

SEMI E73-0301 (Reapproved 0307) SPECIFICATION FOR VACUUM PUMP INTERFACES - DRY 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 February 1999.

1 Purpose

1.1 This standard specifies the physical and electrical interfaces for dry pump (DRP) 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 dry pumps including the following.

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

2.3 Figure 1 shows the scope of the 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.

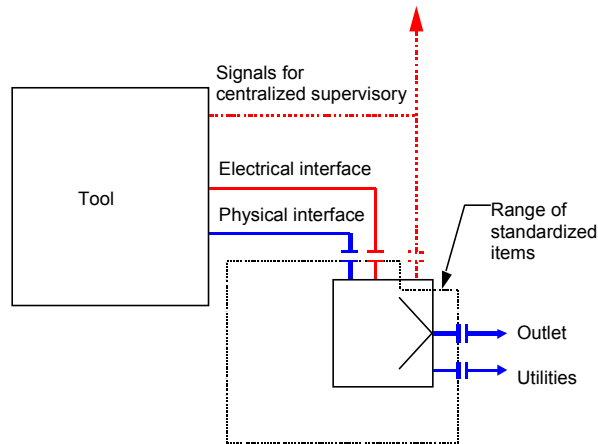


Figure 1
Scope of Standardized Interface

3 Limitations

3.1 This guide 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, laws, and regulations should be consulted to ensure that the equipment meets regulatory requirements in each location of use.

4 Referenced Standards and Documents

4.1 SEMI Standard

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

4.2 ISO Standards¹

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 *dry pump (DRP)* — dry pumps are a type of mechanical vacuum pump. Dry pumps can work at atmospheric pressure. They are called dry pumps because no liquid sealing materials are used on any surface contacted by gases. Hereafter, the term “DRP” is substituted for “dry pump”.

5.1.2 *pump alarm* — a cautionary signal that the pump has stopped.

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

5.1.4 *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* — Table 1 specifies the required DRP connector type and size by flange/port.

Table 1 Mechanical Connectors

| No. | Items | | Connector Type | Connector Size | Referenced Standard | Remarks |
|-----|--------------------|------------------------------|---|--|---------------------|--|
| 1 | Inlet flange | Nominal bore 50 mm or less | ISO KF flange | ≤50 mm Connector dimensions should be based on the referenced standard. | ISO 2861-1 | A port flange which connects the pump to a process tool to evacuate gases. |
| | | Nominal bore over 63 mm size | ISO clamped flange | ≥63 mm Connector dimensions should be based on the referenced standard. | ISO 1609 | |
| 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 facility evacuation system. |
| 3 | Duct port (Option) | | Not specified | 50 mm or 100 mm diameter port | | Port to connect duct for evacuating flames inside the pump. |
| 4 | Purge gas port | | Compression type ^{#1} | 1/4" Connector | | 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. |
| 5 | 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. |

#1 For example, Swagelock®

¹ International Organization for Standardization, ISO Central Secretariat, 1, rue de Varembe, Case postale 56, CH-1211 Geneva 20, Switzerland. Telephone: 41.22.749.01.11; Fax: 41.22.733.34.30; Website: <http://www.iso.ch>

6.2 Electrical Interfaces

6.2.1 Control Signals

6.2.1.1 Table 2 specifies the required DRP control signals. Table 3 and Figure 2 specify the required response time for DRP control signals. Table 4 specifies the required power and contacts for DPR control signals. Tables 5 and 6 and Figure 3 specify the required connector and pin assignments for DRP control signals.

Table 2 I/O Signals

| No. | Signal Name | Direction | Type | | Remarks |
|-----|------------------|-------------------------|-----------|----------------------------------|---|
| 1 | Start (Run)/Stop | Input signal to Pump | Alternate | Pump runs when closed | |
| 2 | Start (Run)/Stop | Output signal from Pump | Alternate | Close on pump start | Running status signals When input power is OFF, output status signals should become open (normally open). |
| 3 | Remote/Local | Output signal from Pump | Alternate | Close during remote operation | |
| 4 | Pump Warning | Output signal from Pump | Alternate | Open at warning | |
| 5 | Pump Alarm | Output signal from Pump | Alternate | Open at alarm | |
| | | | | | |

Table 3 Response Time for Signals

| No. | Items | Acceptable Response Time | Remarks |
|-----|-----------------|--|---|
| 1 | Input Power ON | Under 10 seconds After input power turns on | Objects: All status signals shall be ready. |
| 2 | Control Signals | Under 2 seconds After receiving a signal | See Figure 2. Objects: a) Start signal (input) ->> Start status (output) b) Stop signal (input) ->> Stop status (output) |

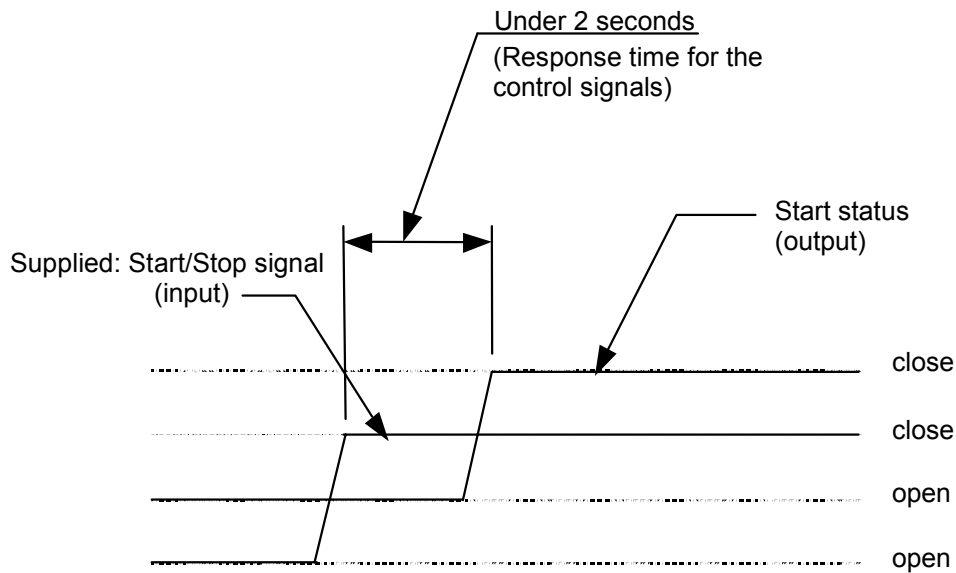


Figure 2
Example of Response Time for Start Signal and Start Status