Background Statement for SEMI Draft Document 5874 Line Item Revision to SEMI S2-0712d, ENVIRONMENTAL, HEALTH, AND SAFETY GUIDELINE FOR SEMICONDUCTOR MANUFACTURING EQUIPMENT

Line Item 1: Revision Related to Location for Table of Contents

Notice: This background statement is not part of the balloted item. It is provided solely to assist the recipient in reaching an informed decision based on the rationale of the activity that preceded the creation of this Document.

Notice: Recipients of this Document are invited to submit, with their comments, notification of any relevant patented technology or copyrighted items of which they are aware and to provide supporting documentation. In this context, “patented technology” is defined as technology for which a patent has issued or has been applied for. In the latter case, only publicly available information on the contents of the patent application is to be provided.

Notice: Additions are indicated by underline and deletions are indicated by strikethrough.

S2 contains a list of section numbers and their headings (i.e., section titles) in the Scope section as well as a list of Related Information sections and their headings, which makes S2 non-conformant to the requirements in §3.2.3 of the Procedure Manual. Despite purely procedural nature of the issue, leaving this issue unaddressed may cause rejection of any future S2 revision Letter ballot that is passed by TC Chapters at procedure review stage by ISC A&R SC.

During North America TC Chapter meeting held on Apr.2, this issue was raised and discussed. It was desired in the meeting that this revision to be carried out independently from any ongoing S2 revision activities in a separate Line Item solely to resolve this issue.

This Line Item is intended to resolve the issue by removing the list of section numbers and titles from ¶2.2 of S2, as well as the Related Information Index, and add them as a Table of Contents in accordance with ¶3.2.3.1.1 of the Procedure Manual. Additionally, the Table of Contents includes the Delayed Revision sections of S2.

The Line Item consists of three parts. The first part (Line Item 1 Part a) is to add a Table of Contents in front of main Document before the Purpose section. The second part (Line Item 1 Part b) is to remove the list of section numbers and titles from the Scope section and add a NOTE to explain replacement and relocation of the list. The third part (Line Item 1 Part c) is to remove the Related Information Index section and add a NOTE to explain replacement and relocation of the list.

Part of the Document subject to voting is shown in box with mark-ups. Deletion is indicated by strikethrough, addition is indicated in underline. Per ¶3.4.3.3.1 of the Procedure Manual, the purpose, scope, limitations, and terminology sections are provided to show the proposed change in the context but they are not subject to voting unless indicated above mentioned method.

The ballot results will be reviewed and adjudicated at the meetings indicated in the table below. Check www.semi.org/standards under Calendar of Events for the latest update.
<table>
<thead>
<tr>
<th><strong>Review and Adjudication Information</strong></th>
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<tr>
<td><strong>Task Force Review</strong></td>
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<td><strong>City, State/Country:</strong></td>
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<td><strong>Leader(s):</strong></td>
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<td><strong>Standards Staff:</strong></td>
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TF meeting details are subject to change. Contact TF leader or SEMI Staff for confirmation.
Supika Mashiro (Task Force Leader): supika.mashiro@tel.com
Junko Collins (SEMI Japan staff): jcollins@semi.org
Safety Checklist for SEMI Draft Document #5874
Line Item Revision to SEMI S2-0712d, ENVIRONMENTAL, HEALTH, AND SAFETY GUIDELINE FOR SEMICONDUCTOR MANUFACTURING EQUIPMENT

Developing/Revising Body

<table>
<thead>
<tr>
<th>Name/Type:</th>
<th>SDRCM (S Documents REG-PG-SM Conformance Maintenance) Task Force</th>
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<tr>
<td>Technical Committee:</td>
<td>Environmental, Health and Safety</td>
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<td>Region:</td>
<td>Japan</td>
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Leadership

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<th>Affiliation</th>
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<tr>
<td>Leader</td>
<td>Mashiro</td>
<td>Supika</td>
<td>Tokyo Electron</td>
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<tr>
<td>Technical Editor*</td>
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* Only necessary if different from leaders

