SEMI E29-93 (Reapproved 0710)
STANDARD TERMINOLOGY FOR THE CALIBRATION OF MASS FLOW CONTROLLERS AND MASS FLOW METERS

This standard was technically approved by the global Gases Committee. This edition was approved for publication by the global Audits & Reviews Subcommittee on April 30, 2010. Initially available at www.semi.org in June 2010. Originally published in 1993; previously published November 2004.

1 Purpose

1.1 This standard defines terms commonly used in the calibration of mass flow controllers (MFC) and mass flow meters (MFM). It is intended to provide for worldwide terminology to be used by manufacturers and users.

2 Scope

2.1 This standard defines terminology related to MFC/MFM calibration. At present, there are often several words used by the semiconductor industry to describe the same concept or device. This standard is intended to eliminate confusion and provide for a common language which users and manufacturers can employ to discuss MFC/MFM calibration.

NOTICE: This standard does not purport to address safety issues, if any, associated with its use. It is the responsibility of the users of this standard to establish appropriate safety and health practices and determine the applicability of regulatory or other limitations prior to use.

3 Limitations

3.1 This standard attempts to provide basic definitions. In some instances, it may be impossible to provide definitions which thoroughly explain a concept. It is suggested, in such instances, that the user consult other sources or SEMI Standards related to this topic.

4 Referenced Standards and Documents

4.1 *SEMI Standards*

SEMI E12 — Standard for Standard Pressure and Standard Temperature for Flow Units Used in Mass Flow Meters and Mass Flow Controllers

SEMI E18 — Guideline for Temperature Specifications of the Mass Flow Controller

SEMI E28 — Guideline for Pressure Specifications of the Mass Flow Controller

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

5 Definitions

5.1 *attitude* — for mass flow controllers and mass flow meters, the relationship between the base mounting plane of the MFC, the gas flow direction and the gravity vector. It may be stated as horizontal (base down), vertical (inlet up), vertical (inlet down), horizontal (upside down), or horizontal (either side down).

5.2 *calibration gas* — for mass flow controllers and mass flow meters, the gas which is flowed while the device is being calibrated.

5.3 *calibration temperature* — for mass flow controllers and mass flow meters, the ambient temperature at which the device is calibrated. [SEMI E18]

5.4 *mass flow controller (MFC)* — a self-contained device, consisting of a mass flow transducer, control valve, and control and signal-processing electronics, commonly used in the semiconductor industry to measure and regulate the mass flow of gas.

5.5 *mass flow meter (MFM)* — a self-contained device, consisting of a mass flow transducer and signal-processing electronics, commonly used in the semiconductor industry to measure the mass flow of gas.

5.6 *molar flow* — the number of moles per unit of time flowing in a closed channel.

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5.7 *nameplate gas* — for mass flow controllers and mass flow meters, the gas, as labeled on the product, intended to be controlled or measured.

5.8 *primary flow standard* — a device or system which measures flow using a method based on some or all of the primary measurements of length, time, temperature, volume, pressure, or mass.

5.9 *process gas* — for mass flow controllers and mass flow meters, the principal gas which the user requires the device to control or measure.

5.10 *standard pressure* — the pressure in pascals specified as a reference for measurement and comparison. It is defined for use in the semiconductor industry as 101.32 kilo pascals (760 torr).

5.11 *standard temperature* — the temperature, in degrees Celsius, specified as a reference for measurement and comparison. It is defined for use in semiconductor industry as 0.0°C.

5.12 *standard volumetric flow* — for mass flow controllers and mass flow meters, the calculated volumetric flow, at standard temperature and pressure, of gas in a closed fluid channel. Volume at standard temperature and pressure assumes the ideal gas law, PV = nRT. Units of standard volumetric flow are commonly used to express mass flow in mass flow controllers and mass flow meters.

5.13 *surrogate gas* — for mass flow controllers and mass flow meters, a gas intended to simulate the calibration characteristics of another gas.

5.14 *transfer standard* — for mass flow controllers and mass flow meters, a device typically calibrated against a primary standard which can guarantee sufficient accuracy to, in turn, calibrate another device.

5.15 *warm-up time* — for mass flow controllers and mass flow meters, the time required, after going from an unpowered to a powered state, for the device to achieve sufficient electrical and thermal stability such that rated performance specifications can be met.

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