

SEMI E15.1-0299

PROVISIONAL SPECIFICATION FOR 300-mm TOOL LOAD PORT

1. Purpose

1.1 This specification defines dimensional requirements for the load ports of 300-mm wafer process and inspection equipment. It is intended to promote a uniform physical interface between equipment and the factory, to facilitate the use of automated wafer carrier transport systems, and/or to meet ergonomic requirements for manually loaded equipment.

2. Scope

2.1 This is a provisional standard covering 300-mm equipment only. Similar requirements covering equipment for 200-mm wafers and smaller are covered in *SEMI E15*. The provisional status is dictated by the immaturity of designs for 300-mm equipment and additional specifications may yet be defined.

3. Limitations

3.1 This standard is not met by direct loading/unloading of vacuum load locks. Requirements of such interfaces may differ from those in this document.

4. Referenced Documents

4.1 SEMI Documents

SEMI E1.9 — Provisional Mechanical Specification for Cassettes Used to Transport and Store 300-mm Wafers

SEMI E15 — Specification for Tool Load Port

SEMI E19.5 — Specification for 300-mm Bottom-Opening Standard Mechanical Interface (SMIF)

SEMI E47.1 — Provisional Mechanical Specification for Boxes and Pods Used to Transport and Store 300-mm Wafers

SEMI E57 — Provisional Mechanical Specification for Kinematic Couplings Used to Align and Support 300 mm Wafer Carriers

SEMI E62 — Provisional Specification for 300-mm Front-Opening Interface Mechanical Standard (FIMS)

5. Terminology

See SEMI E15.

6. Ordering Information

6.1 Per Section 6 of SEMI E15, except for Sections 6.1.3 and 6.1.4. Also, the user must specify which of the three options (defined in Section 7.6) is required for each load port.

7. Requirements

7.1 The dimensional requirements for the load port of a tool are given in Table 1 with reference to the figures in this document. Although the carrier transport systems shown in these figures appear similar to overhead monorails, they are intended to represent any type of transport system (AGV, PGV, conveyor, overhead track, etc.).

7.2 The dimensional requirements for the placement of a wafer carrier on the load port are given in Table 1 with reference to the figures of this document. The carriers shown in these figures are intended to represent any type of carrier (cassette or box).

7.3 The wafers are to be oriented horizontally face up with zero nominal tilt at the time they are placed on the load port. The tolerance in the horizontal plane is determined by the registration and alignment feature between the carrier and the load port, as specified in SEMI E57.

7.3.1 The carrier shall be loaded and unloaded with its front parallel to and away from the load face plane (see Figure 1).

7.4 Dimension H is nominally 900 mm, fully adjustable at installation over the range of 890 to 910 mm. The precision with which the load port height must be maintained is dictated by the needs of the carrier delivery system.

7.5 As shown in Figure 2, tool load ports must conform to one of the following configuration options. If no option is specified, Option 1 is assumed.

7.6 As shown in Figure 3, the maximum allowable height (H1) of an obstruction on the load port over which the carrier must be lifted (before being set down on the kinematic couplings) is H1. Examples of such an obstruction may be an alignment device or identification tag readers as well as the kinematic couplings themselves. Below H1 above the horizontal datum plane, clearances C1 and C2 no longer apply. Two exclusion volumes on the left and right side of the load port must also be kept clear so that fork-lifts

or conveyors may be used. Each exclusion volume extends from the load face plane to D0 beyond the facial datum plane and extends H0 below the horizontal datum plane between W1 and W2 from the bilateral datum plane. Although the carrier shown in Figure 3 is an open cassette, these exclusion volumes are also required on load ports that are configured with a FIMS interface (conforming to SEMI E62) for front-opening boxes. However, these exclusion volumes are not required on load ports that are configured for bottom-opening (SMIF) pods, because SEMI E19.5 already defines that part of the load port.

7.6.1 In Option 1, the load port must nominally be at 900 mm, and it must be open from above to facilitate automatic carrier delivery from an overhead transport system. The open volume required for vertical delivery is defined by a projection of the tool load port area, including the area required for C1 and C2 clearances, projected upward to the top of the tool. Note that this condition need only be met when the tool is being loaded. For example, the load port may be formed by a surface that extends outward during loading to provide overhead access.

7.6.2 In Option 2 (which allows faster automatic carrier delivery from an overhead transport system), the horizontal datum plane of the load port may be at any height above H that leaves the top of the carrier under H2, but it must be open from above.

7.6.3 In Option 3 (which allows bulkhead mounting of tools with fan/filter units at C3), the load port must nominally be at 900 mm, and it must have a clearance C3 above the maximum height of the carrier.

7.7 Clearances C1, C2, and C3 are defined with respect to the maximum dimensions of the carrier (defined in SEMI E47.1 for a box or in SEMI E1.9 for an open cassette), not to the rectangular wafer carrier envelope (defined in SEMI E15).

7.8 Dimension S specifies the recommended minimum spacing between cassette/wafer carrier centroids. In any case, if S violates C1, then C1 prevails.

7.9 To add clearance for overhead carrier transport, no part of the tool in front of the plane defined by C2 may be higher than H2 from the floor.

The volume below H2 may contain carriers stored in an internal buffer by the tool.

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7.10 If the tool occupies the space behind the load port and above any interface to the carrier, then the front of that upper part of the tool (shown as the equipment boundary in Figure 1) must be at a distance D1 from the facial datum plane. This equipment boundary is parallel to the load face plane, and carriers may be moved or rotated below this surface after loading.

