

SEMI E44-96 (Withdrawn 0301) GUIDE FOR PROCUREMENT AND ACCEPTANCE OF MINIENVIRONMENTS

This Standard was technically approved by the Physical Interfaces & Carriers Global Technical Committee.
This edition was approved for publication by the global Audits and Reviews Subcommittee on December 22, 2000. Available at www.semi.org in March 2001; originally published in 1996.

NOTICE: This Document was balloted and approved for withdrawal in 2001.

1 Purpose

1.1 It is widely felt that the requirements of buyers can be standardized. The purpose of this guide is to provide standardized procedures for the procurement and acceptance of minienvironments. It should assist the buyer in producing a procurement specification by providing a comprehensive and structured overview and checklists of all the parameters relating to procurement of minienvironments.

1.2 In addition, it is intended to support and improve communication and common agreement on minienvironment acquisitions between seller and buyer. It may be used at various levels of detail appropriate to the type of minienvironment involved.

1.3 Where appropriate, reference will be made to supporting documents such as:

- International specifications
- National specifications
- Company specifications

2 Scope

2.1 This document defines and describes the major topics normally included in procurement and acceptance of minienvironments. Use of the document is expected to result in a rapid and concise agreement between seller and buyer. It is emphasized that the document is a guide which, per definition (SEMI International Standards Program - Editorial Guidelines) as "a series of options or instructions intended to increase the awareness of the user to available techniques in a given subject area and to provide information from which subsequent evaluations and standardization can be derived. Guides are based on a consensus of viewpoints and may or may not suggest a particular course of action."

3 Limitations

3.1 The guide does not apply to pods and boxes, which are minienvironments as agreed upon during the JESSI/SEMATECH minienvironment workshop 93 in Geneva.

4 Referenced Standards and Documents

4.1 SEMI Standards and Safety Guidelines

SEMI E14 — Measurement of Particle Contamination Contributed to the Product from the Process or Support Tool

SEMI E19 — Standard Mechanical Interface (SMIF)

SEMI E45 — Test Method for the Determination of Inorganic Contamination from Minienvironments

SEMI E46 — Specification for the Determination of Organic Contamination from Minienvironments

SEMI E48 — Specification for SMIF Indexer Volume Requirement

SEMI Draft Doc. 2268 — Guideline for Wafer Fabrication Equipment Procurement Specification (Preliminary Version)

SEMI Draft Doc. 2302 — Environmental, Safety, and Health Guideline for Minienvironment Enclosures of Semiconductor Manufacturing Equipment (Preliminary Version)

4.2 Other Documents

ASHRAE — Sound and Vibration; Handbook; Fundamentals, Chapter 7

FED-STD-209 — Federal Standard Cleanroom and Work Station Requirements, Controlled Environment.

IES-RP-CC-006.2 — Recommended Practice for Testing Cleanrooms

Intercoms — International Commercial Terms 1990

SEMI — Minienvironments Terminology Workshop Proceedings, April 2, 1993¹

SPIE Vol. 161 — VC-A – VC-E classification by Colin G. Gordon: ‘Generic criteria for vibration-sensitive equipment.’
Vibration Control in Microelectronics, Optics, and Metrology (1991): pp 71–85

5 Terminology

5.1 Abbreviations and Acronyms

5.1.1 *CNC* — condensation nucleus counter

5.1.2 *DI-water* — deionized water

5.1.3 *FFT* — fast Fourier transformation

5.1.4 *GFAAS* — graphite furnace atomic absorption spectroscopy

5.1.5 *I/O* — input/output

5.1.6 *ISO* — International Organization for Standardization

5.1.7 *NC* — noise criteria

5.1.8 *OEM* — original equipment manufacturer

5.1.9 *OPC* — airborne optical particle counter

5.1.10 *MPPS* — most penetrating particle size

5.1.11 *PWP* — particles per wafer pass

5.1.12 *SMIF* — standard mechanical interface

5.1.13 *TXRF* — total reflection x-ray fluorescence spectroscopy

5.1.14 *VC* — vibration classification (VC-A – VC-E)

5.1.15 *VPD* — vapor phase decomposition

5.2 Definitions

5.2.1 *active minienvironment* — a minienvironment that creates and maintains a controlled condition.

5.2.2 *adapted minienvironment* — a minienvironment which can be removed from the process tool without restricting the tool's wafer loading/unloading and processing functions. Tools may have provisions for input/output interface, power, and interlock communications.

5.2.3 *adapted SMIF* — a unit including a SMIF port and a cassette transfer mechanism. The unit can be removed from the process tool without restricting the tool's loading/unloading function.

5.2.4 *air/gas supply* — a method to create a clean air/gas environment in the minienvironment.

5.2.5 *box* — a protective portable container for a cassette and/or substrate(s).

5.2.6 *cassette* — an open structure that holds one or more substrates (wafer, masks, etc.).

5.2.7 *enclosure* — a physical barrier between the localized environment and the surroundings.

