

SEMI S13-0305

ENVIRONMENTAL, HEALTH AND SAFETY GUIDELINE FOR DOCUMENTS PROVIDED TO THE EQUIPMENT USER FOR USE WITH SEMICONDUCTOR MANUFACTURING EQUIPMENT

This safety guideline was technically approved by the Global Environmental Health & Safety Committee and is the direct responsibility of the Japanese Environmental Health & Safety Committee. Current edition approved by the Japanese Regional Standards Committee on November 24, 2004. Initially available at www.semi.org in January 2005; to be published in March 2005. Originally published in February 1998.

NOTICE: This document was rewritten in its entirety in 2005.

1 Purpose

1.1 This guideline presents considerations for environmental, health and safety information in documents (such as operation, maintenance, installation and safety manuals) provided for use with semiconductor or Flat Panel Display (FPD) manufacturing equipment in order to help risk reduction in operation, maintenance, and installation of equipment used in semiconductor or FPD manufacturing.

1.2 It is intended that personnel who operate, maintain, service, install, decontaminate or decommission equipment should read the documents provided to the equipment user that describe the tasks they are to perform.

2 Scope

2.1 This guideline applies to the documents provided to the equipment user to be used with equipment for production, measurement, assembling, and testing of semiconductor or FPD products.

2.2 This guideline contains the following items:

- Purpose
- Scope
- Limitations
- Referenced Standards
- Terminology
- General Criteria of Documents Provided to the Equipment User
- Hazards Inherent in Equipment
- Hazardous Energy Control Procedures
- Hazard Alerts
- Hazards Inherent in Tasks
- Material Safety Data Sheet (MSDS)
- Personal Protective Equipment (PPE)
- Equipment Inspection, Consumables, and Maintenance
- Training Requirements
- Emergency Contact and Response
- Related Documents
- Appendix 1: Document Criteria to be added to SEMI S2

NOTE 1: This document contains several Related Information sections that restate documentation criteria that appear in other SEMI documents. These restatements were current as of the dates that the Related Information sections were written and are included for the convenience of the users of this document. As the other SEMI documents may be changed at any time, the users of this document must refer to the other SEMI documents for the official versions of these criteria.

NOTE 2: This document contains several Related Information sections that include proposed subject-specific documentation criteria developed by the SEMI S13 Revision TF. It was the intent of the Task Force responsible for SEMI S13 that the criteria in these Related Information sections be incorporated in future revisions of the documents to which they pertain and that these Related Information sections be removed from SEMI S13 by revising SEMI S13 with the same effective date as the effective date of the addition of these criteria to the documents to which they pertain.

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 Limitations

3.1 Evaluation reports are not within the scope of SEMI S13.

3.2 SEMI S13 does not address physical characteristics of documents.

4 Referenced Standards

4.1 SEMI Standards

SEMI S1 — Safety Guideline for Equipment Safety Labels

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

SEMI S6 — Safety Guideline for Ventilation

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

SEMI S10 — Safety Guideline for Risk Assessment and Risk Evaluation Process

SEMI S12 — Guideline for Equipment Decontamination

SEMI S14 — Safety Guideline for Fire Risk Assessment and Mitigation for Semiconductor Manufacturing Equipment

SEMI S16 — Environmental, Health and Safety Guidelines for Semiconductor Manufacturing Equipment Disposal

4.2 ANSI Standard ¹

ANSI Z400.1 — American National Standard for Hazardous Industrial Chemicals - Material Safety Data Sheets - Preparation

4.3 Other Standards

International Labor Convention No. 170² — Convention Concerning Safety in the Use of Chemicals at Work

EN1050³ — Safety of Machinery — Principles for risk assessment

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

1 American National Standards Institute, Headquarters: 1819 L Street, NW, Washington, DC 20036, USA. Telephone: 202.293.8020; Fax: 202.293.9287, New York Office: 11 West 42nd Street, New York, NY 10036, USA. Telephone: 212.642.4900; Fax: 212.398.0023, www.ansi.org

2 International Labour Organization, 4, route des Morillons CH-1211 Geneva 22 Switzerland, Tel: +41.22.799.6111, Fax: +41.22.798.8685, <http://www.ilo.org/>

3 European Committee for Standardization(CEN) 36 rue de Stassart, B - 1050 Brussels, Tel: + 32 2 550 08 11, Fax: + 32 2 550 08 19, <http://www.cenorm.be/cenorm/index.htm>; European Committee for Electrical Standardization(CENELEC), 35, Rue de Stassartstraat, B-1050 Brussels, Belgium, Phone: +32 2 519 68 71, Fax: +32 2 519 69 19, <http://www.cenelec.org/Cenelec/Homepage.htm>

5 Terminology

NOTE 3: Terminology defined in SEMI S1, SEMI S2, SEMI S6, SEMI S8, SEMI S10, SEMI S12, SEMI S14 and SEMI S16 is incorporated herein by reference.