Table 1. Dimensional Requirements for 300-mm Load Ports

<i>Dimension</i>	<i>Application</i>	<i>Value, mm (in.)</i>	<i>Notes</i>
C1	minimum	75 (3.0)	
C2	minimum	30 (1.2)	
C3	minimum	150 (5.91)	
D	range	250 + 0 – 10 (9.8 + 0 – 0.4)	
D0	minimum	110 (0.59)	
D1	range	200 + 10 – 4 (7.9 + 0.4 – 0.2)	
H	nominal	900 (35.4)	1
H0	minimum	15 (5.12)	
H1	maximum	25 (1.0)	
H2	maximum	2600 (102.4)	
S	minimum	420 (16.5)	open cassette (SEMI E1.9) only
		475 (18.7)	box (SEMI E47.1) without manual side handles
		505 (19.9)	box (SEMI E47.1) with manual side handles
W1	maximum	130 (5.12)	
W2	minimum	205 (8.07)	

NOTES:

1. This value is ergonomically compatible with the proposed 13 wafer carriers and may not be ergonomically compatible with the proposed 25 wafer carriers. Such carriers may require assisted loading. H to be fully adjustable at installation over the range of 890 to 910 mm (35 to 35.8 inches).

7.11 Dimension Definitions — See SEMI E15 for applicable definitions.

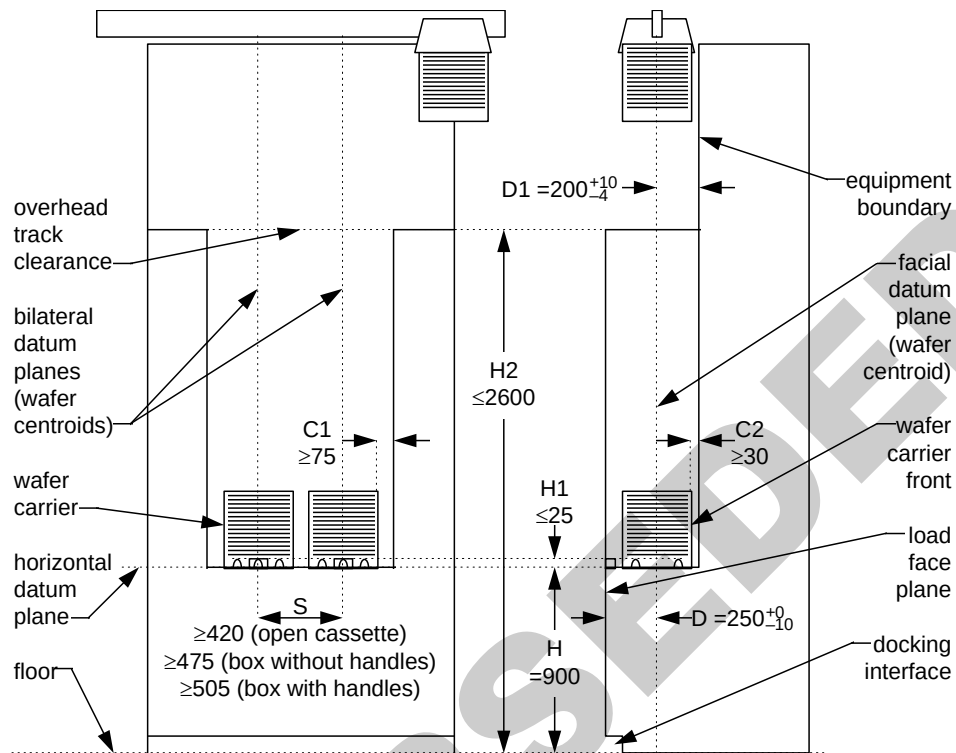


Figure 1
Load Port Requirements

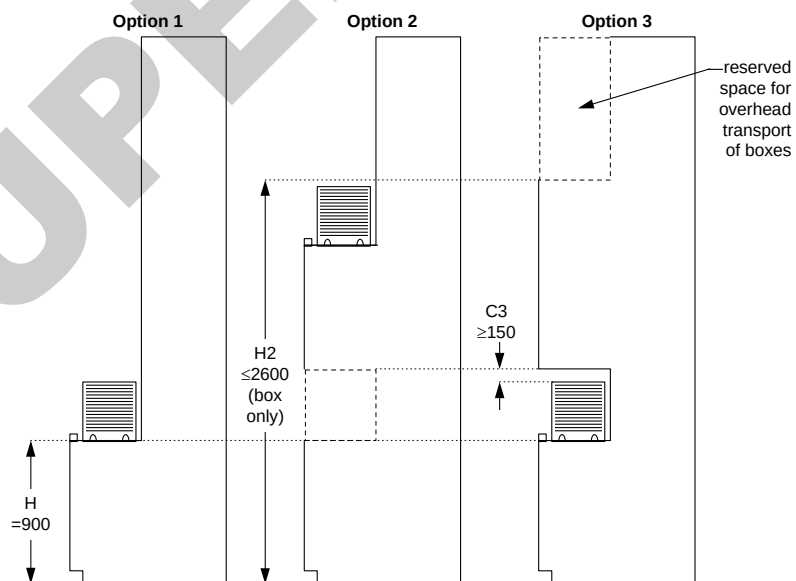


Figure 2
Load Port Options