

SEMI E165-0712

GUIDE FOR A COMPREHENSIVE EQUIPMENT TRAINING SYSTEM WHEN DEDICATED TRAINING EQUIPMENT IS NOT AVAILABLE

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

1 Purpose

1.1 The purpose of this Standard is to provide recommendations for defining a comprehensive training system for both suppliers and users of equipment for the semiconductor and related industries. Such training systems are used by technical training organizations/departments to instruct technicians and engineers to successfully operate, maintain, and repair this equipment.

1.1.1 The purpose of defining a comprehensive training system is to provide the basis for a common understanding of the required elements to effectively deliver training. This Standard concerns the acceptable alternatives and additions to deliver training to operators, technicians, and engineers with or without dedicated training equipment in the semiconductor and related industries.

2 Scope

2.1 This Standard describes a framework for developing alternative methods for a comprehensive training system, such as simulators, or specific components when dedicated training equipment is not available. The preferred method for training is to use dedicated training equipment. This Standard provides guidance for development and delivery of training supplied without using dedicated training equipment. The Standard also provides definitions of what the equivalent of equipment-based training should be.

2.2 These recommendations pertain only to training systems located at supplier training facilities and not for user-provided equipment utilized for customer on-site training.

NOTE 1: Refer to SEMI E150 for more detailed information on training development guidelines.

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 Referenced Standards and Documents

3.1 SEMI Standards and Safety Guidelines

SEMI E150 — Guide for Equipment Training Best Practices

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

4 Terminology

4.1 Definitions

4.1.1 *assembly* — two or more component parts and/or subassemblies joined together to perform a specific function and capable of disassembly. [SEMI E149]

4.1.2 *competence* — an individual’s demonstrated capacity to perform or accomplish a task or set of tasks to a defined level or criteria. [SEMI E150]

4.1.3 *component part* — a constituent part, which can be separated from or attached to an assembly, not normally considered capable of independent operation. Also sometimes just called part. [SEMI E149]

4.1.4 *emulator* — hardware and/or software that duplicates (or emulates) the functions of the equipment computer system in a different second computer system, so that the behavior of the second system closely resembles the behavior of the equipment system.

4.1.5 *equipment* — the combination of hardware and software required to perform an operation or activity (e.g., processing, transporting, storing), including all direct auxiliary support or peripheral equipment (e.g., vacuum pumps, heat exchangers, effluent/exhaust treatment equipment). [SEMI E149]

4.1.6 *equipment module* — an indivisible entity within an equipment system. An equipment module may be either a nonprocessing equipment module or a processing equipment module. [SEMI E10]

NOTE 2: The distinction between an assembly and subassembly is determined by the individual application. An assembly in one instance may be a subassembly in another where it forms a portion of an assembly.

4.1.7 *performance objective* — a statement that describes the intended performance of a worker for a single task or group of tasks. A performance objective must be a complete objective. [SEMI E150]

4.1.8 *simulation* — any representation or imitation of reality used as an instructional strategy to teach problem solving, procedures, or operations by immersing the learner in situations resembling reality. The learner's actions can be analyzed, feedback about specific errors provided, and performance can be scored. [SEMI E150]

4.1.9 *simulator* — any device that can provide a simulation.

4.1.10 *subassembly* — two or more component parts joined together to perform a specific function and capable of disassembly. [SEMI E149]

4.1.11 *subsystem* — an integrated structure of component parts, subassemblies, and assemblies capable of performing, in aggregate, one or more specific functions within an equipment. [SEMI E149]

4.1.12 *task* — a piece of work to be done (i.e., a human activity) with a definite beginning and end, that typically consists of steps of a procedure (e.g., Replace the pump, Clean the lens) or steps of a process (e.g., Diagnose the fault, Debug the program). [SEMI E150]

4.1.13 *training system* — the combination of an equipment and its associated operation environment (e.g., operator, host controller, automation interface) required to train users to perform an operation or activity (e.g., processing, transporting, storing).

5 Training System Definition and Utilization

5.1 The comprehensive training system should allow the learner to effectively demonstrate competence on all performance objectives required by the associated training curriculum, within the limits of a training environment (e.g., inert gases vs. actual process gases, deionized water baths vs. acids).

5.2 To the maximum extent possible when dedicated training equipment is not available, training should be conducted by actual performance of the task using a combination of one or more of the following: simulator, emulator, equipment module, component part, subassembly, or subsystem.

5.2.1 A simulator should provide a representation or imitation of reality that can be used as an instructional aide to teach problem solving, procedures, or operations by placing the learner in situations resembling reality (i.e., the actual functionality of the equipment). The learner's actions can be analyzed, feedback about specific errors can be provided, and performance can be scored. The simulator's interface should correlate to the equipment complexity and user interactions.

5.2.2 An emulator should duplicate (or emulate) the functions of the equipment computer system in a different second computer system, so that the behavior of the second system closely resembles the behavior of the equipment system. An emulator can be used as an instructional aide to teach procedures or operations by providing learner with computer system situations resembling reality (i.e., the actual functionality of the equipment computer system). The emulator interface should correlate to the equipment computer system complexity and user interactions.