¹ Available through SEMI Europe.

5.2.8 *integrated minienvironment* — the minienvironment is an integral part of the tool.

5.2.9 *integrated SMIF* — a unit including a SMIF port and a mechanism for indexing the port door. The entire unit being incorporated within the tool.

5.2.10 *minienvironment* — a localized environment created by an enclosure to isolate the product from contamination and people.

5.2.11 *minienvironment input/output* — means to transfer cassettes or substrates into/out of a minienvironment.

5.2.12 *pod* — a box having a Standard Mechanical Interface (SMIF) per SEMI E19.

6 Procurement

The purchase agreement of minienvironments covers technical, logistical, as well as contractual and commercial aspects. The latter are usually subject to negotiations between the contractors and heavily dependent on company policy and culture. Therefore, these aspects are not incorporated in this document. It is advised to cover commercial and contractual matters in a separate part of the purchase agreement.

This guideline concentrates on technical and logistical purchase aspects. Minienvironment buyer and seller can derive the technical part of the purchase agreement from this guideline.

By completion of this part of the purchase agreement, buyer's technical requirements will be defined as well as logistics and acceptance procedures. By affixing their signature to the purchase agreement, the involved parties accept the specification laid down in this part of the purchase agreement.

6.1 *System Description and Document Control* — This purchase specification refers to the minienvironment manufactured/sold by the company (hereafter called the 'seller'):

Company: _____

Minienvironment: _____

It will be used with the

Process equipment: _____

The minienvironment will be used at the following location: _____

Address: _____

Technical contact: _____ Title: _____

Purchasing contact: _____ Title: _____

6.2 *Minienvironment Specifications* — The specifications are contractual parameters. They will be definitive and not disputable. Minienvironments applied to cluster tools may require additional specifications (e.g., mechanical interface).

NOTE 1: The specifications which will be checked in the acceptance test should be marked in the document.

6.2.1 *Material Compatibility* — Depending on the application of a minienvironment, different construction materials are required. The construction materials of this minienvironment should be compatible with the following chemicals (which should also be considered in the construction material specification of § 6.2.5).

Chemicals: _____

6.2.2 *Dimensions* — The minienvironment dimensions as well as the required service and maintenance clearances are specified in Table 1. The shape and size of the process tool has to be taken into consideration. A drawing of the minienvironment (and its relation to the process equipment) should be attached.

Table 1 Permitted Dimensional Envelope of the Minienvironment

	<i>Front</i>	<i>Back</i>	<i>Left</i>	<i>Right</i>	<i>Height</i>	<i>Remarks</i>
Minienvironment Dimensions						
Service and Maintenance Clearances						
Position between Clean and Grey Areas						
Position of Equipment Supports						
Dimensional Positions of Facility Connections						
Others						

#1 The weight of the minienvironment is _____ kg.

6.2.3 Installation Specifications

6.2.3.1 *Installation Specifications* — The location of the minienvironment installation in the cleanroom is specified in Table 2. A drawing showing the geometrical layout and ceiling constraints, if necessary, should be attached to Table 2.

Table 2 Installation Specifications

<i>Parameter</i>	<i>Specification</i>	<i>Remarks</i>
Cleanroom Class		
Filter Layout		
Filter Efficiency		
Filter Leakage Test: Yes/No		
Airflow (Range)		
Temperature (Range)		
Humidity (Range)		
Maximum Ceiling Load		
Others		

The minienvironment is mounted to:

- ☐ floor; raised ☐yes ☐no
☐ the wall
☐ process tool (integrated)
☐ the ceiling

Table 3 Ceiling Mounting Specifications

	<i>Special</i>	<i>Remarks</i>
Interfacing to Ceiling		
Additional Ceiling Load		
Others		

A drawing which clarifies the mounting of the minienvironment should be attached as an appendix.

A separate work area for the preparation of the installation is required as specified in Table 4.

Table 4 Separate Work Area Specification

	<i>Value</i>	<i>Remarks</i>
Separate Work Area		
Separate Work Area Location		
Power Supply		
Others		

A cleanroom protocol for introducing the minienvironment parts into the cleanroom

- ☐ is required
☐ is not required

The responsibility for activities are related to the minienvironment installation and is specified in Table 5.

Table 5 Responsibility for Installation Related Activities

<i>Activity</i>	<i>Seller</i>	<i>Buyer</i>	<i>Other Party</i>	<i>Remarks</i>
Drilling Holes in Ceiling				
Drilling Holes in Floor				
Drilling Holes in Walls				
Drilling Holes in Equipment				
Cleaning				
Others				

The allowed minienvironment mounting methods are specified in Table 6.

Table 6 Allowed Minienvironment Mounting Methods

<i>Method</i>	<i>Remarks</i>

6.2.4 *Air/Gas Supply* — The specifications of the air/gas supply are subdivided into the following main parts:

- supply method
- cleanliness
- operational specifications
- filtration
- fan