Documents, Conflicts, and Consideration

Safety related codes, standards, and practices used in developing the safety guideline, and the manner in which each item was considered by the technical committee

<table>
<thead>
<tr>
<th># and Title</th>
<th>Manner of Consideration</th>
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<tr>
<td>SEMI S2-0712d</td>
<td>Used as the original for modification</td>
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Known inconsistencies between the safety guideline and any other safety related codes, standards, and practices cited in the safety guideline

<table>
<thead>
<tr>
<th># and Title</th>
<th>Inconsistency with This Safety Guideline</th>
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Other conflicts with known codes, standards, and practices or with commonly accepted safety and health principles to the extent practical

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Participants and Contributors

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<tr>
<td>Mashiro</td>
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<td>Crane</td>
<td>Lauren</td>
<td>KLA Tencor</td>
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The content requirements of this checklist are documented in Section 14.2 of the Regulations Governing SEMI Standards Committees.
SEMI Draft Document 5874
Line Item Revision to SEMI S2-0712d, ENVIRONMENTAL, HEALTH, AND SAFETY GUIDELINE FOR SEMICONDUCTOR MANUFACTURING EQUIPMENT

This Safety Guideline was technically approved by the global Environmental Health & Safety Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on January 5, 2015. Available at www.semi.org in [Month] 2015; originally published in 1991; previously published February 2015.

NOTICE: Paragraphs entitled ‘NOTE’ are not an official part of this Safety Guideline and are not intended to modify or supersede the official Safety Guideline. These have been supplied by the committee to enhance the usage of the Safety Guideline.

Line Item 1 Part a: Addition of Table of Contents
[Ballot Note: Delayed Effective Date Sections will not appear if this Line Item Ballot is approved for publication in time for July 2015 publication]

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1 Purpose
1.1 This Safety Guideline is intended as a set of performance-based environmental, health, and safety (EHS) considerations for semiconductor manufacturing equipment.

2 Scope
2.1 Applicability — This guideline applies to equipment used to manufacture, measure, assemble, and test semiconductor products.

Line Item 1 Part b: Removal of the list of section numbers and titles from section 2 and add a NOTE to explain replacement and relocation of the list.

2.2 Contents — This Document contains the following sections:
1. Purpose
2. Scope
3. Limitations
4. Referenced Standards and Documents
5. Terminology
6. Safety Philosophy
8. Evaluation Process
9. Documents Provided to User
10. Hazard Alert Labels
11. Safety Interlock Systems
12. Emergency Shutdown
13. Electrical Design
14. Fire Protection
15. Process Liquid Heating Systems
16. Ergonomics and Human Factors
17. Hazardous Energy Isolation
18. Mechanical Design
19. Seismic Protection
20. Automated Material Handlers
21. Environmental Considerations
22. Exhaust Ventilation
23. Chemicals
24. Ionizing Radiation
25. Non-Ionizing Radiation and Fields
26. Lasers
27. Sound Pressure Level
28. Related Documents

Appendix 1 — Design Guidelines for Equipment Using Liquid Chemicals

Appendix 2 — Ionizing Radiation Test Validation

Appendix 3 — Exposure Criteria and Test Methods for Non-Ionizing Radiation (Other than Laser) and Electromagnetic Fields

Appendix 4 — Fire Protection: Flowchart for Selecting Materials of Construction

Appendix 5 — Laser Data Sheet – SEMI S2

NOTE 1: The list of section numbers and their titles that were shown in ¶ 2.2 in previous revisions of S2 are relocated in front of the main part of the document in the Table of Contents.

2.3 Precedence of Sectional Requirements — In the case of conflict between provisions in different sections of this guideline, the section or subsection specifically addressing the technical issue takes precedence over the more general section or subsection.

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

NOTICE: Revisions to § 3 will be effective upon the July 2015 publication as shown in Delayed Revisions Section 1. The Environmental Health & Safety Global Technical Committee has voted that the revision is OPTIONAL before the Effective Date.

