NFPA®

318

Standard for the Protection of Semiconductor Fabrication Facilities

2018

IMPORTANT NOTICES AND DISCLAIMERS CONCERNING NFPA® STANDARDS

NOTICE AND DISCLAIMER OF LIABILITY CONCERNING THE USE OF NFPA STANDARDS

NFPA® codes, standards, recommended practices, and guides ("NFPA Standards"), of which the document contained herein is one, are developed through a consensus standards development process approved by the American National Standards Institute. This process brings together volunteers representing varied viewpoints and interests to achieve consensus on fire and other safety issues. While the NFPA administers the process and establishes rules to promote fairness in the development of consensus, it does not independently test, evaluate, or verify the accuracy of any information or the soundness of any judgments contained in NFPA Standards.

The NFPA disclaims liability for any personal injury, property, or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use of, or reliance on NFPA Standards. The NFPA also makes no guaranty or warranty as to the accuracy or completeness of any information published herein.

In issuing and making NFPA Standards available, the NFPA is not undertaking to render professional or other services for or on behalf of any person or entity. Nor is the NFPA undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances.

The NFPA has no power, nor does it undertake, to police or enforce compliance with the contents of NFPA Standards. Nor does the NFPA list, certify, test, or inspect products, designs, or installations for compliance with this document. Any certification or other statement of compliance with the requirements of this document shall not be attributable to the NFPA and is solely the responsibility of the certifier or maker of the statement.

REVISION SYMBOLS IDENTIFYING CHANGES FROM THE PREVIOUS EDITION

Text revisions are shaded. A Δ before a section number indicates that words within that section were deleted and a Δ to the left of a table or figure number indicates a revision to an existing table or figure. When a chapter was heavily revised, the entire chapter is marked throughout with the Δ symbol. Where one or more sections were deleted, a • is placed between the remaining sections. Chapters, annexes, sections, figures, and tables that are new are indicated with an *N*.

Note that these indicators are a guide. Rearrangement of sections may not be captured in the markup, but users can view complete revision details in the First and Second Draft Reports located in the archived revision information section of each code at www.nfpa.org/docinfo. Any subsequent changes from the NFPA Technical Meeting, Tentative Interim Amendments, and Errata are also located there.

REMINDER: UPDATING OF NFPA STANDARDS

Users of NFPA codes, standards, recommended practices, and guides ("NFPA Standards") should be aware that NFPA Standards may be amended from time to time through the issuance of a Tentative Interim Amendment (TIA) or corrected by Errata. An official NFPA Standard at any point in time consists of the current edition of the document together with any TIAs and Errata then in effect.

To determine whether an NFPA Standard has been amended through the issuance of Tentative Interim Amendments or corrected by Errata, go to www.nfpa.org/docinfo to choose from the list of NFPA Standards or use the search feature to select the NFPA Standard number (e.g., NFPA 13). The document information page provides up-to-date document-specific information as well as postings of all existing TIAs and Errata. It also includes the option to register for an "Alert" feature to receive an automatic email notification when new updates and other information are posted regarding the document.

ISBN: 978-145591693-1 (Print)
ISBN: 978-145591694-8 (PDF)
ISBN: 978-145591763-

IMPORTANT NOTICES AND DISCLAIMERS CONCERNING NFPA® STANDARDS

ADDITIONAL NOTICES AND DISCLAIMERS

Updating of NFPA Standards

Users of NFPA codes, standards, recommended practices, and guides ("NFPA Standards") should be aware that these documents may be superseded at any time by the issuance of new editions or may be amended from time to time through the issuance of Tentative Interim Amendments or corrected by Errata. An official NFPA Standard at any point in time consists of the current edition of the document together with any Tentative Interim Amendments and any Errata then in effect. In order to determine whether a given document is the current edition and whether it has been amended through the issuance of Tentative Interim Amendments or corrected through the issuance of Errata, consult appropriate NFPA publications such as the National Fire Codes® Subscription Service, visit the NFPA website at www.nfpa.org, or contact the NFPA at the address listed below.

Interpretations of NFPA Standards

A statement, written or oral, that is not processed in accordance with Section 6 of the Regulations Governing the Development of NFPA Standards shall not be considered the official position of NFPA or any of its Committees and shall not be considered to be, nor be relied upon as, a Formal Interpretation.

Patents

The NFPA does not take any position with respect to the validity of any patent rights referenced in, related to, or asserted in connection with an NFPA Standard. The users of NFPA Standards bear the sole responsibility for determining the validity of any such patent rights, as well as the risk of infringement of such rights, and the NFPA disclaims liability for the infringement of any patent resulting from the use of or reliance on NFPA Standards.

