

SEMI F109-0212

GUIDE FOR HEATER SYSTEMS REQUIREMENTS

This Standard was technically approved by the global Gases Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on December 24, 2011. Available at www.semiviews.org and www.semi.org in February 2012.

1 Purpose

1.1 The purpose of this Guide is to define a framework for documenting uniform heater system requirements. The intended use of this Document is to act as a generic form for heater system manufacturers to deliver to requestors of custom heaters.

2 Scope

2.1 The intended use of this Document is to provide a uniform set of technical definitions to aid in rapid design, development, test, and manufacturing of custom heater systems. This Document applies to all types of resistive electrical heater system used in the semiconductor, flat panel, solar, and related industry.

2.2 The Document herein discusses the aspect of: electrical specifications, thermal load, cabling, environmental considerations, performance, operational requirements, control system specification specifications, information exchange, packaging, and testing.

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 Limitations

3.1 This Document does not advise on specific requirements for safety construction, GFI or grounding requirements, and boundary use conditions of heaters.

3.2 The intent of this Document is not to recommend specific constructions, materials or methods of heater elements themselves.

4 Referenced Standards and Documents

4.1 NFPA Standards¹

NFPA 70 — National Electrical Code

NFPA 497 — Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas

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

5 Terminology

5.1 Abbreviations and Acronyms

5.1.1 AC — alternating current

5.1.2 DC — direct current

5.1.3 GFI — ground fault interrupter

5.1.4 MSDS — material safety data sheet

5.1.5 MTBF — mean time between failure

5.1.6 SLM — standard liters per minute

¹ National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269, USA; Telephone: 617.770.3000, Fax: 617.770.0700, <http://www.nfpa.org>

6 Electrical Specifications – Heaters and Control Elements

6.1 *Current Type* — AC DC

6.2 *Voltage* — 24/120/208/220/440/230/400 or other _____ (select all that apply)

6.3 *Frequency* — 50Hz 60Hz

6.4 *Phase* — 1 3

6.5 *Power* — _____ watts per individual heater and total _____ watts per system.

6.6 *Current Rating* — _____ amperes per individual heater and total _____ amperes per system (max. value only).

7 Thermal Load and Mechanical Parameters

7.1 Application: is the purpose heating alone or is insulation as well required?

7.2 Specific shape required.

7.3 Location(s): _____ (e.g., gas panel, chamber, foreline).

7.4 Are heaters required to be removable and reusable?

7.5 Use of heater: Indoor/Outdoor. If indoor – cleanroom class apply.

7.6 Describe any hazards that may interact with heater operation or function (e.g., flammable gases/liquids).

7.7 Is the heater to be used in a hazardous location (see NFPA 70/NFPA 497)?

7.8 Describe materials/components heat sensitivity, limits on heat or ramp tolerance.

7.9 Describe any additional heat loss or heat contributors to the target heat requirement.

7.10 Define internal fluid(s) state (i.e., liquid or gas) prior to heating _____ and after heating _____.

7.11 List internal fluid(s) and attach MSDS: _____.

7.12 Flow rate _____ min/max in SLM.

7.13 Inlet temperatures _____ °C.

7.14 Fluid mixture ranges (min. ratio to max. ratio) (e.g., 100% He to 75%He + 25%TEOS by volume).

7.15 Flow directions (attach fluid distribution diagram with flow directions and regions to be heated).

7.16 Fluid pressure _____ (min./max. bar).

7.17 Outlet temperature requirement _____ (min./ max. °C).

7.18 Temperature control point: internally mounted or externally mounted sensor.

7.19 Human/machine ergonomic issues to heater placement and operation.

8 Cable and Connectors Requirements

8.1 Cable length: _____ meters/inches _____ tolerance ±meters/inches

8.2 Connector part number: Manufacturer _____ Mfg. p/n _____

8.3 Wire type: _____ Insulation material: _____ Conductor material: _____

8.4 Pin-out table? ☐ Yes ☐ No

8.5 Keying diagram? ☐ Yes ☐ No