3.1 This guideline is intended for use by supplier and user as a reference for EHS considerations. It is not intended to be used to verify compliance with local regulatory requirements.

3.2 It is not the philosophy of this guideline to provide all of the detailed EHS design criteria that may be applied to semiconductor manufacturing equipment. This guideline provides industry-specific criteria, and refers to some of the many international codes, regulations, standards, and specifications that should be considered when designing semiconductor manufacturing equipment.

3.3 Existing models and subsystems should continue to meet the provisions of SEMI S2-93A. Models with redesigns that significantly affect the EHS aspects of the equipment should conform to the latest version of SEMI S2. This guideline is not intended to be applied retroactively.

3.4 In many cases, references to standards have been incorporated into this guideline. These references do not imply applicability of the entire standards, but only of the sections referenced.

4 Referenced Standards and Documents

4.1 SEMI Standards and Safety Guidelines

SEMI E6 — Guide for Semiconductor Equipment Installation Documentation

SEMI F5 — Guide for Gaseous Effluent Handling

SEMI F14 — Guide for the Design of Gas Source Equipment Enclosures

SEMI F15 — Test Method (SF₆ Tracer Gas) for Enclosures Has Been Moved to SEMI S6

SEMI S1 — Safety Guideline for Equipment Safety Labels

SEMI S3 — Safety Guideline for Process Liquid Heating System

SEMI S6 — EHS Guideline for Exhaust Ventilation of Semiconductor Manufacturing Equipment

SEMI S7 — Safety Guideline for Evaluating Personnel and Evaluating Company Qualifications
SEMI S8 — Safety Guidelines for Ergonomics Engineering of Semiconductor Manufacturing Equipment
SEMI S10 — Safety Guideline for Risk Assessment and Risk Evaluation Process
SEMI S12 — Guidelines for Equipment Decontamination
SEMI S13 — Environmental, Health and Safety Guideline for Documents Provided to the Equipment User for Use with Semiconductor Manufacturing Equipment
SEMI S14 — Safety Guidelines for Fire Risk Assessment and Mitigation for Semiconductor Manufacturing Equipment
SEMI S22 — Safety Guideline for the Electrical Design of Semiconductor Manufacturing Equipment

4.2 ANSI Standards
ANSI/RIA R15.06 — Industrial Robots and Robot Systems – Safety Requirements
ANSI/ISA S84.01 — Application of Safety Instrumented Systems for the Process Industry

4.3 CEN/CENELEC Standards
CEN EN 775 — Manipulating Industrial Robots – Safety
CEN EN 1050 — Safety of Machinery – Principles of Risk Assessment
CEN EN 1127-1 — Explosive Atmospheres – Explosion Prevention and Protection – Part 1: Basic Concepts and Methodology

4.4 DIN Standards
DIN V VDE 0801 — Principles for Computers in Safety-Related Systems

4.5 IEC Standards
IEC 60825-1 — Safety of Laser Products – Part 1: Equipment Classification, Requirements
IEC 61010-1 — Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements
IEC 61508 — Functional Safety of Electrical/Electronic/Programmable Electronic Safety-Related Systems

4.6 IEEE Standards
IEEE C95.1 — Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz

4.7 ISO Standards
ISO 10218-1 — Robots for Industrial Environments – Safety Requirements – Part 1: Robot
ISO 13849-1 — Safety of Machinery – Safety-Related Parts of Control Systems – Part 1: General Principles for Design

