NFPA®

61

Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities

2020

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NFPA® 61

Standard for the

Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities

2020 Edition

This edition of NFPA 61, *Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities*, was prepared by the Technical Committee on Agricultural Dusts and released by the Correlating Committee on Combustible Dusts. It was issued by the Standards Council on November 4, 2019, with an effective date of November 24, 2019, and supersedes all previous editions.

This edition of NFPA 61 was approved as an American National Standard on November 24, 2019.

Origin and Development of NFPA 61

The NFPA 61 standard originated in 1923, when standards were first being developed to prevent dust explosions in grain terminals and flour mills. There were four standards associated with agricultural dusts. In 1969, NFPA 61B was adopted by the Association as a tentative standard to replace three former standards: NFPA 61B, *Code for the Prevention of Dust Explosions in Terminal Grain Elevators*; NFPA 64, *Code for the Prevention of Dust Ignitions in Country Grain Elevators*; and NFPA 661, *Suction and Venting in Grain Elevators*. In addition, NFPA 93, *Standard for Dehydrators and Dryers for Agricultural Products*, was withdrawn in 1968 and its text was incorporated as a chapter in NFPA 61B. The 1969 tentative edition of NFPA 61B was officially adopted at the 1970 NFPA Annual Meeting.

In 1995, the following four agricultural dust standards were combined into a single standard: NFPA 61A, Standard for the Prevention of Fire and Dust Explosions in Facilities Manufacturing and Handling Starch; NFPA 61B, *Standard for the Prevention of Fires and Explosions in Grain Elevators and Facilities Handling Bulk Raw Agricultural Commodities*; NFPA 61C, *Standard for the Prevention of Fire and Dust Explosions in Feed Mills*; and NFPA 61D, *Standard for the Prevention of Fire and Dust Explosions in the Milling of Agricultural Commodities for Human Consumption*. The Technical Committee on Agricultural Dusts determined that the four standards were largely duplicative, and it therefore created one comprehensive standard, NFPA 61, Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities, covering the full range of requirements for good design, operating practice, and protective features.

In the 2002 edition, the second revised edition after the combination of the four documents, requirements were clarified and additional advisory material was added. The document was also modified to comply with the updated NFPA *Manual of Style* for technical committee documents.

In the 2008 edition, requirements for life safety and construction were clarified. A requirement for safety devices on belt conveyors was added. Requirements for proper head section venting were added, as well as a requirement for all filters to be located outdoors. Clarification on training requirements were provided.

In the 2013 edition, the Committee updated definitions related to agricultural products handling, conveying, and dust collection. The requirements in Chapter 7 affecting bucket elevators were revised to reflect current industry practice. The requirements in Chapter 10 affecting dust control systems were revised to include a written housekeeping program. Requirements for pneumatic conveying system design were added into Chapter 11. In Chapter 12, the requirement related to standpipes was revised.

The 2017 edition underwent substantial revision to better align with the newly issued NFPA 652, *Standard on the Fundamentals of Combustible Dust*. The document was reorganized to match, where possible, the organization of NFPA 652. New requirements for dust hazards analysis (Chapter 7) were added, as well as a new Chapter 6 on performance-based design. Objectives were added to the

general requirements in Chapter 4. A new Chapter 5 on hazard identification also was added to the document. In addition, the table on agricultural dust test data was reviewed and updated.

In the 2020 edition, additional changes have been made to align the organization of NFPA 61 with NFPA 652 where possible, and the deadline for completing a dust hazard analysis (DHA) for existing processes and facility compartments has been specified as January 1, 2022. Surface resistivity requirements for conveyor belts, lag belts, and lagging have been revised, and a new statement has been added to exclude air-material separators with a dirty side volume of less than 0.2 m^3 (8 ft^3) from explosion protection requirements. This edition contains new sections on spray dryer systems, mixers and blenders, and work activities that present an ignition source. The section on management of change has been revised to clarify what is required to be addressed versus what is recommended. Annex material has been added to provide information about the methods that can be used to complete a DHA; determining filtering efficiency of dust collectors; and protection methods for bins, silos, and tunnels where explosion venting is not practical. The table on agricultural dust test data has been updated and expanded to include additional dusts, and the example checklist for completing a DHA has been replaced with a more detailed, comprehensive example.

