

SEMI E156-1115

SPECIFICATION FOR MECHANICAL INTERFACES BETWEEN 450 mm AUTOMATED MATERIAL HANDLING SYSTEMS (AMHS) STOCKER AND TRANSPORT EQUIPMENT

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 August 31, 2015.
Available at www.semiviews.org and www.semi.org in November 2015; originally published July 2010.

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1 Purpose

1.1 The purpose of this Specification is to define interfaces between automated material handling systems (AMHS) stocker and different types of transport equipment and to clarify dimensions required for 450 Wafer Carrier transfer.

2 Scope

2.1 The specification in this Standard covers representative handoff interfaces between 450 mm AMHS stocker and transport equipment for 450 Wafer Carrier.

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3 Limitations

3.1 This Standard does not intend to cover transfer of 450 TFC.

3.2 This Standard only provides specification for single 450 Wafer Carrier handoff.

4 Referenced Standards and Documents

4.1 SEMI Standards and Safety Guidelines

SEMI E154 — Specification for Mechanical Features of 450 mm Load Port

SEMI E158 — Specification for Mechanical Features of Fab Wafer Carrier Used to Transport and Store 450 mm Wafers (450 FOUP) and Kinematic Coupling

SEMI E159 — Specification for Mechanical Features of Multi Application Carrier (MAC) Used to Transport and Ship 450 mm Wafers

SEMI G92 — Specification for Tape Frame Cassette for 450 mm Wafer

SEMI M80 — Specification for Front-Opening Shipping Box Used to Transport and Ship 450 mm Wafers

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

5 Terminology

5.1 Abbreviations and Acronyms

5.1.1 *AMHS* — automated material handling systems

5.1.2 *BP* — bilateral plane

5.1.3 *FP* — facial plane

5.1.4 *HP* — horizontal plane

5.1.5 *OHS* — overhead shuttle

5.1.6 *OHT* — overhead hoist transport

5.2 Definitions

5.2.1 *450 Wafer Carrier* — 450 FOUP (SEMI E158), 450 FOSB (SEMI M80), or 450 MAC (SEMI E159).

5.2.2 *active transport equipment* — transport equipment that transfers a carrier to and from a stocker transfer port using robots located on the transport equipment itself.

5.2.3 *bilateral plane (BP)* — a vertical plane, defining $x=0$ of a system with three orthogonal planes (HP, BP, FP), coincident with the nominal location of the rear primary KCP, and midway between the nominal locations of the front primary KCPs. [SEMI E154]

5.2.4 *stocker transfer port* — a transfer port that is attached to or embedded in a stocker.

5.2.5 *facial plane (FP)* — a vertical plane, defining $y=0$ of a system with three orthogonal planes (HP, BP, FP), $y_{33}=194 \pm 0$ mm in front of the nominal location of the rear primary KCP. [SEMI E154]

5.2.6 *horizontal plane (HP)* — a horizontal plane, defining $z=0$ of a system with three orthogonal planes (HP, BP, FP), coincident with the nominal location of the uppermost points (tips) of the three KCPs. [SEMI E154]

5.2.7 *load face plane* — the furthest physical vertical boundary plane from the cassette centroid or carrier centroid on the side (or sides) of the equipment where loading of the equipment is intended.

5.2.8 *overhead shuttle (OHS)* — a vehicle that travels overhead on a rail (or rails) and does not have a hoist. [SEMI S17]

5.2.9 *overhead hoist transport (OHT)* — a vehicle that travels overhead on a rail (or rails) and does have a hoist. [SEMI S17]

NOTE 1: OHS and OHT can be active transport equipment or passive transport equipment depending on configuration.

5.2.10 *passive transport equipment* — transport equipment that requires another piece of equipment (e.g., a robot at a stocker transfer port) to be loaded/unloaded with 450 Wafer Carrier.

5.2.11 *stocker* — an AMHS storage device. [SEMI E85]

5.2.12 *stocker crane* — stocker transfer agent specialized for the movement of carriers between shelves and input and output port locations. [SEMI E88]

5.2.13 *stocker port robot* — robot for transport of the carrier from stocker transfer port to vehicle or conveyor, and from vehicle or conveyor to stocker transfer port.

5.2.14 *transport equipment* — a piece of active or passive equipment which transports 450 Wafer Carrier. Vehicle (e.g., OHS, OHT) and conveyor are types of transport equipment.

6 Requirements

6.1 The 450 Wafer Carrier shall be loaded and unloaded with its front surface of carrier parallel to the load face plane.

6.2 Representative interfaces between AMHS stocker and transport equipment are detailed in the following configuration options (¶¶ 6.2.1, 6.2.2, 6.2.3, or 6.2.4). The dimensional requirements for the configurations are in Table 1. Figures 1 to 4 illustrate the options and are not intended to contain requirements, be dimensionally accurate or be to scale.