4.8 NFPA Standards

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1 American National Standards Institute, 25 West 43rd Street, New York, NY 10036, USA; Telephone: 212.642.4900, Fax: 212.398.0023, http://wwwansi.org
2 European Committee for Standardization, Avenue Marnix 17, B-1000 Brussels; Telephone: 32.2.550.08.11, Fax: 32.2.550.08.19, http://www.cen.eu
3 Deutsches Institut für Normung e.V., Available from Beuth Verlag GmbH, Burggrafenstrasse 4-10, D-10787 Berlin, Germany; http://www.din.de
4 International Electrotechnical Commission, 3 rue de Varembé, Case Postale 131, CH-1211 Geneva 20, Switzerland; Telephone: 41.22.919.02.11, Fax: 41.22.919.03.00, http://www.iec.ch
5 Institute of Electrical and Electronics Engineers, 3 Park Avenue, 17th Floor, New York, NY 10016-5997, USA; Telephone: 212.419.7900, Fax: 212.752.4929, http://www.ieee.org
6 International Organization for Standardization, ISO Central Secretariat, 1 rue de Varembé, Case postale 56, CH-1211 Geneva 20, Switzerland; Telephone: 41.22.749.01.11, Fax: 41.22.733.34.30, http://www.iso.ch
NFPA 12 — Standard on Carbon Dioxide Extinguishing Systems
NFPA 13 — Standard for Installation of Sprinkler Systems
NFPA 72 — National Fire Alarm 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
NFPA 2001 — Standard on Clean Agent Fire Extinguishing Systems

4.9 Underwriters Laboratories Standards
UL 508A — Industrial Control Panel

4.10 US Code of Federal Regulations
21 CFR Parts 1000-1050 — Food and Drug Administration/Center for Devices and Radiological Health (FDA/CDRH), Performance Standards for Electronic Products, Title 21 Code of Federal Regulations, Parts 1000-1050

4.11 Other Standards and Documents
ACGIH, Industrial Ventilation Manual
Burton, D.J., Semiconductor Exhaust Ventilation Guidebook
Uniform Building Code™ (UBC)
Uniform Fire Code™

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

5 Terminology
5.1 Abbreviations and Acronyms
5.1.1 ACGIH® — American Conference of Governmental Industrial Hygienists (ACGIH is a registered trademark of the American Conference of Governmental Industrial Hygienists.)
5.1.2 ASHRAE — American Society of Heating, Refrigeration, and Air Conditioning Engineers
5.1.3 MPE — maximum permissible exposure
5.1.4 NOHD — nominal ocular hazard distance

5.2 Definitions
NOTE 2: Composite reports using portions of reports based upon earlier versions of SEMI S2 and SEMI S10 may require understanding of the SEMI S2-0703 or SEMI S10-1296 definitions for the terms hazard, likelihood, mishap, severity, and risk.
5.2.1 abort switch — a switch that, when activated, interrupts the activation sequence of a fire detection or fire suppression system.

5.2.2 accredited testing laboratory — an independent organization dedicated to the testing of components, devices, or systems that is recognized by a governmental or regulatory body as competent to perform evaluations based on established safety standards.

5.2.3 baseline — for the purposes of this Document, “baseline” refers to operating conditions, including process chemistry, for which the equipment was designed and manufactured.

5.2.4 breathing zone — imaginary globe, of 600 mm (2 ft.) radius, surrounding the head.

5.2.5 capture velocity — the air velocity that at any point in front of the exhausted hood or at the exhausted hood opening is necessary to overcome opposing air currents and to capture the contaminated air at that point by causing it to flow into the exhausted hood.

5.2.6 carcinogen — confirmed or suspected human cancer-causing agent as defined by the International Agency for Research on Cancer (IARC) or other recognized entities.

5.2.7 chemical distribution system — the collection of subsystems and components used in a semiconductor manufacturing facility to control and deliver process chemicals from source to point of use for wafer manufacturing processes.

5.2.8 cleanroom — a room in which the concentration of airborne particles is controlled to specific limits.

5.2.9 combustible material — for the purpose of this guideline, a combustible material is any material that does propagate flame (beyond the ignition zone with or without the continued application of the ignition source) and does not meet the definition in this section for noncombustible material. See also the definition for noncombustible material.

5.2.10 equipment — a specific piece of machinery, apparatus, process module, or device used to execute an operation. The term “equipment” does not apply to any product (e.g., substrates, semiconductors) that may be damaged as a result of equipment failure.