5.1 Definitions

5.1.1 *consumable parts* — parts which are recognized by the equipment supplier as having a useful lifetime which is expected to be significantly less than the lifetime of the equipment.

NOTE 4: Consumable parts include some parts that degrade gradually (such as o-rings) and some that degrade suddenly (such as drive belts).

5.1.2 *decommissioning* — the process of removing equipment from service for disposition by sale, storage, or disposal.

5.1.3 *documents provided to the equipment user* — documents provided by the equipment supplier, such as operation manual, maintenance manual, installation manual, safety manual, or OEM manual, which are intended for use with equipment.

NOTE 5: Additional safety features provided in the equipment according to the equipment user's requisition or request may be described separately. Documents concerning the additional safety features may be provided with the documents provided to the equipment user as a separate attachment.

5.1.4 *evaluation report* — a report describing the results of an evaluation to determine the conformance of equipment to a SEMI document.

5.1.5 *supporting device* — a device which is prepared to assist in the use of equipment.

5.1.6 *unjamming* — service task used to loosen automated material handler from entanglement.

6 General Criteria of Documents Provided to the Equipment User

6.1 The EHS information needed to perform a task should either be included in the document provided to the user that describes how to perform a task or be provided separately in another document. In latter case, the document provided to the user describing the task should identify where to find EHS information relevant to the task.

6.2 Documents provided to the equipment user should provide specific instructions to enable safe installation, operation, maintenance, decontamination and decommissioning of the equipment.

EXCEPTION: Any procedure that is to be performed only by the equipment supplier's personnel does not need to be described in the documentation provided to the equipment user.

NOTE 6: A service manual may be included in the documents provided by the equipment supplier based on the contract.

6.2.1 The documents provided to the equipment user should describe the hazards inherent in equipment, warn of the potential of exposure to hazards, and provide information as to how to minimize risk.

6.3 The equipment supplier should identify, within the documents provided to the equipment user, the intended audience for each equipment document supplied to the user.

6.4 The equipment supplier should provide, in the documents provided to the equipment user, at least the EHS information related to items in the following list. Other SEMI "S" series documents address these subjects for inclusion in documents provided to the equipment user.

- Safety interlocks
- Emergency shutdown
- Ergonomics
- Seismic performance
- Environmental performance
- Industrial Hygiene
- Fire Protection

- Decontamination and decommissioning

NOTE 7: Some documentation criteria regarding Safety interlock systems are given in Appendix 1 of this guideline at the time of publication.

6.5 Where contractually agreed upon, it is recommended that the documents provided to the equipment user should be provided in the primary languages of the location in which the equipment is to be used.

NOTE 8: Where required by law, the documents provided to the equipment user must be provided in the primary languages of the location in which the equipment is to be used.

6.6 Each document should identify the language(s) in which it was originally written.

6.7 Procedures needed to maintain the effectiveness of safety design features or devices should be described in the documents provided to the equipment user.

6.8 The documentation provided to the user may state that the user is responsible for analyzing and controlling the risks of work not described in the documentation.

6.9 The Equipment supplier should provide information in the documents provided to the equipment user about how to check if the documents are applicable for the particular model.

6.9.1 Each document provided to the equipment user (e.g., operations, maintenance, installation, drawings, sub-systems) should include at least a reference to a list of all documents that are necessary to compose a complete set of documents for the equipment model. Reference may be made to a website containing the list.

7 Hazards Inherent in Equipment

7.1 The hazards inherent in equipment identified as part of the SEMI S2 evaluation should be described in the documents provided to the equipment user.

7.2 The summary should include the location and the type of each hazard in a safety section of the documents provided to the equipment user.

7.3 The documents provided to the equipment user should include a list of hazardous materials (e.g., lubricants, cleaners, and coolants) required for maintenance, ancillary equipment or peripheral operations.

NOTE 9: See §11 for discussion of MSDSs.

7.4 Hazards related to by-products and effluents of supplier-characterized baseline processes should be described in the documents provided to the equipment user.

7.5 The documents provided to the equipment user should describe the safety measures in the equipment that mitigate risk in the event of fire, explosion or chemical leakage within the equipment or of earthquake.

8 Hazardous Energy Control Procedures

8.1 Any source of hazardous energy (such as electrical, chemical, thermal, mechanical, radiation, pneumatic or hydraulic energy) that exists in equipment and which may pose a risk to workers maintaining or servicing the equipment should be described in the documents provided to the equipment user along with the procedures for isolation (“lockout/tagout”) and control of each of the hazardous energies.

NOTE 10: The procedures must allow compliance with requirements at the locations of use. In the USA, the procedure must be consistent with 29 CFR1910.147.

9 Hazard Alerts

9.1 The equipment supplier should explain, in the documents provided to the equipment user, the meaning of hazard alerts. Examples of hazard alerts include: visual alerts, auditory alarms, safety labels, status indicators; or hazard alert systems integral with the equipment’s operating system (e.g., displayed through the video display).