Correlating Committee on Combustible Dusts

Kevin Kreitman, *Chair*
Albany Fire Department, OR [E]

Chris Aiken, Cargill, Inc., MN [U]

Matthew J. Bujewski, MJB Risk Consulting, MO [SE]

John M. Cholin, J. M. Cholin Consultants Inc., NJ [SE]

Gregory F. Creswell, Cambridge-Lee Industries, PA [M]

Scott G. Davis, GexCon US, MD [SE]

Walter L. Frank, Frank Risk Solutions, Inc., DE [SE]

Robert C. Gombar, Baker Engineering & Risk Consultants, Inc., MD [U]
Rep. US Beet Sugar Association

John A. LeBlanc, FM Global, MA [I]
Rep. FM Global

Arthur P. Mattos, Jr., TUV SUD America Inc./Global Risk Consultants, NC [SE]

Jack E. Osborn, Airdusco, Inc., TN [M]

Jeffrey R. Roberts, AXA XL/Global Asset Protection Services, LLC, MS [I]

Bill Stevenson, CV Technology, Inc., FL [M]

Alternates

Christopher D. Headen, Cargill, Inc., MN [U]
(Alt. to Chris Aiken)

Jason Krbec, CV Technology, Inc., FL [M]
(Alt. to Bill Stevenson)

Adam Morrison, Fike Corporation, MO [M]
(Voting Alt.)

Nonvoting

Brad D. Burridge, Novelis, Inc., KY [U]
Rep. TC on Fundamentals of Combustible Dusts

Mark W. Drake, Liberty Mutual, KS [I]
Rep. TC on Combustible Metals and Metal Dusts

William R. Hamilton, US Department of Labor, DC [E]

Timothy J. Myers, Exponent, Inc., MA [SE]
Rep. TC on Agricultural Dusts

Laura E. Moreno, NFPA Staff Liaison

Jason P. Reason, Seam Group/Lewellyn Technology, IN [SE]
Rep. TC on Wood and Cellulosic Materials Processing

Mark L. Runyon, Marsh Risk Consulting, OR [I]
Rep. TC on Handling and Conveying of Dusts, Vapors, and Gases

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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 hazard identification, prevention, control, and extinguishment of fires and explosions in the design, construction, installation, operation, and maintenance of facilities and systems used in manufacturing, processing, recycling, handling, conveying, or storing combustible particulate solids, combustible metals, or hybrid mixtures.

Technical Committee on Agricultural Dusts

Timothy J. Myers, *Chair*
Exponent, Inc., MA [SE]

Kevin Baumhover, Todd & Sargent Inc., IA [SE]
Matthew J. Bujewski, MJB Risk Consulting, MO [SE]
Ashok Ghose Dastidar, Fauske & Associates, LLC, IL [SE]
David Depuydt, Hays Companies, MN [I]
Brian Edwards, Conversion Technology, Inc., GA [SE]
Craig Froehling, Cargill, Inc., MN [U]
Matthew S. Gibbons, Archer Daniels Midland Company, IL [U]
Rep. National Oilseed Processors Association
Dan A. Guaricci, ATEX Explosion Protection, L.P., FL [M]
Gary Huddleston, American Feed Industry Association, KY [U]
William E. Janz, Global Asset Protection Services, LLC, IL [I]
William F. Kearns, Fred D. Pfening Company, OH [M]
William F. Kinslow, Jr., Mondelez International, NJ [U]
James E. Maness, JEM Safety Consulting, DE [U]
Rep. Grain Elevator and Processing Society
Nancy J. Marks, Kelloggs, MI [U]
Jess P. McCluer, National Grain and Feed Association, VA [U]
Steven A. McCoy, Ingredion, IN [U]
Bruce McLelland, Fike Corporation, MO [M]
Jack E. Osborn, Airdusco, Inc., TN [M]
Michael Peters, Nebraska State Fire Marshal, NE [E]
Kent C. Quinney, The Amalgamated Sugar Company LLC, ID [U]
Rep. US Beet Sugar Association
Mark L. Runyon, Marsh Risk Consulting, OR [I]
Andrew Ryerson, FM Global, MA [I]
Rep. FM Global
Nicholas P. Schlentz, Boss Products LLC, WA [M]
Robert D. Shafto, Zurich Insurance, MI [I]
Jeffery W. Sutton, TUV SUD America Inc./Global Risk Consultants Corporation, MN [SE]
P. D. (Nick) Thielen, General Mills, Inc., MN [U]
Courtney L. Turner, Process Risk Solutions, AL [SE]
Erdem A. Ural, Loss Prevention Science & Technologies, Inc., MA [SE]
Clyde Waller, Powder Process Solutions, MN [IM]
J. Anthony Yount, Ardent Mills, LLC, CO [U]