5.2.11 face velocity — velocity at the cross-sectional entrance to the exhausted hood.

5.2.12 facilitization — the provision of facilities or services.

5.2.13 fail-safe — designed so that a failure does not result in an increased risk.

NOTE 3: For example, a fail-safe temperature limiting device would indicate an out-of-control temperature if it were to fail. This might interrupt a process, but would be preferable to the device indicating that the temperature is within the control limits, regardless of the actual temperature, in case of a failure.

5.2.14 fail-to-safe equipment control system (FECS) — a safety-related programmable system of control circuits designed and implemented for safety functions in accordance with recognized standards such as ISO 13849-1 (EN 954-1) or IEC 61508, ANSI SP 84. These systems (e.g., safety programmable logic controller (PLC), safety-related input and output (I/O) modules) diagnose internal and external faults and react upon detected faults in a controlled manner in order to bring the equipment to a safe state.

NOTE 4: A FECS is a subsystem to a programmable electronic system (PES) as defined in IEC 61508-4 Definitions.

NOTE 5: Related Information 13 provides additional information on applications of FECS design.

5.2.15 failure — the termination of the ability of an item to perform a required function. Failure is an event, as distinguished from “fault,” which is a state.

5.2.16 fault — the state of an item characterized by inability to perform a required function, excluding the inability during preventive maintenance or other planned actions, or due to lack of external resources.

5.2.17 fault-tolerant — designed so that a reasonably foreseeable single point failure does not result in an unsafe condition.

5.2.18 flammable gas — any gas that forms an ignitable mixture in air at 20°C (68°F) and 101.3 kPa (14.7 psia).

5.2.19 flammable liquid — a liquid having a flash point below 37.8°C (100°F).
5.2.20 **flash point** — the minimum temperature at which a liquid gives off sufficient vapor to form an ignitable mixture with air near the surface of the liquid, or within the test vessel used.

5.2.21 **gas cylinder cabinet** — cabinet used for housing gas cylinders, and connected to gas distribution piping or to equipment using the gas. Synonym: gas cabinet.

5.2.22 **gas panel** — an arrangement of fluid handling components (e.g., valves, filters, mass flow controllers) that regulates the flow of fluids into the process. Synonyms: gas jungle, jungle, gas control valves, valve manifold.

5.2.23 **gas panel enclosure** — an enclosure designed to contain leaks from gas panel(s) within itself. Synonyms: jungle enclosure, gas box, valve manifold box.

5.2.24 **harm** — physical injury or damage to health of people, or damage to equipment, buildings, or environments.

5.2.25 **hazard** — condition that has the potential to cause harm.

5.2.26 **hazardous electrical power** — power levels equal to or greater than 240 VA.

5.2.27 **hazardous production material (HPM)** — a solid, liquid, or gas that has a degree-of-hazard rating in health, flammability, or reactivity of class 3 or 4 as ranked by NFPA 704 and which is used directly in research, laboratory, or production processes that have as their end product materials that are not hazardous.

5.2.28 **hazardous voltage** — unless otherwise defined by an appropriate international standard applicable to the equipment, voltages greater than 30 volts rms, 42.4 volts peak, 60 volts dc are defined in this Document as hazardous voltage.

**NOTE 6:** The specified levels are based on normal conditions in a dry location.

5.2.29 **hinged load** — a load supported by a hinge such that the hinge axis is not vertical.

5.2.30 **hood** — in the context of § エラー!参照元が見つかりません。of this guideline, “hood” means a shaped inlet designed to capture contaminated air and conduct it into an exhaust duct system.

5.2.31 **incompatible** — as applied to chemicals: in the context of § エラー!参照元が見つかりません。of this guideline, describes chemicals that, when combined unintentionally, may react violently or in an uncontrolled manner, releasing energy that may create a hazardous condition.