9.2 Descriptions of the label locations and, if appropriate, additional safety information relating to the hazards they describe should also be provided.

9.3 Pictographs or symbols may be used to represent the hazard alerts in the document provided to the equipment user.

NOTE 11: Pictographs or symbols may also be adapted to help communicate safety information in installation instructions, operation and maintenance manuals, and other similar written communication relating to a product.

NOTE 12: If pictographs or symbols are used instead of text, then it is recommended that the documentation include explanations of the pictographs or symbols. This recommendation does not apply if the pictographs are used with text messages, as is the common practice in Hazard Alert Labels that conform to SEMI S1.

10 Hazards Inherent in Tasks

10.1 In the documents provided to the equipment user, hazards inherent in each task should be indicated using the signal words “Danger,” “Warning,” or “Caution”, as described in SEMI S1. The signal word and the explanation of the hazard should be highlighted in the documentation (e.g., by enlarged lettering or by being enclosed in a box). The equipment supplier should include the definitions of “Danger,” “Warning,” and “Caution” that are provided in SEMI S1 in the documents provided to the equipment user if those terms are used.

10.2 Specific instructions should be provided for routine Type 4 energized electrical work tasks (as defined in SEMI S2), excluding troubleshooting. General procedures for troubleshooting, including Type 4 work, should be provided.

NOTE 13: SEMI S2 provides guidance that suppliers should design the equipment to minimize the need to calibrate, modify, repair, test, adjust, or maintain equipment while it is energized, and to minimize work that must be performed on components near exposed energized circuits. SEMI S2 also states that the supplier should move as many tasks as practical from category Type 4 to Types 1, 2, or 3.

NOTE 14: NFPA70E describes the identification of the Flash Protection Boundary in the USA.

10.3 Specific instruction may be provided for the unjamming task.

NOTE 15: “Unjamming” (also called “jam clearing”) is considered to be a service task.

10.4 Each maintenance and service task should include a list of the materials required for the task.

11 Material Safety Data Sheet (MSDS)

11.1 The equipment supplier should provide MSDSs covering those chemical substances which are inherent in, or shipped with, the equipment.

11.2 For those chemical substances which are used for processing, maintenance, or service of equipment, but are not provided in or with the equipment, the documents provided to the equipment user should state that the user must obtain the MSDSs from their chemical suppliers, rather than from the equipment supplier. The user is responsible for obtaining process related MSDSs and should contact their suppliers to obtain them.

NOTE 16: The equipment user may request, from the equipment supplier, the list of chemicals prepared in accordance with the chemical section in SEMI S2.

NOTE 17: International Labor Convention No. 170 and ANSI Z400.1 call for MSDSs to describe:

- Product and company identification
- Composition
- Hazard identification
- First aid measures
- Fire fighting measures
- Accidental release measure
- Handling and storage
- Exposure controls / Personal protection
- Physical and chemical properties
- Stability and reactivity
- Toxicological information

- Ecological information
- Disposal considerations
- Transport information
- Regulatory information
- Other information

12 Personal Protective Equipment (PPE)

12.1 The documents provided to the equipment user should clarify which tasks require personal protective equipment and which kind of PPE (e.g., goggles, aprons, gloves, masks, safety shoes, helmets) is needed for each task.

12.2 The documents should identify the characteristics, such as being shatterproof or acid resistant, of the personal protective equipment to be used.

12.3 The equipment supplier should state in the documents provided to the equipment user that PPE should be used in accordance with the instructions provided by the PPE supplier, except where additional instructions by the equipment supplier are required.

13 Equipment Inspection, Consumables, and Maintenance

13.1 The documents provided to the equipment user should describe the recommended methods of periodic inspections including the frequency of each inspection.

13.1.1 Periodic inspections include periodic situations that have long intervals between procedures (e.g., changing memory batteries in computers, replacing UPS batteries, replacing sensor modules for detection systems).

13.2 The equipment supplier should provide a list of consumable parts and materials, with their replacement intervals, maintenance methods, and part/material number in the documents provided to the equipment user.

13.3 The equipment supplier should provide information on the specific tools necessary for inspections and maintenance in the documents provided to the equipment user.

14 Training Requirement

14.1 The equipment supplier should describe the training required for safe operations and maintenance in the documents provided to the equipment user.

14.2 Documents provided to the equipment user should define what level of training is considered, by the supplier, to be sufficient.

15 Emergency Contact and Response

15.1 The documents provided to the equipment user should include information on how to contact the equipment supplier in case of EHS issues related to the equipment.

15.2 The documents provided to the equipment user should include an explanation of how the user may keep the supplier notified of the appropriate user contact information for EHS related issues and notified of what supplier equipment models are in use at which user locations.

15.3 When supplier contact information changes for EHS issues or the supplier wishes to communicate regarding EHS issues, the supplier should notify equipment users through their most recently provided EHS contacts. Which contacts are notified may depend on which equipment models are of concern.