

SEMI S11-1296 (Withdrawn 1106)

ENVIRONMENTAL, SAFETY, AND HEALTH GUIDELINES FOR SEMICONDUCTOR MANUFACTURING EQUIPMENT MINIENVIRONMENTS

This safety guideline was technically approved by the global Environmental, Health, & Safety Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on August 24, 2006. It was available at www.semi.org in October 2006 and on CD-ROM in November 2006. Originally published in 1996.

NOTICE: This document was balloted and approved for withdrawal in 2006.

1 Purpose

- 1.1 These guidelines are intended as a minimum set of performance-based environmental, health, and safety considerations for minienvironments used in semiconductor manufacturing.
- 1.2 These guidelines are intended to be a supplement to SEMI S2 (see § 3.1).

2 Scope

- 2.1 These guidelines apply to minienvironments used in the manufacturing, metrology, assembly, and testing of semiconductor products.
- 2.2 Equipment enclosed by, or used in conjunction with, the minienvironments is addressed separately by SEMI S2 (see § 3.1). Examples are process tools and exhaust emissions abatement devices.
- 2.3 For “integrated minienvironments,” only the minienvironment enclosure portion is addressed by these guidelines.

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

3 Referenced Standards and Documents

3.1 SEMI Documents

SEMI S2 — Safety Guidelines for Semiconductor Manufacturing Equipment

SEMI S8 — Safety Guidelines for Ergonomics/Human Factors Engineering of Semiconductor Manufacturing Equipment

3.2 NFPA Documents¹

NFPA 255 — Standard Method of Test of Surface Burning Characteristics of Building Materials

NFPA 318 — Standard for the Protection of Cleanrooms

3.3 Other Documents

ACGIH — Industrial Ventilation - A Manual of Recommended Practice²

UL 181 — Standard for Safety Factory-Made Air Ducts and Air Connectors³

4 Terminology

- 4.1 *closed loop air supply* — a system in which air is recirculated from the minienvironment and returned to the minienvironment with minimal make-up air.
- 4.2 *emergency off (EMO)* — control circuit which when activated, places the equipment into a safe shut down condition.
- 4.3 *integrated minienvironment* — the minienvironment that is an integral part of the tool.

1 National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269-9101

2 American Conference of Governmental Industrial Hygienists, 6500 Glenway, Building D-7, Cincinnati, OH 45211-4438

3 Underwriters Laboratories Inc., 33 Pfingsten Road, Northbrook, IL 60062

4.4 *minienvironment* — a localized environment created by an enclosure to isolate the product from contamination and people.

4.5 *minienvironment end user* — the facility which uses a minienvironment for semiconductor fabrication.

4.6 *minienvironment supplier* — the party that builds, sells, or otherwise provides minienvironment enclosures.

4.7 *tool supplier* — the party that builds, sells, or otherwise provides the tools that are used together with the minienvironments.

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

5 General Requirements

5.1 *Safety and Health Design Requirements* — Minienvironment manufacturers should consider site-specific design requirements but must not compromise compliance with applicable regulatory requirements. The requirements covered in these guidelines are not all-inclusive. The minienvironment supplier should employ any additional applicable regulatory and industry standards that govern associated components. It is the minienvironment supplier's responsibility to work with the user and tool supplier to understand the local codes and variances.

5.2 Environmental Design Requirements

5.2.1 In order to assess the environmental impact of minienvironments, the minienvironment supplier should provide a listing of materials of construction showing the compatibility with chemical and process materials typically used in the given minienvironment. In the case of "non-typical" chemical and process chemicals, the minienvironment supplier and minienvironment end-user will evaluate the particular materials involved to ensure compatibility. "Nonprocess" chemical wastes (i.e., wastes not in contact with the product such as oil filters, pump oils, etc.) that are generated by routine preventative maintenance should be included.

5.3 Materials of construction should be in conformance with SEMI S2, Section 19.

6 Enclosure Interlocks

6.1 Not all enclosure panels, doors, and hatches require interlocks. There may be cases where the customer requires ports for manual access for product load/unload or tool adjustment without process tool interrupt. The need for interlocks should be assessed. If the overall level of safety is not compromised, interlocks need not be provided.

6.2 Interlocks are required when the minienvironment replaces an interlocked door or panel on the process tool or where the minienvironment provides the primary barrier to operator exposure to chemical, electrical, mechanical, thermal, radiation or other recognized hazards.

7 Chemical and Physical Hazards

7.1 The addition of the minienvironment and its associated components should not compromise equipment safety and health considerations required for conformance with SEMI S2.

7.2 *Shut-off Valves* — Manual shut-off valves for hazardous materials should be clearly visible, labeled, and easily accessible. Access to these valves should not be restricted by any part of the minienvironment.

8 Noise

8.1 The addition of a minienvironment system should not cause the noise level to exceed conformance with SEMI S2, § 9 (see § 3.1).

9 Ventilation & Exhaust

9.1 Recirculating air ducts, connectors, and ventilation components within the minienvironment, should be constructed of noncombustible material of Class 0 or Class 1 materials as tested in accordance with UL 181, Standard for Safety Factory-Made Air Ducts and Air Connectors.

9.2 Recirculating air duct materials should be compatible with chemical processes used in the given minienvironment; the minienvironment supplier should provide a listing of materials of construction showing the compatibility with chemical and process materials typically used in the given minienvironment. In the case of "non-typical" chemical and process materials, the minienvironment supplier and minienvironment end-user will evaluate the particular materials involved to ensure compatibility.

9.3 Exhaust should not be altered in any fashion to accommodate a process where flammable liquids are used or flammable vapors present. Dampers, where required for balancing or control of the exhaust system, should be of the locking type.