5.2.32 **intended reaction product** — chemicals that are produced intentionally as a functional part of the semiconductor manufacturing process.

5.2.33 **interlock** — a mechanical, electrical or other type of device or system, the purpose of which is to prevent or interrupt the operation of specified machine elements under specified conditions.

5.2.34 **ionizing radiation** — alpha particles, beta particles, gamma rays, X-rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions in human tissue.

5.2.35 **laser** — any device that can be made to produce or amplify electromagnetic radiation in the wavelength range from 180 nm to 1 mm primarily by the process of controlled stimulated emission.

5.2.36 **laser product** — any product or assembly of components that constitutes, incorporates, or is intended to incorporate a laser or laser system (including laser diode), and that is not sold to another manufacturer for use as a component (or replacement for such component) of an electronic product.

5.2.37 **laser source** — any device intended for use in conjunction with a laser to supply energy for the excitation of electrons, ions, or molecules. General energy sources, such as electrical supply mains, should not be considered to be laser energy sources.

5.2.38 **laser system** — a laser in combination with an appropriate laser energy source, with or without additional incorporated components.

5.2.39 **lifting accessory** — a component (e.g., eyehook, shackle, hoist ring, wire rope, chain, or eyebolt) which is part of a lifting fixture or is attached directly between the lifting device and the load in order to lift it.

5.2.40 **lifting device** — a mechanical or electro-mechanical structure that is provided for the purpose of raising and lowering a load during maintenance or service tasks, and may be capable of moving the load in one or more horizontal directions.
5.2.41 lifting equipment — lifting devices, lifting fixtures and lifting accessories.

5.2.42 lifting fixture — a mechanical device or an assembly of lifting accessories (e.g., hoisting yoke, wire rope sling, webbing sling, or chain assembly) placed between the lifting device (but not permanently attached to it) and the load, in order to attach them to each other.

5.2.43 likelihood — the expected frequency with which harm will occur. Usually expressed as a rate (e.g., events per year, per product, or per substrate processed).

5.2.44 local exhaust ventilation — local exhaust ventilation systems operate on the principle of capturing a contaminant at or near its source and moving the contaminant to the external environment, usually through an air cleaning or a destructive device. It is not to be confused with laminar flow ventilation. Synonyms: LEV, local exhaust, main exhaust, extraction system, module exhaust, individual exhaust.

5.2.45 lower explosive limit — the minimum concentration of vapor in air at which propagation of flame will occur in the presence of an ignition source. Synonyms: LEL, lower flammability limit (LFL).

5.2.46 maintenance — planned or unplanned activities intended to keep equipment in good working order. See also the definition for service.

5.2.47 mass balance — a qualitative, and where possible, quantitative, specification of mass flow of input and output streams (including chemicals, gases, water, de-ionized water, compressed air, nitrogen, and by-products), in sufficient detail to determine the effluent characteristics and potential treatment options.

5.2.48 material safety data sheet (MSDS) — written or printed material concerning chemical elements and compounds, including hazardous materials, prepared in accordance with applicable standards.

5.2.49 maximum permissible exposure (MPE) — level of laser radiation to which, under normal circumstances, persons may be exposed without suffering adverse effects.

5.2.50 nominal ocular hazard distance (NOHD) — distance at which the beam irradiance or radiant exposure equals the appropriate corneal maximum permissible exposure (MPE).

NOTE 7: Examples of such standards are USA government regulation 29 CFR 1910.1200, and Canadian WHMIS (Workplace Hazardous Material Information System).

5.2.51 noncombustible material — a material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat. Typical noncombustible materials are metals, ceramics, and silica materials (e.g., glass and quartz). See also the definition for combustible material.

5.2.52 non-ionizing radiation — forms of electro-magnetic energy that do not possess sufficient energy to ionize human tissue by means of the interaction of a single photon of any given frequency with human tissue. Non-ionizing radiation is customarily identified by frequencies from zero hertz to $3 \times 10^{15}$ hertz (wavelengths ranging from infinite to 100 nm). This includes: static fields (frequencies of 0 hertz and infinite wavelengths); extremely low frequency fields (ELF), which includes power frequencies; subradio-frequencies; radiofrequency/microwave energy; and infrared, visible, and ultraviolet energies.

