

SEMI E70-1213 (Reapproved 1021) GUIDE FOR TOOL ACCOMMODATION PROCESS

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1 Purpose

1.1 This Guide provides an overview of the various elements of Tool Accommodation, a methodology by which semiconductor processing equipment is installed in a cost-effective and timely manner. This addition to the SEMI Tool Accommodation Standards set describes the process by which the referenced SEMI Standards can be effectively used to achieve tool installation cost and schedule goals.

2 Scope

2.1 This overview Guide provides process development, facilities, manufacturing, and sales engineers (as well as purchasing agents and managers) with a basic understanding of the various elements in a Tool Accommodation methodology. This process emphasizes quality, completeness, timeliness, and cost-effectiveness as key elements of successfully installing semiconductor processing equipment into wafer fabrication facilities. By describing a generic process flow, this Guide identifies a road map for using published standards that comprehend all the procedures involved in tool accommodation from procurement through acceptance. As a common ground for communication and comparison, terms and definitions are also included.

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 E6 — Guide for Semiconductor Equipment Installation Documentation

SEMI E10 — Specification for Definition and Measurement of Equipment Reliability, Availability, and Maintainability (RAM) and Utilization

SEMI E45 — Test Method for the Determination of Inorganic Contamination from Minienvironments Using Vapor Phase Decomposition-Total Reflection X-Ray Spectroscopy (VPD-TXRF), VPD-Atomic Absorption Spectroscopy (VPD-AAS), or VPD/Inductively Coupled Plasma-Mass Spectrometry (VPD/ICP-MS)

SEMI E49 — Guide for High Purity and Ultrahigh Purity Piping Performance, Subassemblies, and Final Assemblies

SEMI E49.2 — Guide for the Qualification of Polymer Assemblies Used in Ultrapure Water and Liquid Chemical Systems in Semiconductor Process Equipment

SEMI E49.4 — Guide for Ultrahigh Purity Solvent Distribution Systems with Metallic Fluid Paths in Semiconductor Manufacturing Equipment

SEMI E49.5 — Guide for the Design of Ultrahigh Purity Solvent Distribution Systems with Non-Metallic Fluid Paths in Semiconductor Manufacturing Equipment

SEMI E49.6 — Guide for Subsystem Assembly and Testing Procedures - Stainless Steel Systems

SEMI E49.7 — Guide for the Design and Manufacture of Polymer Assemblies Used for Liquid Chemical Systems in Semiconductor Equipment

SEMI E49.8 — Guide for High Purity and Ultrahigh Purity Gas Distribution Systems in Semiconductor Manufacturing Equipment

SEMI E51 — Guide for Typical Facilities Services and Termination Matrix

SEMI E137 — Guide for Final Assembly, Packaging, Transportation, Unpacking, and Relocation of Semiconductor Manufacturing Equipment

SEMI S4 — Safety Guideline for the Segregation/Separation of Gas Cylinders Contained in Cabinets

3.2 ISO Standards¹

ISO 14644-1 — Cleanrooms and Associated Controlled Environments Part 1: Classification of Air Cleanliness

ISO 14644-2 — Cleanrooms and Associated Controlled Environments Part 2: Specifications for Testing and Monitoring to Prove Continued Compliance with ISO 14644-1

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

4 Summary of Referenced Standards

4.1 SEMI E6 — Guide for Semiconductor Equipment Installation Documentation

4.1.1 Purpose of SEMI E6 is to communicate from supplier to user the facilities requirements of semiconductor equipment.

4.1.2 Benefits of SEMI E6 include assurance of effective communication of process tool installation requirements.

4.1.3 *Roles and Responsibilities for SEMI E6* — Tool supplier submits information requested in SEMI E6, facilities interface specification. Equipment engineer, facilities engineer, and installation manager use tool requirements information provided by supplier to prepare facility and efficiently install the tool.

