

NFPA 481

Standard for the Production, Processing, Handling, and Storage of Titanium

2000 Edition



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An International Codes and Standards Organization

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NFPA 481

Standard for the

Production, Processing, Handling, and Storage of Titanium

2000 Edition

This edition of NFPA 481, *Standard for the Production, Processing, Handling, and Storage of Titanium*, was prepared by the Technical Committee on Combustible Metals and Metal Dusts and acted on by the National Fire Protection Association, Inc., at its World Fire Safety Congress and Exposition™ held May 14–17, 2000, in Denver, CO. It was issued by the Standards Council on July 20, 2000, with an effective date of August 18, 2000, and supersedes all previous editions.

This edition of NFPA 481 was approved as an American National Standard on August 18, 2000.

Origin and Development of NFPA 481

This standard was initiated in 1955, tentatively adopted in 1957 and, with certain amendments, was adopted by NFPA in May 1958. Amendments were adopted in 1959 and 1961.

A complete revision of the 1961 edition was adopted in 1972. Amendments to the 1972 edition were adopted in 1974.

In 1980, the 1974 edition was completely revised, primarily to comply with the NFPA *Manual of Style*. Minor technical corrections were also made at this time. The completely revised edition was adopted by the NFPA at its 1981 Fall Meeting, and the revision was designated the 1982 edition.

The 1987 edition was a reconfirmation of the 1982 edition.

For the 1995 edition, the committee completely revised the standard to update the fire and dust explosion prevention measures and the requirements for safe handling of titanium solids and powders. The committee revision also incorporated editorial and style revisions to comply with the NFPA *Manual of Style* and to assist in making the document more usable, adoptable, and enforceable.

The 2000 edition has several updates throughout the document. The most significant change is the addition of requirements that address dust collection systems in Chapter 5. In addition, several new fire protection requirements were added to Chapter 8.

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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 safeguards against fire and explosion in the manufacturing, processing, handling, and storage of combustible metals, powders, and dusts.

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

Changes other than editorial are indicated by a vertical rule in the margin of the pages on which they appear. These lines are included as an aid to the user in identifying changes from the previous edition.

Information on referenced publications can be found in Chapter 9 and Appendix C.

Chapter 1 General

1.1 Scope.

1.1.1 This standard shall apply to the production, processing, handling, and storage of titanium.

1.1.2 This standard shall also apply to finished parts and those materials, including scrap, that exhibit the burning characteristics of titanium.

1.1.3 This standard shall not apply to the transportation of titanium in any form on public highways and waterways, or by air or rail.

1.1.4 This standard shall not apply to those laboratories handling hazardous chemicals as defined in NFPA 45, *Standard on Fire Protection for Laboratories Using Chemicals*.

1.2* Purpose. The purpose of this standard shall be to provide requirements addressing the fire and explosion hazards of titanium and titanium alloys and to outline requirements for fire prevention and protection.

1.3 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.

1.4 Applicability. The provisions of this document shall be considered necessary to provide a reasonable level of protection from loss of life and property from fire and explosion. They reflect situations and the state-of-the-art prevalent at the time the standard was issued. Unless otherwise noted, it shall not be intended that the provisions of this document be applied to facilities, equipment, structures, or installations that were existing or approved for construction or installation prior to the effective date of the document, except in those cases where it is determined by the authority having jurisdiction that the existing situation involves a distinct hazard to life or adjacent property.

1.5 Definitions. For the purpose of this standard, the following terms shall have the meanings given below.

1.5.1* Approved. Acceptable to the authority having jurisdiction.

1.5.2* Authority Having Jurisdiction. The organization, office, or individual responsible for approving equipment, materials, an installation, or a procedure.

1.5.3 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

1.5.4* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

1.5.5 Media Collector. Refers to either a bag house or a filter-type cartridge collector used for collecting dust.

1.5.6 Shall. Indicates a mandatory requirement.

1.5.7 Should. Indicates a recommendation or that which is advised but not required.

1.5.8 Titanium. Refers to either pure metal or alloys having the generally recognized properties of titanium metal, including the fire or explosion characteristics of titanium in its various forms.

1.5.8.1* Titanium Chips. Particles produced from a cutting, machining, or grinding operation that are not oxidized and that are not diluted by noncombustible materials.

1.5.8.2* Titanium Dust. Any finely divided titanium material 420 microns or smaller in diameter (material passing U.S. No. 40 Standard Sieve) that presents a fire or explosion hazard when dispersed and ignited in air.

1.5.8.3 Titanium Fines. Titanium particles typically 20 mesh and below that can be ignited in a static layer.

1.5.8.4* Titanium Powder. See 1.5.8.2, Titanium Dust, and 1.5.8.3, Titanium Fines.

1.5.8.5* Titanium Sponge. Titanium metal after it has been won from the ore but before it is melted into ingot.

1.5.8.6 Titanium Swarf. Particles produced from a cutting, machining, or grinding operation that causes partial oxidation of the parent material or dilution by other inert materials.

Chapter 2 Sponge Production

2.1 Plant Construction.

2.1.1* Buildings housing reduction furnaces, boring and crushing facilities, and titanium refining operations shall be constructed of noncombustible materials. Consideration shall be given to the provision of explosion venting in accordance with current accepted practices.