Alternates

Darren Adams, The Fred D Pfening Company, OH [M]
(Alt. to William F. Kearns)
Venkateswara Sarma Bhamidipati, Powder Process Solutions, MN [IM]
(Alt. to Clyde Waller)
Eric Douglas Colvin, CHS Inc., MN [U]
(Alt. to Matthew S. Gibbons)
Brian G. Deutsch, Michigan Sugar Company, MI [U]
(Alt. to Kent C. Quinney)
Christopher D. Headen, Cargill, Inc., MN [U]
(Alt. to Craig Froehling)
James Karnesky, Exponent, Inc., CA [SE]
(Alt. to Timothy J. Myers)
Kevin Kimbell, Ardent Mills, LLC, NE [U]
(Alt. to J. Anthony Yount)
Glen R. Mortensen, Zurich Services Corporation, IL [I]
(Alt. to Robert D. Shafto)
James Peters, Boss Products LLC, KS [M]
(Alt. to Nicholas P. Schlentz)
Ronald A. Stein, Aon Global Risk Consultants, MO [I]
(Voting Alt.)

Nonvoting

William R. Hamilton, US Department of Labor, DC [E]
Robert W. Nelson, Pocasset, MA [SE]
(Member Emeritus)

Laura E. Moreno, NFPA Staff Liaison

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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 prevention, control, and extinguishment of fire and explosions resulting from dusts produced by the processing, handling, and storage of grain, starch, food, animal feed, flour, and other agricultural products. The Technical Committee shall also be responsible for requirements relating to the protection of life and property from fire and explosion hazards at agricultural and food products facilities.

Contents

NFPA 61

Standard for the

Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities

2020 Edition

NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced and extracted publications can be found in Chapter 2 and Annex G.

Chapter 1 Administration

1.1 Scope. This standard provides requirements applicable to agricultural and/or food processing facilities for managing or mitigating fire and explosion hazards of combustible agricultural or food processing dusts or related particulate solids.

1.2* Purpose. This standard shall provide the minimum requirements necessary for safety to life and property from fire, flash fire, and explosion posed by agricultural and food processing combustible dust and represents the industry and commodity-specific requirements for agricultural and food processing.

1.3 Application.

1.3.1* This standard shall apply to all of the following:

(1) All facilities that receive, handle, process, dry, blend, use, mill, package, store, or ship dry agricultural bulk materials, their by-products, or dusts that include grains, oilseeds, agricultural seeds, legumes, sugar, flour, spices, feeds, dry dairy/food powders, and other related materials

(2) All facilities designed for manufacturing and handling starch, including drying, grinding, conveying, processing, packaging, and storing dry or modified starch, and dry products and dusts generated from these processes

(3) Those seed preparation and meal-handling systems of oilseed processing plants not covered by NFPA 36

1.3.2 This standard shall not apply to oilseed extraction processes that are covered by NFPA 36.

1.4* Conflicts.

1.4.1 Where a requirement specified in this industry-specific standard differs from a requirement specified in NFPA 652, the requirement in this standard shall be permitted to be used instead.

1.4.2 Where a requirement specified in this standard specifically prohibits a requirement specified in NFPA 652, the prohibition in this standard shall be permitted.

1.4.3 The requirements of this standard shall be applied or construed so as not to create an unreasonable risk to public food safety.

1.5 Retroactivity. The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued.

1.5.1 Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive.

1.5.2 In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate.

1.5.3 The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

1.5.4 When renovating an existing facility, equipment, or process, the provisions of this standard shall apply to that portion of the facility, equipment, or process.