NFPA adheres to the policy of the American National Standards Institute (ANSI) regarding the inclusion of patents in American National Standards ("the ANSI Patent Policy"), and hereby gives the following notice pursuant to that policy:

NOTICE: The user's attention is called to the possibility that compliance with an NFPA Standard may require use of an invention covered by patent rights. NFPA takes no position as to the validity of any such patent rights or as to whether such patent rights constitute or include essential patent claims under the ANSI Patent Policy. If, in connection with the ANSI Patent Policy, a patent holder has filed a statement of willingness to grant licenses under these rights on reasonable and nondiscriminatory terms and conditions to applicants desiring to obtain such a license, copies of such filed statements can be obtained, on request, from NFPA. For further information, contact the NFPA at the address listed below.

Law and Regulations

Users of NFPA Standards should consult applicable federal, state, and local laws and regulations. NFPA does not, by the publication of its codes, standards, recommended practices, and guides, intend to urge action that is not in compliance with applicable laws, and these documents may not be construed as doing so.

Copyrights

NFPA Standards are copyrighted. They are made available for a wide variety of both public and private uses. These include both use, by reference, in laws and regulations, and use in private self-regulation, standardization, and the promotion of safe practices and methods. By making these documents available for use and adoption by public authorities and private users, the NFPA does not waive any rights in copyright to these documents.

Use of NFPA Standards for regulatory purposes should be accomplished through adoption by reference. The term "adoption by reference" means the citing of title, edition, and publishing information only. Any deletions, additions, and changes desired by the adopting authority should be noted separately in the adopting instrument. In order to assist NFPA in following the uses made of its documents, adopting authorities are requested to notify the NFPA (Attention: Secretary, Standards Council) in writing of such use. For technical assistance and questions concerning adoption of NFPA Standards, contact NFPA at the address below.

For Further Information

All questions or other communications relating to NFPA Standards and all requests for information on NFPA procedures governing its codes and standards development process, including information on the procedures for requesting Formal Interpretations, for proposing Tentative Interim Amendments, and for proposing revisions to NFPA standards during regular revision cycles, should be sent to NFPA headquarters, addressed to the attention of the Secretary, Standards Council, NFPA, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101; email: stds_admin@nfpa.org.

For more information about NFPA, visit the NFPA website at www.nfpa.org. All NFPA codes and standards can be viewed at no cost at www.nfpa.org/docinfo.

NFPA® 318

Standard for the

Protection of Semiconductor Fabrication Facilities

2018 Edition

This edition of NFPA 318, *Standard for the Protection of Semiconductor Fabrication Facilities*, was prepared by the Technical Committee on Semiconductor and Related Facilities. It was issued by the Standards Council on August 1, 2017, with an effective date of August 21, 2017, and supersedes all previous editions.

This edition of NFPA 318 was approved as an American National Standard on August 21, 2017.

Origin and Development of NFPA 318

The Committee on Cleanrooms was formed in 1988 and held its first meeting during May of that year. The committee was organized into chapter subcommittees that separately prepared individual chapters and related appendix material for review by the full committee at meetings held October 1988, March 1989, September 1989, March 1990, September 1990, and June 1991.

The standard was submitted and adopted at the Fall Meeting in Montreal in 1991. The 1992 edition was the first edition of this standard.

The standard was revised in 1995.

The 1998 and 2000 editions were partial revisions of the standard.

The 2002 edition of this standard incorporated Article 51 of NFPA 1, *Uniform Fire Code,* and was reformatted to comply with the *Manual of Style for NFPA Technical Committee Documents.*

The 2006 edition contained a new chapter addressing quantity limits for hazardous materials following coordination of this information with *NFPA 5000, Building Construction and Safety Code.*

The 2009 edition clarified the requirements for both Type 1 and Type 2 subatmospheric gas systems. Revisions also included the removal of seismic considerations, in order to focus the scope of the document.

The 2012 edition provided additional modifications to the requirements for subatmospheric gas systems (SAGS) based on the technical committee's review of necessary safeguards for these systems. Several reference standards were updated as part of this revision.

The 2015 edition was completely reorganized in an effort to make the standard more user friendly. The term *subatmospheric gas system* was revised to *subatmospheric gas source* throughout the standard to clarify its meaning. Various categories of hazardous materials were identified, and the concept of "HPM risk assessment" was introduced. New requirements were added throughout the standard that encompassed the following subject matter: hazardous materials, liquid chemical storage and handling, gas storage and handling, production and support equipment, waste treatment, and fire protection.