Table 1 SEMI Tool Accommodation Standards

Guideline for	Facility Services	Process Tool	Process Tool Subsystems (internal distribution system for)			
			General	Water & Chemical	Solvent	Gas
Facility Services Matrix defines utilities available for tool	SEMI E51					
Facilities Interface Specification defines tool requirements of facilities		SEMI E6				
Subsystem terms and references			SEMI E49			
High purity (HP) subsystem requirements				SEMI E49.2	SEMI E49.4	SEMI E49.8
Ultrahigh purity (UHP) subsystem requirements				SEMI E49.2	SEMI E49.5	SEMI E49.8
Subsystem assembly and testing				SEMI E49.7	SEMI E49.6	SEMI E49.6
Tool packaging and delivery		SEMI E137				

4.2 SEMI E49 — Guide for High Purity and Ultrahigh Purity Piping Performance, Subassemblies, and Final Assemblies

4.2.1 Purpose of SEMI E49 is to specify requirements for process distribution systems located inside of, and provided with, semiconductor processing tools. (SEMI E49 acts as a reference document for the series of SEMI E49 standards, SEMI E49.2 through SEMI E49.8 and SEMI E137. See Table 1, SEMI Tool Accommodation Standards for an explanation of the ten documents included in the SEMI E49 series.)

4.2.2 Benefits of the SEMI E49 series include assurance of compatibility in purity and performance between the tool and facility distribution systems.

¹ International Organization for Standardization, ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland; Telephone: +41.22.749.01.11, <http://www.iso.org>

4.2.3 *Roles and Responsibilities for SEMI E49 Series* — Facilities engineer and installation manager submit appropriate SEMI E49 requirements, either HP or UHP. Tool supplier uses information provided to ensure distribution system compatibility.

4.3 *SEMI E51* — Guide for Typical Facilities Services and Termination Matrix

4.3.1 Purpose of SEMI E51 is to communicate from customer to supplier factory facilities available at the utility point of connection (UPOC) for a semiconductor tool.

4.3.2 Benefits of SEMI E51 include assurance of cost-effective and timely tool installation with minimum retrofit to customer site.

4.3.3 *Roles and Responsibilities for SEMI E51* — Facilities engineer and installation manager submit utility specifications requested in SEMI E51 matrixes, either typical or site-specific. Tool supplier uses information provided about facility to assist in configuration of the process tool.

5 Terminology

5.1 Definitions

5.1.1 *acceleration cost* — additional costs incurred to complete the project sooner than the original scheduled baseline plan.

5.1.2 *as-built drawings* — documentation describing the actual configuration and dimensions at the end of construction.

5.1.3 *base build* — installation of base building, services, and equipment to establish functional environmental controls and utilities to support production equipment installation.

5.1.4 *bidding* — obtaining sealed quotes for a defined scope of work.

5.1.5 *burdened/unburdened* — identification of costs included or excluded from contractual labor rates.

5.1.6 *capital equipment* — equipment that is depreciated according to tax guidelines for durable goods. Generally has a value greater than \$1,000.00 and a useful life greater than 5 years.

5.1.7 *change order* — a document defining a formal change in drawings, specifications, and/or scope of work.

5.1.8 *cleanroom* — confined area in which the humidity, temperature, particulate matter, and contamination are precisely controlled within specified parameters. Cleanroom classes are defined in ISO 14644.

5.1.9 *conditioned power* — electrical power that is manipulated to maintain specified tolerances.

5.1.10 *construction* — the set of activities that transforms plans and specifications into functional systems capable of performing to specification.

5.1.11 *construction consumable* — any material used up during construction.

5.1.12 *construction management* — the set of activities that define, direct, monitor, and report construction activities such as workmanship, adherence to design, cost, and schedule conformance.

5.1.13 *contingency* — a reserve of funds, time, and/or material that is allocated to maintain schedule and budget. A reserve for scope changes, unforeseen site conditions, change in material prices, or unanticipated events.

5.1.14 *contract award* — notification to the successful bidder and subsequent signing of contract documents.

5.1.15 *contractor* — a licensed company hired to accomplish a contractually specified scope of work.

5.1.16 *cost of ownership (COO)* — the total lifetime cost associated with acquisition, installation, and operation of fabrication equipment. [SEMI E35]

5.1.17 *cycle time, gross installation* — total time to install and commission process equipment, typically starting from dock date to release for vendor startup.

5.1.18 *cycle time, net installation* — actual time devoted to construction activities related to tool hookup from dock date to ready for inspection.

5.1.19 *damage* — destruction or unintentional alteration resulting in a liability.