6.2.1 In Option A, active transport equipment (e.g., active overhead shuttle [OHS]) loads/unloads a 450 Wafer Carrier to/from stocker transfer port utilizing the KC mating grooves on the 450 Wafer Carrier. The stocker transfer port shall therefore maintain the center exclusion volume below the HP, which is defined by dimensions H1, A1, A2, D, D1 and D3 as shown in Figure 1. This exclusion volume in the stocker transfer port facilitates 450 Wafer Carrier delivery from the transport equipment using the secondary set of kinematic pins. Although the stocker may use any of the other 450 Wafer Carrier handling features, the two primary kinematic coupling pins closest to the door are reserved for the stocker transfer port. An exclusion height above the 450 Wafer Carrier, defined by dimension C, allows for clearance during 450 Wafer Carrier transfer. The center exclusion volume below the HP has a height H1, width ($A1 + A1$) extending from the load face plane to a distance ($D - D1$), width ($A2 + A2$) from that point to a distance D3 away from the facial plane (FP) with total depth of ($D + D3$).

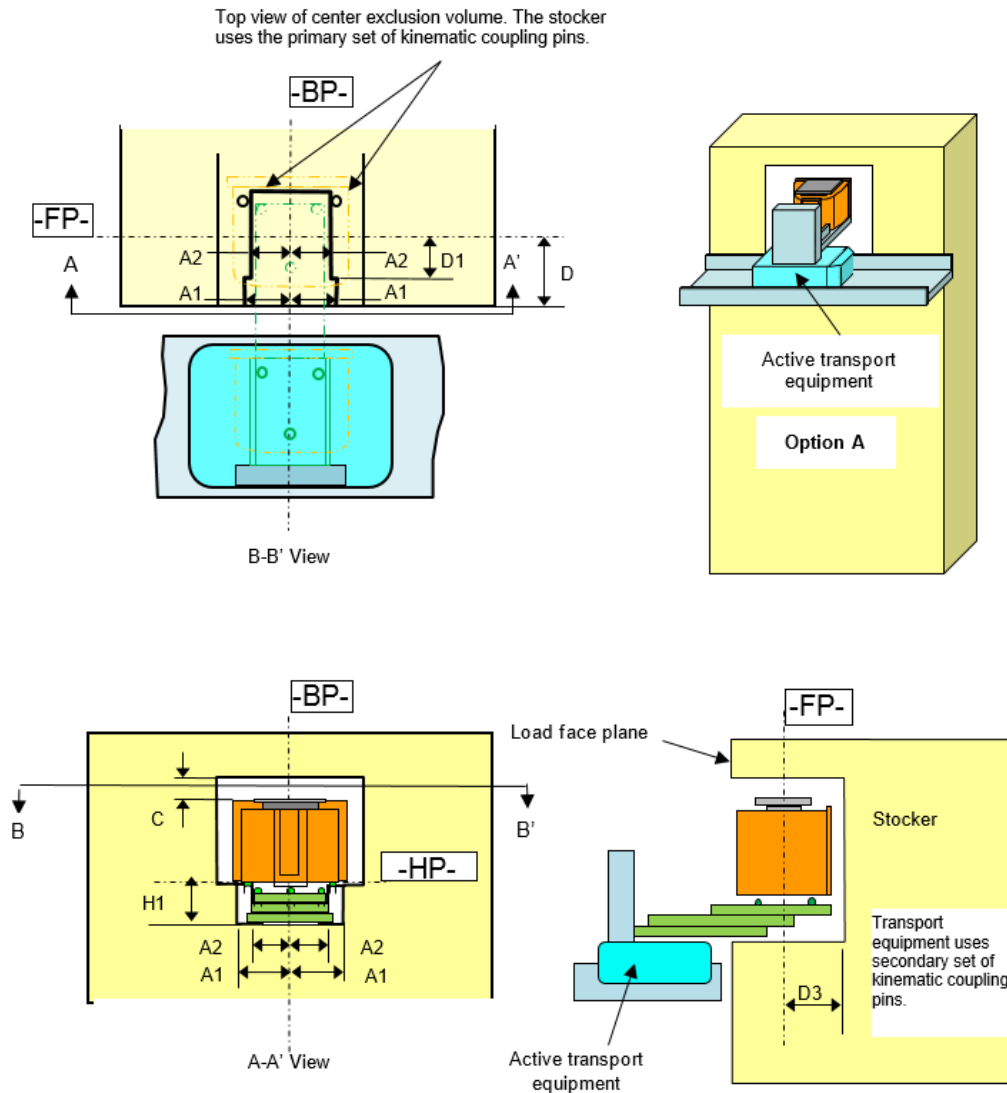


Figure 1
Stocker Transfer Port Option A

6.2.2 In Option B, an overhead hoist transport (OHT) loads/unloads a 450 Wafer Carrier to/from stocker transfer port. The stocker transfer port is open from above to facilitate vertical delivery from an OHT.