For the 2018 edition, the most noteworthy changes are major revisions to the requirements for both gas-detection systems as well as smoke detection systems. Both topics were technically modified and also revised for clarity. Gas detection criteria has been revised to clarify when detection is needed and where it is required to be physically provided. The smoke detection requirements were revised to include not just minimum capabilities of detectors but also coverage areas, alert and alarm sensitivities, and maximum transport times taken from NFPA 76, which were based on research conducted by the Fire Protection Research Foundation.

Technical Committee on Semiconductor and Related Facilities

Rick Guevara, *Chair*
Technology Risk Consulting Services, LLC, CA [SE]

John G. Ronan, *Secretary*
Micron Technology, Inc., ID [U]

Bernard Argo, Sandia National Laboratories/USDOE, NM [E]
Robert J. Ballard, Victaulic Company of America, PA [M]
Rep. Fire Suppression Systems Association
Alastair R. Brown, Rushbrook Consultants, Ltd., Scotland [SE]
Allan Cose, Intertek Testing Services, CA [RT]
Jonathan M. Eisenberg, Arup, MA [SE]
Richard Ffrench, FM Global, RI [I]
Amanda Gonzalez, Global Foundries, Inc., NY [U]
Younghoon Joo, Samsung F&M Insurance, South Korea [I]
Steven W. Joseph, Honeywell/Xtralis, Inc., OR [M]
Richard M. Lattanzio, Spansion, Inc., TX [U]
Randy Luckman, Global Asset Protection Services, CA [I]
Thomas L. Multer, Reliable Automatic Sprinkler Company, Inc., SC [M]
Rep. National Fire Sprinkler Association
Eugene Y. Ngai, Chemically Speaking LLC, NJ [SE]
David A. Quadrini, Consultant, TX [SE]
Rodney D. Randall, Zurich Services Corporation, CA [I]
Charles F. Rowe, TUV SUD America Inc./Global Risk Consultants Corporation, IL [SE]
Scott E. Swanson, Intel Corporation, OR [U]
Randell T. Thompson, American International Group, Inc. (AIG), TX [I]
Steven R. Trammell, Environmental and Occupational Risk Management, Inc. (EORM), TX [SE]
Joshua C. Vogel, U.S. Department of Defense, MD [U]
Derek A. White, JENSEN HUGHES, MD [SE]
Matthew T. Wyman, Koetter Fire Protection International Inc., TX [M]

Alternates

Bruce H. Clarke, American International Group, Inc. (AIG), NC [I]
(Alt. to Randell T. Thompson)
Brett Jay Davis, Cypress Semiconductor/Spansion, Inc., TX [U]
(Alt. to Richard M. Lattanzio)
Vincent DeGiorgio, Samsung F&M Insurance, South Korea [I]
(Alt. to Younghoon Joo)
Stephen L. Fox, Global Foundries Inc., NY [U]
(Alt. to Amanda Gonzalez)
Jeffrey S. Grove, JENSEN HUGHES, NV [SE]
(Alt. to Derek A. White)
Ricky R. Jackson, Northstar Fire Protection of Texas, Inc., TX [M]
(Alt. to Thomas L. Multer)
Phil Mazzurco, Siemens Industry, Inc., NJ [M]
(Voting Alt.)
Joseph V. Porada, Zurich Services Corporation, NV [I]
(Alt. to Rodney D. Randall)
Bryan K. Powell, Global Asset Protection Services, VA [I]
(Alt. to Randy Luckman)
Mark W. Slight, Intel Corporation, CA [U]
(Alt. to Scott E. Swanson)
Dwayne E. Sloan, UL LLC, NC [RT]
(Voting Alt.)
Bobbie L. Smith, Micron Technology, Inc., ID [U]
(Alt. to John G. Ronan)
Jeffrey S. Tubbs, Arup, MA [SE]
(Alt. to Jonathan M. Eisenberg)

Nonvoting

Dennis H. Collins, Florence, OR [SE]
(Member Emeritus)
Dennis Kirson, NAVFAC MIDLANT, VA [SE]
(Member Emeritus)

Richard P. Bielen, NFPA Staff Liaison

This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.

NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on the fire protection for fabrication facilities and comparable fabrication processes for semiconductor, display panel, photovoltaic, and related facilities. When bulk gas systems are involved the responsibility begins at a point downstream of the source valve.

Contents