

SEMI S19-0223

SAFETY GUIDELINE FOR TRAINING OF MANUFACTURING EQUIPMENT INSTALLATION, MAINTENANCE, AND SERVICE PERSONNEL

This Safety Guideline was technically approved by the Environmental, Health & Safety Global Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on June 30, 2022. Available at www.semiviews.org and www.semi.org in February 2023; originally published November 2002; previously published August 2016.

NOTICE: This Document was completely rewritten in 2022.

NOTICE: Paragraphs entitled ‘NOTE:’ are not an official part of this Standard or Safety Guideline and are not intended to modify or supersede the official Standard or Safety Guideline. These have been supplied by the global technical committee to enhance the usage of the Standard or Safety Guideline.

1 Purpose

1.1 Provide guidance to the employer for environmental, health, and safety proficiencies.

NOTE 1: The ‘employer’ is determined by regulation or by contract.

1.2 Establish specific learning objectives which, when fulfilled, demonstrate a baseline level of environmental, health, and safety (EHS) proficiency.

1.3 Identify quality control, documentation, and record keeping criteria for the management of EHS training programs.

2 Scope

2.1 This Safety Guideline applies to the EHS training of personnel servicing, maintaining, or installing manufacturing equipment or otherwise providing equipment support.

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Limitations

3.1 This Safety Guideline is not intended to apply to trades used in the facility construction and remodeling, or to provision of building or facility services to equipment.

3.2 The safety guidance provided herein is not intended to represent an all-inclusive or exhaustive identification of the EHS training required for personnel within the scope of this Safety Guideline.

3.3 Depending on the hazards, additional training or certifications, specific to the task or the area hazards, may be required.

4 Referenced Standards and Documents

4.1 *ANSI® Standards*¹

ANSI/ASSE Z490.1 — Criteria for Accepted Practices in Safety, Health and Environmental Training

4.2 *US Code of Federal Regulations*²

29 CFR Part 1910.147 — The Control of Hazardous Energy (Lockout/Tagout)

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

¹ American National Standards Institute, 25 West 43rd Street, New York, NY 10036, USA; Telephone: +1.212.642.4900, Fax: +1.212.398.0023, <http://www.ansi.org>. ANSI trademark is owned by American National Standards Institute.

² Occupational Safety and Health Administration, Available from U.S. Department of Labor; <http://www.osha.gov>

5 Terminology

5.1 Abbreviations and Acronyms

5.1.1 *CPR* — cardiopulmonary resuscitation

5.1.2 *EEW* — energized electrical work

5.1.3 *EHS* — environmental, health and safety

5.1.4 *FPD* — flat panel display

5.1.5 *MSD* — musculoskeletal disorders

5.1.6 *SDS* — safety data sheet

5.1.7 *PPE* — personal protective equipment

5.1.8 *PV* — photovoltaic

5.2 Definitions

5.2.1 *authorized employee* — a person trained and proficient in performing a hazardous energy isolation procedure on an energy source ensuring that the energy isolating device and the equipment being controlled cannot be operated until the locking device is removed.

5.2.2 *control of hazardous energy (CoHE)* — the practices and procedures necessary to disable equipment, thereby preventing the release of hazardous energy (e.g., electrical, mechanical, hydraulic, pneumatic, chemical, thermal) while employees perform maintenance and service.

5.2.3 *group lockout* — lockout performed by a group (e.g., crew or department).

5.2.4 *instructor or facilitator* — an individual with appropriate technical expertise and experience, authorized by the employer to deliver, or facilitate the delivery of, a course module or set of modules and capable of addressing student questions in a timely manner.

5.2.5 *learning objective* — written statement of the desired knowledge, skill, or ability to be demonstrated.

5.2.6 *lockout* — the placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed. [29 CFR 1910.147]

5.2.7 *maintenance* — planned or unplanned activities intended to keep equipment in good working order. See also the definition for service. [SEMI S2]

5.2.8 *manufacturing equipment* — equipment used in electronics industry for device manufacturing such as semiconductor, flat panel display (FPD), or photovoltaic (PV).

5.2.9 *qualified employee* — a person trained and proficient in the equipment and operation to be performed, including recognition of the hazards and necessary protective measures.

5.2.10 *service* — unplanned activities intended to return equipment that has failed to good working order. See also the definition for maintenance. [SEMI S2]

5.2.11 *training* — an activity which assists an individual in fulfilling the learning objectives.

6 Core Curriculum

6.1 The employer is responsible for ensuring that the employee's EHS training is based on a needs assessment or the results of hazards analyses. The subject matter in this section is considered the minimum basic curriculum for training personnel within the limitations of this Safety Guideline.

6.2 *Housekeeping* — General principles and concepts of hazard recognition and various techniques, procedures, or practices for reducing or eliminating risks such as:

- appropriate use of passageways, storerooms, and service rooms;
- maintaining walking and working surfaces in a safe, clean, orderly, and sanitary condition; and

- establishing and maintaining aisle width and means of egress.

6.3 *Ergonomics* — General principles and concepts of ergonomics and musculoskeletal disorders (MSD) as they relate to maintenance and service activities, with special emphasis in the following areas:

- repetitive motion injuries
- video display terminal usage
- material handling techniques
- recognition of MSD signs and symptoms
- how to report MSD signs and symptoms and the importance of early reporting
- personal MSD risk factors including factors that contribute to MSD of the upper extremities and back
- MSD hazards in their jobs and measures for protection against MSD hazards
- proper selection and use of tools and equipment
- job-specific controls implemented

6.4 *Hand and Portable Power Tools*

- recognition of the hazards associated with the use of hand and portable power tools
- requirements for tool-specific training in the safe use of the tools to be used

6.5 *Material Handling Equipment*

- recognition of the hazards associated with operating or working around material handling equipment and mechanical lifting devices such as hoists, pallet jacks, forklifts, and overhead cranes
- restrictions, including additional training and certification requirements, associated with their operation

6.6 *Robotics*

- recognition of the hazards associated with working near robots and associated components
- restrictions and requirements for robot maintenance and service, including additional training and certification of maintenance and service personnel
- an understanding of the operating envelope and the risks associated with entry
- review of appropriate safe work practices

6.7 *Confined Space*

- ability to recognize a confined space
- recognition of the hazards associated with confined spaces
- requirements and restrictions for confined space entry including sampling or additional training and certification of maintenance and service personnel

6.8 *Elevated Work*

6.8.1 *Fall Protection*

- recognition of the hazards, to both the worker and other personnel, when performing work in an elevated position
- identification of when additional fall protection measures including training are required

6.8.2 *Portable Ladders*

- recognition of the hazards associated with the use of portable ladders
- proper selection, inspection, set-up, and use of portable ladders and working platforms in the work area