5.2.53 non-recycling, deadman-type abort switch — a type of abort switch that must be constantly held closed for the abort of the fire detection or suppression system. In addition, it does not restart or interrupt any time delay sequence for the detection or suppression system when it is activated.

5.2.54 occupational exposure limits (OELs) — for the purpose of this Document, OELs are generally established on the basis of an eight hour workday. Various terms are used to refer to OELs, such as permissible exposure levels, Threshold Limit Values®, maximum acceptable concentrations, maximum exposure limits, and occupational exposure standards. However, the criteria used in determining OELs can differ among the various countries that have established values. Refer to the national bodies responsible for the establishment of OELs. (Threshold Limit Value is a registered trademark of the American Conference of Governmental Industrial Hygienists.)

5.2.55 operator — a person who interacts with the equipment only to the degree necessary for the equipment to perform its intended function.

5.2.56 parts-cleaning hood — exhausted hood used for the purpose of cleaning parts or equipment. Synonym: equipment cleaning hood.
5.2.57 placed on the market — made physically available, regardless of the legal aspects of the act of transfer (loan, gift, sale, hire).

5.2.58 positive-opening — as applied to electromechanical control devices. The achievement of contact separation as a direct result of a specified movement of the switch actuator through non-resilient members (i.e., contact separation is not dependent upon springs).

5.2.59 potentially hazardous non-ionizing radiation emissions — for the purposes of this guideline, non-ionizing radiation emissions outside the limits shown in Appendix 4 are considered potentially hazardous.

5.2.60 pyrophoric material — a chemical that will spontaneously ignite in air at or below a temperature of 54.4°C (130°F).

5.2.61 radio frequency (rf) — electromagnetic energy with frequencies ranging from 3 kHz to 300 GHz. Microwaves are a portion of rf extending from 300 MHz to 300 GHz.

5.2.62 readily accessible — capable of being reached quickly for operation or inspection, without requiring climbing over or removing obstacles, or using portable ladders, chairs, etc.

5.2.63 recognized — as applied to standards; agreed to, accepted, and practiced by a substantial international consensus.

5.2.64 rem — unit of dose equivalent. Most instruments used to measure ionizing radiation read in dose equivalent (rems or sieverts). 1 rem = 0.01 sievert.

5.2.65 reproductive toxicants — chemicals that are confirmed or suspected to cause statistically significant increased risk for teratogenicity, developmental effects, or adverse effects on embryo viability or on male or female reproductive function at doses that are not considered otherwise maternally or paternally toxic.

5.2.66 residual — as applied to risks or hazards: that which remains after engineering, administrative, and work practice controls have been implemented.

5.2.67 risk — the expected magnitude of losses from a hazard, expressed in terms of severity and likelihood.

5.2.68 safe shutdown condition — a condition in which all hazardous energy sources are removed or suitably contained and hazardous production materials are removed or contained, unless this results in additional hazardous conditions.

5.2.69 safety critical part — discrete device or component, such as used in a power or safety circuit, whose proper operation is necessary to the safe performance of the system or circuit.

5.2.70 service — unplanned activities intended to return equipment that has failed to good working order. See also the definition for maintenance.

5.2.71 severity — the extent of potential credible harm.

5.2.72 short circuit current rating — the maximum available current to which an equipment supply circuit is intended, by the equipment manufacturer, to be connected.

NOTE 8: Short circuit current rating for an electrical system is typically based on the analysis of short circuit current ratings of the components within the system. See UL 508A and Related Information 2 of SEMI S22 for methods of determining short circuit rating.

5.2.73 sievert (Sv) — unit of dose equivalent. Most instruments used to measure ionizing radiation read in dose equivalent (rems or sieverts). 1 Sv = 100 rems.

