

SEMI S13-0298

SAFETY GUIDELINES FOR OPERATION AND MAINTENANCE MANUALS USED WITH SEMICONDUCTOR MANUFACTURING EQUIPMENT

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

1 Purpose

1.1 These guidelines present considerations when drafting operation and maintenance manuals in order to help hazard reduction in operation and maintenance of equipment used in semiconductor manufacturing. These guidelines supplement Section 18 of SEMI S2.

2 Scope

2.1 These guidelines apply to the operation and maintenance manuals used with equipment that is used for production, measurement, assembling, and testing of semiconductor products. These guidelines contain the following items:

- Purpose
- Scope
- Referenced Documents
- Terminology
- Concept of Operation and Maintenance Manuals
- Hazards Inherent in Equipment
- Hazardous Energy Control Procedures
- Hardware Safety Interlocks
- Hazard Alerts
- Hazard Inherent in Equipment
- Material Safety Data Sheet (MSDS)
- Personal Protective Equipment (PPE)
- Inspection of System Equipment and Maintenance of Consumables
- Training Requirements
- Place of Supplier's Contact in Case of Emergency
- Laws and Regulations
- Related Documents

3 Referenced Documents

NOTE: All documents cited shall be the latest publications of adopted standards and guidelines.

3.1 SEMI Documents

SEMI S2 — Safety Guidelines for Semiconductor Manufacturing Equipment

SEMI S10 — Safety Guideline for Risk Assessment

3.2 ANSI Documents¹

ANSI Z535.4 — American National Standard for Product Safety Signs and Labels

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

ANSI Guide for Developing User Product Information

3.3 Other Document²

International Labor Convention No. 170 — Convention Concerning Safety in the Use of Chemicals at Work

4 Terminology

4.1 *caution* — Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices (ANSI Z535.4).

4.2 *danger* — Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations (ANSI Z535.4).

4.3 *equipment* — The system equipment, its component parts, and auxiliary or peripheral equipment.

4.4 *warning* — Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury (ANSI Z535.4).

NOTE: Danger or Warning should not be considered for property damage accidents unless personal injury risk appropriate to these levels is also involved. Caution is permitted for property-damage-only accidents (ANSI Z535.4).

1 American National Standards Institute, 1430 Broadway, New York, NY 10018

2 International Labour Organization, CH-1211, Geneva 22, Switzerland

NOTE: Additional terminology is given in SEMI S2 and SEMI S10.

5 Concept of Operation and Maintenance Manuals

5.1 Operation and maintenance manuals should provide sufficient information on proper operation methods and appropriate maintenance methods to enable safe operation and maintenance. Warnings of potential hazards and how to avoid or minimize hazards should be provided.

5.2 Operation and maintenance manuals should conform to the *ANSI Guide for Developing User Product Information*, or an equivalent, to ensure that they have easy-to-read and understandable contents.

5.3 The operation and maintenance manuals should be designed so that the user can readily understand the risk associated with each task.

5.4 Where contractually agreed upon, by request of the user, or where required by law, the operation and maintenance manuals should be provided in the primary language of the location in which the equipment is to be used. However, the language in which the manuals were created should be identified.

5.5 Safety measures provided in the equipment according to the equipment user's requisition or request may be described separately. The additional safety features can be provided with the manuals as a separate attachment.

6 Hazards Inherent in Equipment

6.1 The equipment supplier should use the result of a risk assessment of the equipment, of which method is provided in SEMI S10, to determine the risk of hazards inherent in equipment.

6.2 Hazards in the equipment should be summarized in a safety section of the manuals, including their location and safety procedures recommended by the supplier. Such hazards may be located, for example, within a plasma etcher, at the RF unit, vacuum pump, gas supply and exhaust unit, or chiller.

7 Hazardous Energy Control Procedures

7.1 Any source of electrical, chemical, thermal, or mechanical energy, radiation and compressed air, or liquid energy that exists in equipment which may be hazardous to workers maintaining the equipment should be described in the maintenance manual, along with the procedures for isolation and control of the hazardous energies.

8 Hardware Safety Interlocks

8.1 The equipment supplier should describe the hardware safety interlocks provided for the equipment and their operation in a list or similar format in the operation and maintenance manuals. The interlock list should include, but not be limited to, hazards protected, detection methods, and equipment conditions after the interlocks are activated.

8.2 The locations of hardware safety interlocks protecting personnel should be clearly indicated using a layout sketch.

9 Hazard Alerts

9.1 The equipment supplier should explain in the operation and maintenance manuals the meaning of hazard alerts on the equipment. Examples of hazard alerts include: visual alerts, auditory alarms, status indicators; or hazard alert systems integral with the equipment's operating system (e.g., displayed through the video display).

9.2 The equipment supplier should describe the location of each hazard alert label attached to the equipment.

10 Hazards Inherent in Tasks

10.1 In operation and maintenance manuals, hazards inherent in each task should be indicated using the signal words "Danger," "Warning," or "Caution." The recommended safety procedures should be followed to avoid the hazard and resulting potential injury. The signal word and the explanations for such a hazard should be enhanced by, for instance, enlarging the letters or surrounding them with a box.

10.2 The equipment supplier should include the definitions of "Danger," "Warning," and "Caution" in the operation and maintenance manuals.

11 Material Safety Data Sheet (MSDS)

11.1 The equipment supplier should attach, to the operation and maintenance manuals of the subject system, a material safety data sheet (MSDS) covering those chemical substances which are inherent in, and shipped with, the equipment, including those to which operators or workers may be exposed during operation, maintenance, or inspection of said equipment. For those chemical substances which are used for processing, the manual should state that the user must obtain the MSDS from their chemical supplier.

11.2 Adopted by the International Labor Convention No. 170 and ANSI Z400.1, the MSDS calls for the following points to be described: