—the quantity of CO sorbed at room temperature (25°C) measured in millitorr-litres until the terminal gettering rate is reached.

3.1.4 *conductance, F*—of a system for a given gas or vapor is the ratio of throughput of gas, Q, to the partial pressure difference across the system, $P_2 - P_1$, in the steady state. It is measured in liters per second, and given by $F = Q/(P_2 - P_1)$ where P_2 is the upstream pressure, and P_1 is the downstream pressure.

3.1.5 *flashing*—the evaporation of barium, contained within a getter, as a consequence of induction or resistance heating of the getter.

3.1.6 *Gas Content*:

3.1.6.1 *preflash gas content, PGC*—the quantity of gas in millitorr-litres reported as nitrogen equivalent evolved at flashing after it has been degassed at 350°C for 15 min under kinetic vacuum conditions.

3.1.6.2 *total gas content, TGC*—of a getter is the quantity of gas in millitorr-litres reported as nitrogen equivalent evolved at flashing when a getter is heated from room temperature.

[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 11.01.

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