1.6* Equivalency. Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard. Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency. The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

1.7 Units and Formulas.

1.7.1 SI Units. Metric units of measurement in this standard shall be in accordance with the modernized metric system known as the International System of Units (SI). [**652:**1.7.1]

1.7.2* Primary and Equivalent Values. If a value for a measurement as given in this standard is followed by an equivalent value in other units, the first stated value shall be regarded as the requirement. [**652:**1.7.2]

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 10, *Standard for Portable Fire Extinguishers,* 2018 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems,* 2019 edition.

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems,* 2019 edition.

NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection,* 2017 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems,* 2020 edition.

NFPA 30, *Flammable and Combustible Liquids Code,* 2018 edition.

NFPA 31, *Standard for the Installation of Oil-Burning Equipment,* 2020 edition.

NFPA 36, *Standard for Solvent Extraction Plants,* 2017 edition.

NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work,* 2019 edition.

NFPA 54/ANSI Z223.1, *National Fuel Gas Code,* 2018 edition.

NFPA 58, *Liquefied Petroleum Gas Code,* 2020 edition.

NFPA 68, *Standard on Explosion Protection by Deflagration Venting,* 2018 edition.

NFPA 69, *Standard on Explosion Prevention Systems,* 2019 edition.

NFPA 70®, National Electrical Code®, 2020 edition.

NFPA 72®, National Fire Alarm and Signaling Code, 2019 edition.

NFPA 86, *Standard for Ovens and Furnaces,* 2018 edition.

NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids,* 2020 edition.

NFPA 101®, Life Safety Code®, 2018 edition.

NFPA 496, *Standard for Purged and Pressurized Enclosures for Electrical Equipment,* 2017 edition.

NFPA 505, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations,* 2018 edition.

NFPA 652, *Standard on the Fundamentals of Combustible Dust,* 2019 edition.

NFPA 654, *Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids,* 2020 edition.

NFPA 780, *Standard for the Installation of Lightning Protection Systems,* 2020 edition.

NFPA 2112, *Standard on Flame-Resistant Clothing for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire,* 2018 edition.

NFPA 2113, *Standard on Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire,* 2020 edition.

NFPA 5000®, Building Construction and Safety Code®, 2018 edition.

2.3 Other Publications.

2.3.1 AMCA Publications. Air Movement and Control Association International, Inc., 30 West University Drive, Arlington Heights, IL 60004-1893.

ANSI/AMCA Standard 99, Standards Handbook, *Classifications for Spark Resistant Construction,* 2010.

2.3.2 ASME Publications. ASME Technical Publishing Office, Two Park Avenue, New York, NY 10016-5990.

Boiler and Pressure Vessel Code, Section VIII, Division I, "Rules for Construction of Pressure Vessels," 2015.

2.3.3 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM D378, *Standard Test Methods for Rubber (Elastomeric) Conveyor Belting, Flat Type,* 2010, reapproved 2016.

ASTM E1226, *Standard Test Method for Explosibility of Dust Clouds,* 2012a.

ASTM E1515, *Standard Test Method for Minimum Explosible Concentration of Combustible Dusts,* 2014.

2.3.4 ISA Publications. International Society of Automation, 67 T.W. Alexander Drive, Research Triangle Park, NC 27709.

ANSI/ISA 84.00.01, *Functional Safety: Safety Instrumented Systems for the Process Industry Sector,* 2004.

2.3.5 MSHA Publications. Mine Safety and Health Administration (MSHA), 201 12th Street South, Suite 401, Arlington VA 22202-5450.

MSHA Title 30, Code of Federal Regulations, Part 18, Section 18.65, "2G Test."

2.3.6 UN Publications. United Nations Publications, Customer Service, P.O. Box 960, Herndon, VA 20172.

UN Recommendations on the Transport of Dangerous Goods: Model Regulations — Manual of Tests and Criteria, 13th edition.

2.3.7 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

Δ 2.4 References for Extracts in Mandatory Sections.

NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work,* 2019 edition.

NFPA 68, *Standard on Explosion Protection by Deflagration Venting,* 2018 edition.

NFPA 221, *Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls,* 2018 edition.

NFPA 652, *Standard on the Fundamentals of Combustible Dust,* 2019 edition.

NFPA 654, *Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids,* 2020 edition.

NFPA 1250, *Recommended Practice in Fire and Emergency Service Organization Risk Management,* 2020 edition.

NFPA 1451, *Standard for a Fire and Emergency Services Vehicle Operations Training Program,* 2018 edition.