

SEMI G53-92

SPECIFICATION FOR METAL LID/PREFORM ASSEMBLY

1 Preface

1.1 *Scope* — This specification provides guidelines for the design and acceptance of metal lid/preform assemblies (see Figure 1). This specification may be used by suppliers at outgoing inspection and by the customers at incoming inspection.

The design and acceptance criteria may be used for metal lid/preform assemblies used on all types of semiconductor packages.

1.2 *Significance* — Improper lid/preform design and poorly specified lid/preforms contributes to low sealing yields and unreliable devices.

1.3 *Units* — U.S. Customary (inch-pound) or SI (metric) units may be used at the customer's discretion. This specification uses U.S. Customary units as the prime unit.

2 Applicable Documents

2.1 *Order of Precedence* — To avoid conflicts, the order of precedence when ordering metal lid-preform assemblies shall be as follows:

Purchase Order

Customer's Lid-Preform Drawing

This Specification

Reference Documents

Related Documents

2.2 Referenced Documents

2.2.1 Military and Federal Specifications¹

MIL-STD 883 — Test Methods and Procedures for Microelectronics

MIL-M-38510 — General Specification for Microcircuits

2.2.2 ANSI Specification²

Y14.5M — Dimensioning and Tolerancing

2.2.3 ASTM Specification³

B 568 — Measurement of Coating Thickness by X-Ray Spectrometry

E 10 — Standard Test Method for Brinell Hardness of Metallic Materials

E 384 — Standard Test Method for Microhardness of Materials

E 29 — Practice for Using Significant Digits in Test Data to Determine Conformance to Specifications

E 1182 — Measurement of Surface Layer Thickness by Radial Sectioning

3 Definitions

blister — any enclosed localized separation of the plating from the base material or from another layer of plating which can be depressed by a sharp instrument.

bow — relative flatness of the preform to the lid after spot welding.

burr — an adherent fragment of parent material, lid or preform, at the edge of the lid or preform.

chipout — a region of material which is missing from the surface or edge of the lid or preform.

contamination — three dimensional alien material adhering to a surface.

corrosion — electrochemical degradation of the material usually exhibited by discoloration such as rust.

crack — a cleavage or fracture which extends to the surface of the lid or through the preform.

discoloration — any change in the color of the plating as detected by the unaided eye which normally occurs after the application of heat.

foreign material — an adherent particle other than parent material of that component.

NOTE: Adherent means inability to be removed with an air or Nitrogen blow-off at 20 psi.

gouges — mechanically formed depressions in the lid surface.

nodules — lumps of plating extending above the surface of the lid.

oil canning — lid concavity after sealing.

peeling — the lifting of plating from a surface.

pit — a hole or depression extending below the surface of the lid or preform.

preform — a solder material of defined volume that is attached to the base material.

1 Military Standards, Naval Publications and Form Center, 5801 Tabor Avenue, Philadelphia, PA 19120

2 ANSI, 1430 Broadway, New York, NY 10018

3 American Society of Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2957

protrusion — an adherent fragment of excess material on the surface of lid or preform.

scratch — surface mark which exposes underlying metal.

seal ring — area designated for attaching the lid to the package by welding or soldering techniques.

stain — a two-dimensional substance on a surface of the lid or preform.

tack weld — small spot welds, generally located in the corners which are used to attach the preform to the lid.

void — absence of plating from designated area.

weld splatter — melted preform material which extends from the weld.

4 Ordering Information

Purchase orders for metal lid/preform assemblies furnished to this specification shall include the following information.

4.1 Current customer drawing revision detailing:

All dimensions and tolerances per ANSI Y14.5M

Base material and hardness

Type, and thickness of the plating(s)

Preform type and composition

4.2 Reference to this specification.

4.3 Supplier certification requirements

4.4 Any additions to, or variations from, this specification.

5 Materials

The definitions, design guidelines, defect criteria, and functional tests described in this specification relate to lid/preform assemblies made with the following materials.

5.1 Lid

5.1.1 Base material to be Iron Nickel Cobalt alloy per MIL-M-38510, Type A; OR Iron Nickel alloy per MIL-M-38510, Type B unless otherwise stated on the purchase order.

5.1.2 Plating shall meet the requirements of MIL-M-38510 unless otherwise stated in the purchasing document.

5.2 Preform

5.2.1 Preform to be 80% (+0/-1% tolerance) gold, balance to be tin unless otherwise stated on the

purchase order. Gold and tin to be 99.99% pure per ASTM E 29.

	Maximum Trace Elements
Silver (Ag)	100 ppm
Copper (Cu)	50 ppm
Lead (Pb)	50 ppm
Palladium (Pd)	20 ppm
Iron (Fe)	10 ppm

Others 10 ppm each

Total all impurities: 149 ppm

6 Design Guidelines

These guidelines are based on the use of a furnace sealing process, not seam sealing.

6.1 General Guidelines

6.1.1 The I.D. of the lid preform should be 0.010 larger than the package seal ring I.D. as long as preform width specifications are not violated.

6.1.2 The O.D. of the lid should be 0.025" to 0.035" smaller than the package seal ring O.D. as long as preform width specifications are not violated.

NOTE: The dimensions listed are based on nominal tolerances only. The worst case package and lid conditions must be considered.

6.1.3 *Recommendations* — The following table is a guideline only. Specific requirements may differ depending on the package type or style.