

SEMI S16-0600

ENVIRONMENTAL, HEALTH AND SAFETY GUIDELINES FOR SEMICONDUCTOR MANUFACTURING EQUIPMENT DISPOSAL

These guidelines were technically approved by the Global Environmental, Health and Safety Committee and are the direct responsibility of the Japanese Environmental, Health and Safety Committee. Current edition approved by the Japanese Regional Standards Committee on April 28, 2000. Initially available on www.semi.org June 2000; to be published June 2000.

1 Purpose

1.1 This document provides guidelines to minimize hazards to workers and impacts to the environment during equipment and component disposal.

2 Scope

2.1 These guidelines apply to the disposal of semiconductor manufacturing equipment, its materials and components and equipment design consideration to facilitate disposal.

2.2 These guidelines are intended to be voluntary best practices for this industry. These guidelines apply to disposal parties, equipment designers, equipment manufacturers, equipment suppliers and equipment owners. The information should be provided to the disposal party by the equipment owner prior to contract negotiations.

2.3 These safety guidelines do not purport to address all of the safety issues associated with its use. It is the responsibility of the users of these guidelines to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

3 Limitation

3.1 These guidelines are not intended to supersede the applicable codes and regulations of the region where the equipment is disposed.

3.2 Section 6 in these guidelines should be applied not to existing models and subsystems but to newly designed models and subsystems after publication of these guidelines.

4 Referenced Standards

4.1 SEMI Standards

SEMI S1 — Safety Guidelines for Visual Hazard Alerts

SEMI S2 — Environmental, Health, and Safety Guideline for Semiconductor Manufacturing Equipment

SEMI S10 — Safety Guideline for Risk Assessment

SEMI S12 — Environment, Health and Safety Guidelines for Equipment Decontamination

SEMI S13 — Safety Guidelines for Operation and Maintenance Manuals Used with Semiconductor Manufacturing Equipment

4.2 ISO Documents¹

ISO11469 — Plastics; Generic Identification and Marking of Plastic Products

ISO14001 — 1996 Environment Management Systems, Specifications with Guideline for Use

4.3 CEN² / CENELEC³ Document

EN1050 — Safety of Machinery—Principles for Risk Assessment

4.4 OSHA Document⁴

29 CFR 1910.1200 — Labor

NOTE 1: As listed or revised, all documents cited shall be the latest publications of adopted standards.

5 Terminology

5.1 Terminology defined in SEMI S1, S2, S12, and S13 should be referred to except if otherwise specified below.

5.1.1 *decontaminate* — to remove all known hazards from equipment, including chemical, physical, electrical, to a level that will not pose a threat or harm to humans or the environment. This level may be set by each country, state and local regulations or industry practice.

5.1.2 *decontamination* — the process required to remove hazards to an acceptable level of risk (see Section 5.1).

1 International Standards Organization, 1, rue de Varembe, Case postale 56, CH-1211 Geneve 20, Switzerland.

2 European Committee for Standardization, 36, rue de Stassart, B-1050 Brussels, Belgium

3 European Committee for Electrotechnical Standardization, Rue de Stassart, 35, B-1050 Brussels, Belgium

4 US Government Printing Office, Washington, D.C. 20402

5.1.3 *disposal* — to dispose of equipment and/or component/material based on legislation or industry/regional standard practices.

5.1.4 *disposal party* — a party who disposes of equipment and its components.

5.1.5 *EMAS* — Eco-Management and Audit Scheme which came into force in July, 1993 and operational in the EU Member States in April, 1995.

5.1.6 *equipment owner* — a party who surrenders equipment to a disposal party or disposals of potentially contaminated materials or components.

5.1.7 *hazardous energy* — energy with the potential to affect human health or the environment.

5.1.8 *hazardous material* — materials including chemicals (solid, liquid or gas) that pose a threat to the environment or human health as defined by international, each country and local regulations.

5.1.9 *Material Safety Data Sheet (MSDS)* — written or printed material concerning chemical elements and compounds, including hazardous materials, prepared in accordance with applicable standards such as the International Labor Convention (ILC) No. 170, provisions of USA government regulation 29 CFR 1910.1200, or Canadian WHMIS (Workplace Hazardous Material Information System).

6 Equipment Design for Disposal

6.1 The equipment design should comply with environment section of SEMI S2.

6.2 The equipment design should consider the following regarding disassembly prior to waste treatment:

6.2.1 The equipment design should encourage refurbishing, reuse or recycling.

6.2.1.1 The equipment design should enable disassembly down to the component or subassembly size to facilitate refurbishing or recycling.

6.2.1.2 The equipment design should provide for the ability to appropriately decontaminate all components.

6.2.2 The equipment design should consider enabling all hazardous energies in/on the equipment to be reduced to a non-hazardous level upon equipment disassembly. If a hazardous energy still remains, see Section 7 of this document.

6.2.2.1 This includes the ability to release or remove any trapped materials.

6.2.3 The equipment design should avoid mixing of incompatible chemicals upon equipment disassembly.

If this is not feasible, an appropriate hazard alert label based on SEMI S1 should be affixed at each applicable position (see Section 7 of this document).

6.2.4 The equipment design should prevent release of hazardous materials to the environment upon equipment disassembly. If this is not feasible, see Section 7 of this document.

6.3 Chemicals used to maintain the equipment or chemicals used in the baseline process should comply with following sub-sections.

6.3.1 Materials for which special disposal procedures are required, such as batteries (lithium, ni-cad, mercury and silver), mercury and fluorescent lamps, and other potentially hazardous material should be accompanied by material safety data sheet (MSDS) or other document describing necessary information for disposal and instructions for safe handling and disposal.

6.3.2 Additional information on proper disposal of materials, designed into the equipment with the intent of being contaminated but disposable, but not hazardous themselves until contaminated, such as absorbents and adsorbents, should also be provided with disposal procedures which minimize environmental impact and personnel effect.

6.3.3 Equipment containing ionizing radiation sources subject to licensing by federal or local agencies should be constructed so as to allow the easy removal of ionizing radiation sources. Disposal of ionizing radiation sources must be in compliance with applicable each country, state and local regulations.

6.4 Construction materials and components of equipment should be selected by considering their environmental impacts based on the supplier's environment management program. Environment management programs should be constructed based on ISO14001, EMAS or other environment management system.

6.5 The hazardous and primary construction materials of equipment should be provided in document such as operation and/or maintenance manuals based on the supplier's environment management program.

6.5.1 Recycling category identification should be molded as part of the material or labeled on the material. This requirement should only be applied to non-metallic materials which are capable of being molded or labeled.

6.5.2 Identification and marking of plastics should comply with ISO11469 unless local regulations differ. This requirement should be applied to only materials which are able to be molded or labeled.