

SEMI E117-1102

PROVISIONAL SPECIFICATION FOR RETICLE LOAD PORT

This specification was technically approved by the Global Physical Interfaces & Carriers Committee and is the direct responsibility of the North American Physical Interfaces & Carriers Committee. Current edition approved by the North American Regional Standards Committee on July 24, 2002. Initially available at www.semi.org October 2002; to be published November 2002.

1 Purpose

1.1 This specification defines dimensional requirements of reticle loadports on reticle stockers, lithography exposure equipment, and reticle inspection equipment. It is intended to promote a uniform physical interface between equipment and the factory, to facilitate the use of automated RSP transport systems, and/or to meet ergonomic requirements for manually loaded equipment.

2 Scope

2.1 This standard covers only loadports for reticle SMIF pods (RSPs) as specified in SEMI E100, E111, and E112. Similar requirements covering loadports for wafers are covered in SEMI E15 (for 200 mm wafers and smaller) and in SEMI E15.1 (for 300 mm wafers).

2.2 This standard is provisional because standard RSPs and loadports are new technology. Once such systems have been tested in production, this standard should be modified and upgraded from provisional status.

2.3 This standard does not purport to address safety issues, if any, associated with its use. It is the responsibility of the users of this standard to establish appropriate safety health practices and determine the applicability or regulatory limitations prior to use.

3 Referenced Standards

3.1 SEMI Standards

SEMI E15 — Specification for Tool Load Port

SEMI E15.1 — Specification for 300 mm Tool Load Port

SEMI E19.3 — Port Standard for Mechanical Interface of Wafer Cassette Transfer, 150 mm (6 inch) Port

SEMI E19.4 — 200 mm Standard Mechanical Interface (SMIF)

SEMI E72 — Specification and Guide for 300 mm Equipment Footprint, Height, and Weight

SEMI E100 — Specification for a Reticle SMIF Pod (RSP) Used to Transport and Store 6 inch or 230 mm Reticles

SEMI E111 — Provisional Mechanical Specification for a 150mm Reticle SMIF Pod (RSP150) Used to Transport and Store a 6 Inch Reticle

SEMI E112 — Provisional Mechanical Specification for a Multiple 150 mm Reticle SMIF Pod (MRSP150) Used to Transport and Store 6 Inch Reticles

NOTE 1: As listed or revised, all documents cited shall be the latest publications of adopted standards.

4 Terminology

4.1 Definitions

4.1.1 *150 mm Multiple Reticle SMIF Pod (MRSP150)* — a minienvironment compatible carrier (as defined in SEMI E112) that is capable of holding six 6 inch reticles in a horizontal orientation during transport and storage and is compatible with a Standard Mechanical Interface (SMIF) per SEMI E19.3.

4.1.2 *150 mm Reticle SMIF Pod (RSP150)* — a minienvironment compatible carrier (as defined in SEMI E111) that is capable of holding one 6 inch reticle in a horizontal orientation during transport and storage and is compatible with a Standard Mechanical Interface (SMIF) per SEMI E19.3.

4.1.3 *200 mm Reticle SMIF Pod (RSP200)* — a minienvironment compatible carrier (as defined in SEMI E100) that is capable of holding one 6 inch reticle or one 230 mm reticle in a horizontal orientation during transport and storage and is compatible with a Standard Mechanical Interface (SMIF) per SEMI E19.4.

4.1.4 *Reticle SMIF Pod (RSP)* — a minienvironment compatible carrier that is capable of holding either one or six reticles in a horizontal orientation during transport and storage and is compatible with a Standard Mechanical Interface (SMIF) per SEMI E19.3 or SEMI E19.4.

NOTE 2: All other terminology from SEMI E100, E111, E112, and E15 also apply (except that in SEMI E15, the substrate must be assumed to be a reticle and not a wafer).

5 Ordering Information

5.1 The user must specify which RSPs will be used: RSP200, RSP150, MRSP150, or both RSP150 and MRSP150.

6 Requirements

6.1 *Figures and Tables* — The dimensional requirements for a reticle loadport (and for the placement of an RSP on that loadport) are given in Table 1 with reference to the figures in this document. Although the carrier transport systems shown in these figures represent an overhead transport system using an OHT delivery vehicle, they are intended to represent all types of transport systems (AGV, PGV, conveyor, overhead track, etc.).

6.2 *Orientation* — The reticles are to be oriented horizontally (chrome down) with zero nominal tilt when the RSP is placed on the loadport. The tolerance in the horizontal plane is determined by the registration and alignment feature between the RSP and the loadport, as specified in SEMI E19.3 or SEMI E19.4. The RSP shall be loaded and unloaded with its front (where reticles are inserted and extracted after the SMIF pod is opened) parallel to and away from the load face plane (see Figure 2).

6.3 *Side Clearances* — Clearances C1 and C2 are defined with respect to the maximum dimensions of the footprint of the RSP (as specified in SEMI E19.3 or SEMI E19.4), not to the rectangular carrier envelope (defined in SEMI E15). Note that C1 is lateral clearance to the left and right of the RSP, but C2 is a radial clearance from the nearest point of the RSP.