5.2.74 standard temperature and pressure — for ventilation measurements, either dry air at 21°C (70°F) and 760 mm (29.92 inches) Hg, or air at 50% relative humidity, 20°C (68°F), and 760 mm (29.92 inches) Hg.

5.2.75 supervisory alarm — as applied to fire detection or suppression systems; an alarm indicating a supervisory condition.

5.2.76 supervisory condition — as applied to fire detection or suppression systems; condition in which action or maintenance is needed to restore or continue proper function.
5.2.77 **supplemental exhaust** — local exhaust ventilation that is used intermittently for a specific task of finite duration.

5.2.78 **supplier** — party that provides equipment to, and directly communicates with, the user. A supplier may be a manufacturer, an equipment distributor, or an equipment representative. See also the definition for **user**.

5.2.79 **testing** — the term “testing” is used to describe measurements or observations used to validate and Document conformance to designated criteria.

5.2.80 **trouble alarm** — as applied to fire detection or suppression systems; an alarm indicating a trouble condition.

5.2.81 **trouble condition** — as applied to fire detection or suppression systems; a condition in which there is a fault in a system, subsystem, or component that may interfere with proper function.

5.2.82 **user** — party that acquires equipment for the purpose of using it to manufacture semiconductors. See also the definition for **supplier**.

5.2.83 **velocity pressure (VP)** — the pressure required to accelerate air from zero velocity to some velocity \(V\). Velocity pressure is proportional to the kinetic energy of the air stream. Associated equation:

\[
VP = (V/4.043)^2
\]  

where:

- \(V\) = air velocity in m/s
- \(VP\) = velocity pressure in mm water gauge (w.g.)

U.S. units: \(VP = (V/4005)^2\)

where:

- \(V\) = velocity in feet per second
- \(VP\) = velocity pressure in inches water gauge (w.g.)

5.2.84 **volumetric flow rate (Q)** — in the context of §12 of this guideline, \(Q\) is the volume of air exhausted per unit time. Associated equation:

\[
Q = VA
\]  

where:

- \(V\) = air flow velocity
- \(A\) = the cross-sectional area of the duct or opening through which the air is flowing at standard conditions.

5.2.85 **wet station** — open surface tanks, enclosed in a housing, containing chemical materials used in the manufacturing of semiconductor materials. Synonyms: wet sink, wet bench, wet deck.

5.2.86 **yield strength** — the stress at which a material exhibits a specified permanent deformation or set. This is the stress at which, the strain departs from the strain departs from the linear portion of the stress-strain curve by an offset unit strain of 0.002.\(^{15}\)

\[\text{===== The intervening S2 content not shown and is not subject to ballot ======}\]

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**Line Item 1 Part c: Removal of the Related Information Index following Appendix 5 and add a NOTE to explain replacement and relocation of the list.**

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## RELATED INFORMATION INDEX

### CONTENTS

- Related Information 1 — Equipment/Product Safety Program
- Related Information 2 — Additional Standards That May Be Helpful
- Related Information 3 — EMO Reach Considerations
- Related Information 4 — Seismic Protection
- Related Information 5 — Continuous Hazardous Gas Detection
- Related Information 6 — Documentation of Ionizing Radiation (§ 24 and Appendix 2) Including Rationale for Changes
- Related Information 7 — Documentation of Non-ionizing Radiation (§ 25 and Appendix 3) Including Rationale for Changes
- Related Information 8 — Laser Equipment Safety Features
- Related Information 9 — Laser Certification Requirements by Region of Use
- Related Information 10 — Other Requirements by Region of Use
- Related Information 11 — Light Tower Color and Audible Alert Codes
- Related Information 12 — Surface Temperature Documentation
- Related Information 14 — Additional Considerations for Fire Suppression Systems
- Related Information 15 — Remote Operation

NOTE XX: The Related Information Index that was shown here following Appendix 5 has been relocated into the front of the main part of the document in the Table of Contents.