

SEMI E49-1104 (Reapproved 1211) GUIDE FOR HIGH PURITY AND ULTRAHIGH PURITY PIPING PERFORMANCE, SUBASSEMBLIES, AND FINAL ASSEMBLIES

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NOTICE: This Document was reapproved with minor editorial changes.

1 Purpose

1.1 The purpose of this overview Document is to provide a basic set of terminology and reference documents for SEMI E49.2, SEMI E49.4, SEMI E49.5, SEMI E49.6, SEMI E49.7, SEMI E49.8 and SEMI E137.

2 Scope

2.1 This Document contains terminology and reference documents used in SEMI E49.2, SEMI E49.4, SEMI E49.5, SEMI E49.6, SEMI E49.7, SEMI E49.8 and SEMI E137, which will reference performance and method standards as well as recommended practices.

2.1.1 The SEMI E49 subordinate Documents are organized by types of piping distribution systems: gas, DI/chemical, solvent, and by types of assembly and testing procedures: sub-assembly for stainless steel, sub-assembly for polymer and final tool assembly. Final assemblies should be tested or validated for all appropriate parameters (e.g., purity, integrity, failure rate) as specified in the applicable SEMI E49 Subordinate Documents.

2.1.2 The piping distribution Documents (SEMI E49.2 through SEMI E49.8) include guidelines for system design, performance, materials, and components. Purity and performance grades are described for each of the three types of distribution systems.

2.1.3 Users should complete an overall tool cost of ownership analysis (see SEMI E35) to determine the optimum application of HP or UHP tool features. Key parameters should include facilities cost and installation cycle time, piping system reliability and maintainability factors, tool and sub-system contribution to contamination, and resultant effects on wafer quality and wafer throughput factors.

2.2 Final assemblies should be evaluated according to the criteria of SEMI S2 for environmental, health and safety (EH&S) issues associated with their use.

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Referenced Standards and Documents

3.1 SEMI Standards and Safety Guidelines

SEMI E35 — Guide to Calculate Cost of Ownership (COO) Metrics for Semiconductor Manufacturing Equipment

SEMI E49.2 — Guideline for the Qualification of Polymer Assemblies Used in Ultrapure Water and Liquid Chemical Systems in Semiconductor Process Equipment

SEMI E49.4 — Guide for High Purity Solvent Distribution Systems in Semiconductor Manufacturing Equipment

SEMI E49.5 — Guide for Ultrahigh Purity Solvent Distribution Systems in Semiconductor Manufacturing Equipment

SEMI E49.6 — Guide for Subsystem Assembly and Testing Procedures – Stainless Steel Systems

SEMI E49.7 — Purity Guide for the Design and Manufacture of Ultrapure Water and Liquid Chemical Systems in Semiconductor Process Equipment

SEMI E49.8 — Guide for High Purity and Ultrahigh Purity Gas Distribution Systems in Semiconductor Manufacturing Equipment

SEMI E137 — Guide for Final Assembly, Packaging, Transportation, Unpacking, and Relocation of Semiconductor Manufacturing Equipment

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

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

4 Terminology

4.1 Abbreviations and Acronyms

- 4.1.1 *Ar* — argon
- 4.1.2 *C_v* — valve flow coefficient
- 4.1.3 *CVD* — chemical vapor deposition
- 4.1.4 *DSF* — dead space free
- 4.1.5 *DIW* — deionized water
- 4.1.6 *ESCA* — electron spectroscopy for chemical analysis (also known as XPS)
- 4.1.7 *FTIR* — Fourier transform infrared
- 4.1.8 *HD* — high density (i.e., polymer)
- 4.1.9 *HP* — high purity
- 4.1.10 *HPM* — hazardous production material
- 4.1.11 *IEEE* — Institute of Electrical and Electronics Engineers, Inc.
- 4.1.12 *ID/OD* — inside/outside (i.e., diameter)
- 4.1.13 *IPA* — isopropyl alcohol
- 4.1.14 *MFC* — mass flow controller
- 4.1.15 *MTBA* — mean time between assists
- 4.1.16 *MTBF* — mean time between failure
- 4.1.17 *MTTR* — mean time to repair
- 4.1.18 *PFA* — perfluoroalkoxy
- 4.1.19 *PPB* — parts per billion
- 4.1.20 *PTFE* — polytetrafluoroethylene
- 4.1.21 *PVDF* — polyvinylidene fluoride
- 4.1.22 *QA* — quality assurance
- 4.1.23 *QC* — quality control
- 4.1.24 *Ra* — roughness average (e.g., surface)
- 4.1.25 *SMTR* — Smelter's test report
- 4.1.26 *SPC* — statistical process control
- 4.1.27 *TEOS* — tetraethylorthosilicate
- 4.1.28 *TOC* — total organic carbons
- 4.1.29 *UHP* — ultrahigh purity
- 4.1.30 *WC* — water column, inches (cm) of water
- 4.1.31 *XPS* — X-ray photoelectron spectroscopy