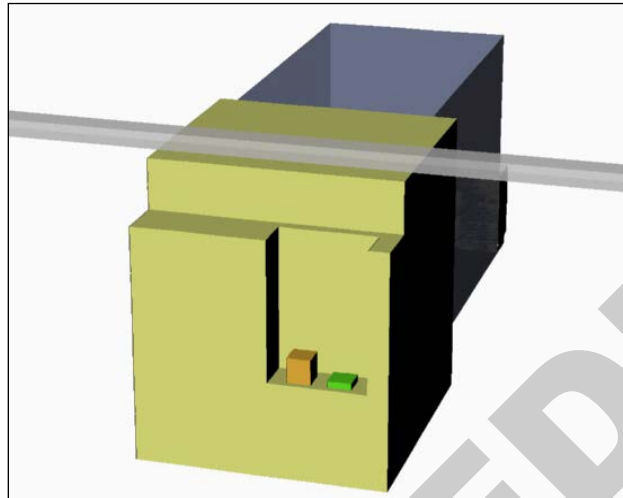
6.4 *Overhead Clearances* — All loadports intended for automated overhead access must be open from above to facilitate automatic RSP delivery. The open volume required for automated overhead delivery is defined by a projection of the loadport area, including the area required for C1 and C2 clearances, projected upward to the top of the equipment. To allow space for overhead delivery above H2, D1 also defines the open volume. Note that this condition need only be met when the equipment is being loaded or unloaded. For example, the loadport may be formed by a surface that extends outward during loading to provide overhead access.

6.5 *Easement for Overhead Transport* — As shown in Figure 1 and Figure 2, to add clearance for overhead RSP transport, no part of the equipment may be higher than H2 above the floor along an easement between the loadports of adjacent equipment down the bay. On a reticle stocker, on inspection equipment, and on lithography exposure equipment that has the loadports on the far end from the litho track, this easement is between the load face plane and a plane parallel to it that is D1 beyond the facial reference plane. On lithography exposure equipment that has the loadports on a side adjacent to the litho track, this easement is between two planes parallel to the bilateral reference plane at the furthest reach of clearance C1 to the left and right of the set of loadports. Such tools must also have an additional easement above H6 between the load face plane and a plane parallel to it that is D1 beyond the facial reference plane. It is recommended that transport equipment using these easements have extra clearance to avoid contacting any equipment boundaries.

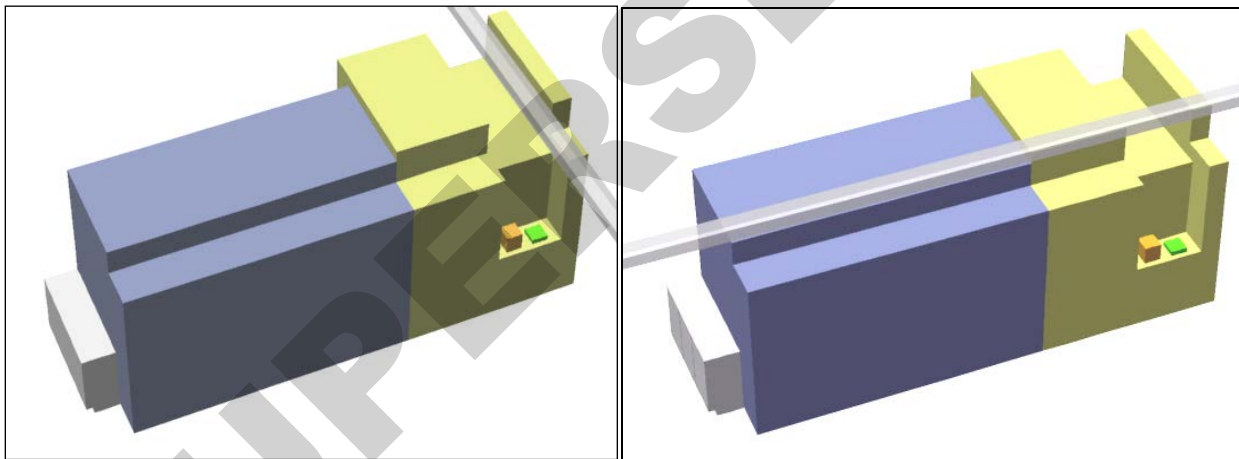
6.6 *Loading Obstructions* — As shown in Figure 3, the maximum allowable height of an obstruction on the loadport over which the RSP must be lifted (before being set down on the SMIF interface) is H1. Examples of such obstructions include alignment devices and identification tag readers (as well as the SMIF port itself). In the volume between the horizontal reference plane and H1 above it, clearances C1 and C2 no longer apply. The loadport must provide a lead-in capability (in addition to that required on the SMIF port) that corrects an RSP misalignment distance of R in any horizontal direction.

6.7 *Adjacent Loadports* — All reticle loadports for automated access must be on the same side of the equipment. All equipment must have at least one loadport with access for automated overhead delivery. At least two of these loadports are recommended to support equipment throughput. Auxiliary loadports intended for manual delivery may be located

on a different side of the equipment. On each piece of equipment, reticle loadports are numbered in increasing order (beginning with 1) from left to right (as seen by a person facing the load face plane) beginning with reticle loadports in the lowest level and then continuing (from left to right) with any reticle loadports at higher levels. Dimension S specifies the spacing between adjacent reticle loadports.



a. Exposure Equipment with RSP Loadports on Rear



b. Exposure Equipment with RSP Loadports on One Side, and an Optional View of a 90° OHV Track Orientation.

Figure 1
Easement for Overhead Transport

Table 1 Dimensional Requirements for Reticle Loadports

Dimension	Application	Value, mm (in.)	Notes
C1	minimum	75 (3.0)	Clearance to left and right of RSP.
C2	minimum	50 (2.0)	Radial clearance around RSP.
D	maximum	250 (9.8)	Load face plane to facial reference plane.
D1	minimum	196 (7.72)	Facial reference plane to OHT easement.
H	range	minimum 890 (35.0) maximum 2690 (106)	Port height: lithography exposure equipment.
		925 ± 35 (36.4 ± 1.4)	Reticle stockers and inspection equipment.