

SEMI E74-0301 (Reapproved 0307) SPECIFICATION FOR VACUUM PUMP INTERFACES - TURBOMOLECULAR PUMPS

This standard was technically approved by the global Physical Interfaces & Carriers Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on November 21, 2006. It was available at www.semi.org in February 2007 and on CD-ROM in March 2007. Originally published June 1998; previously published March 2001.

1 Purpose

1.1 This standard specifies the physical and electrical interfaces for turbomolecular pump (TMP) type vacuum pumps. Standardization of pump interfaces will allow for interchangeability of pumps. Device manufacturers use this standard when procuring processing equipment to specify to the equipment supplier the interface required for interchangeability of pumps. This document is also used by semiconductor processing equipment suppliers to specify standardized interfaces to pump suppliers.

2 Scope

2.1 This standard applies to vacuum pumps supplied with 300 mm semiconductor processing equipment.

2.2 The standard specifies the mechanical and electrical interfaces for turbomolecular pumps, including the following:

- Mechanical connectors and locations
- Control signals and connector
- Power supply and connector

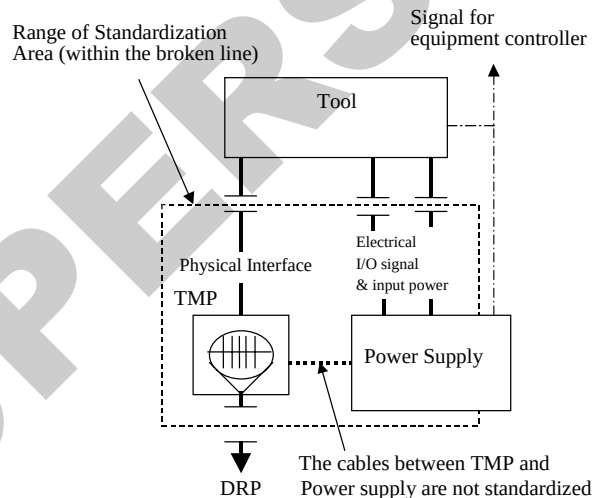


Figure 1
Scope of Standardized Interface

NOTICE: 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 and health practices and determine the applicability of regulatory or other limitations prior to use.

3 Limitations

3.1 This standard is not intended to dictate how to build a vacuum pump, but to specify interfaces that will allow for interchangeability of individual pumps.

3.2 This standard does not include specifications for sensor-bus compliant interfaces.

3.3 This standard is not intended to address design issues related to safety considerations and containment issues which are addressed elsewhere in the SEMI guidelines.

3.4 International, national and local codes, regulations and laws should be consulted to ensure that the equipment meets regulatory requirements in each location of use.

3.5 This standard does not apply to turbomolecular pumps less than 300 l/s or greater than 3000 l/s. Pumps less than 300 l/s are too small and pumps greater than 3000 l/s pumps are not commonly used.

3.6 Double flow turbomechanical pumps are excepted from this standard, because their shapes and structures are different from turbomolecular pumps to be applied this standard.

4 Referenced Standards and Documents

4.1 SEMI Standard

SEMI S2 — Environmental, Health, and Safety Guideline for Semiconductor Manufacturing Equipment

4.2 ISO Documents¹

ISO 7-1 — Pipe threads where pressure-tight joints are made on the threads - Part 1: Dimensions, tolerances and designation

ISO 1609 — Vacuum Technology - Flange dimensions

ISO 2861-1 — Vacuum technology - Quick-release couplings - Dimensions - Part 1: Clamped type

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

5 Terminology

5.1 Definitions

5.1.1 *pump alarm* — a cautionary signal that the pump has stopped or is to be stopped.

5.1.2 *pump warning* — a state of an abnormal or extraordinary event during pump operation which means there is a probability the pump will stop.

5.1.3 *turbomolecular pump (TMP)* — equipment used to create a high vacuum. Rapidly rotating blades force molecules to the bottom for removal by a mechanical pump.

5.1.4 *Vacuum Pump* — a pumping apparatus which exhausts gas or air from an enclosed space to achieve a desired degree of vacuum.

6 Requirements

6.1 Mechanical Interfaces

6.1.1 Table 1 specifies the required TMP connector type and size by flange/port. Axial orientation and position of the connectors are specified in Table 2 and Figure 2. Port and connector positions shall be at the periphery of the pump. Put inlet port on the z-axis and the outlet port on the x-axis. Other connector locations are specified by the angle between the x-axis and the center of the connector.

Table 1 Mechanical Connectors

No.	Items	Connector Type	Connector Size	Referenced Standard	Remarks
1	Inlet flange	ISO bolted flange	Connector dimensions should be based on the referenced standard.	ISO 1609	A port flange which connects the pump to a process tool to evacuate gases.
2	Outlet flange	ISO KF flange	Connector dimensions should be based on the referenced standard.	ISO 2861-1	A port flange which connects the pump to the DRP (Dry Pump).

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No.	Items	Connector Type	Connector Size	Referenced Standard	Remarks
3	Purge gas port	ISO KF flange	Size 10 or 16 connector	ISO 2861-1	A connection port used to supply inert gas, typically N ₂ , to the pump. The purge gas protects the inside of the pump from corrosion due to process gases.
4	Cooling water port	ISO taper pipe thread (female on pump side)	1/4" or 3/8"	ISO 7/1	A connection port to supply water used to keep the pump cool.

Table 2 Connector Locations

No.	Items	Connector Location	Connector Angle (degrees)	Remarks
1	Inlet flange	z-axis		Flange bolt holes shall be symmetrically located at equal distance from the center line of the outlet flange.
2	Outlet flange	transverse	0°	
3	Purge gas port	transverse	-90° to +90°	The forbidden area shall be symmetrically located at equal distances from the center of the outlet flange.
4	Cooling water port	transverse	-90° to +90°	Distance from the x-axis shall be more than 1.5 times the nominal bore of the outlet flange.
5	Electrical connections	transverse	0° to -120°	
6	Other ports	transverse	-90° to +90°	