ASME B31.9-2025
(Revision of ASME B31.9-2020)

Building Services Piping

ASME Code for Pressure Piping, B31

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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The American Society of Mechanical Engineers
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FOREWORD

The need for a national code for pressure piping became increasingly evident from 1915 to 1925. The American Standards Association (ASA) initiated the B31 Project in March 1926 to meet that need. The American Society of Mechanical Engineers (ASME) proposed the work and has served as sponsor since its inception.

The first edition was published in 1935 as the American Tentative Standard Code for Pressure Piping. To keep the Code abreast of developments in design, welding, and service conditions, and of new standards and specifications, new or supplementary editions were issued as follows:

B31.1-1942	American Standard Code for Pressure Piping
B31.1a-1944	Supplement 1
B31.1b-1947	Supplement 2
B31.1-1951	American Standard Code for Pressure Piping
B31.1a-1953	Supplement 1 to B31.1-1951
B31.1-1955	American Standard Code for Pressure Piping

In 1955, a decision was made to develop and publish separate Code Sections for various industries. The current Sections are as follows:

B31.1	Power Piping
B31.3	Process Piping
B31.4	Pipeline Transportation Systems for Liquids and Slurries
B31.5	Refrigeration Piping and Heat Transfer Components
B31.8	Gas Transmission and Distribution Piping Systems
B31.9	Building Services Piping
B31.12	Hydrogen Piping and Pipelines

In 1969, ASA, renamed the United States of America Standards Institute (USASI), became the American National Standards Institute (ANSI), and the B31 Sectional Committee became the B31 Standards Committee. In 1978, ASME was granted accreditation by ANSI to organize the B31 Committee as the ASME Code for Pressure Piping, with Code Sections designated as ANSI/ASME B31.

Need for a separate building services section of the Code for Pressure Piping had been recognized for several years. ASME B31.9, Building Services Piping, first issued in 1982, was developed to fill that need.

The Code has intentionally been written on a conservative basis in order to avoid the necessity for complex design, fabrication, and inspection criteria. For this reason, application of this Code is expected to be simple and straightforward.

Metric (SI) units were added in parentheses after U.S. Customary (USC) units. The 2008 edition was approved by ANSI on April 1, 2008, and designated as ASME B31.9-2008.

The 2011 edition of ASME B31.9 contained revisions to the definitions and materials section of the Code. Additionally, the allowable stress values were updated to the 3.5 design margin.

The 2014 edition of ASME B31.9 included revisions to materials and the standards for material specifications, and other errata found in the Code.

The 2017 edition of ASME B31.9 included the addition of allowable stresses for (austenitic) stainless steels to Table I-1 and revisions to references in Mandatory Appendix III. Following approval by the B31 Main Committee and the ASME Board on Pressure Technology Codes and Standards, and after public review, ASME B31.9-2017 was approved by ANSI on October 31, 2017.

The 2020 edition of ASME B31.9 added the definition of *manufacturer's weld line*, second paragraphs to paras. 927.4.6 and 931, and three new rows to Table I-1 and revised the references in Mandatory Appendix III. Following approval by the B31 Main Committee and the ASME Board on Pressure Technology Codes and Standards, and after public review, ASME B31.9-2020 was approved by ANSI on September 16, 2020.

The 2025 edition of ASME B31.9 adds MSS SP-119 to Table 926.1-1, removes “toxic” and “flammable” services from various paragraphs, and revises para. 904.7.2. Following approval by the B31 Main Committee and the ASME Board on Pressure Technology Code and Standards, and after public review, ASME B31.9-2025 was approved by ANSI on June 17, 2025.

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Code for Pressure Piping

(The following is the roster of the committee at the time of approval of this Code.)

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Revisions and Errata. The committee processes revisions to this Code on a continuous basis to incorporate changes that appear necessary or desirable as demonstrated by the experience gained from the application of the Code. Approved revisions will be published in the next edition of the Code.

In addition, the committee may post errata on the committee web page. Errata become effective on the date posted. Users can register on the committee web page to receive email notifications of posted errata.

This Code is always open for comment, and the committee welcomes proposals for revisions. Such proposals should be as specific as possible, citing the paragraph number, the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent background information and supporting documentation.

Cases

(a) The most common applications for cases are

(1) to permit early implementation of a revision based on an urgent need

(2) to provide alternative requirements

(3) to allow users to gain experience with alternative or potential additional requirements prior to incorporation directly into the Code

(4) to permit the use of a new material or process

(b) Users are cautioned that not all jurisdictions or owners automatically accept cases. Cases are not to be considered as approving, recommending, certifying, or endorsing any proprietary or specific design, or as limiting in any way the freedom of manufacturers, constructors, or owners to choose any method of design or any form of construction that conforms to the Code.

(c) A proposed case shall be written as a question and reply in the same format as existing cases. The proposal shall also include the following information:

(1) a statement of need and background information

(2) the urgency of the case (e.g., the case concerns a project that is underway or imminent)

(3) the Code and the paragraph, figure, or table number

(4) the editions of the Code to which the proposed case applies

(d) A case is effective for use when the public review process has been completed and it is approved by the cognizant supervisory board. Approved cases are posted on the committee web page.

Interpretations. Upon request, the committee will issue an interpretation of any requirement of this Code. An interpretation can be issued only in response to a request submitted through the online Inquiry Submittal Form at https://go.asme.org/InterpretationRequest. Upon submitting the form, the inquirer will receive an automatic email confirming receipt.

ASME does not act as a consultant for specific engineering problems or for the general application or understanding of the Code requirements. If, based on the information submitted, it is the opinion of the committee that the inquirer should seek assistance, the request will be returned with the recommendation that such assistance be obtained. Inquirers can track the status of their requests at https://go.asme.org/Interpretations.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME committee or subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Interpretations are published in the ASME Interpretations Database at https://go.asme.org/Interpretations as they are issued.

Committee Meetings. The B31 Standards Committee regularly holds meetings that are open to the public. Persons wishing to attend any meeting should contact the secretary of the committee. Information on future committee meetings can be found on the committee web page at https://go.asme.org/B31committee.

(25)

INTRODUCTION

The ASME B31 Code for Pressure Piping consists of a number of individually published Sections, each an American National Standard. Hereafter, in this Introduction and in the text of this Code Section B31.9, where the word *Code* is used without specific identification, it means this Code Section.

The Code specifies engineering requirements deemed necessary for safe design and construction of pressure piping. While safety is the primary consideration, this factor alone will not necessarily govern the final specifications for any piping installation. The Code is not a design handbook. Many decisions made to produce a sound piping installation are not specified in detail within this Code. The Code does not serve as a substitute for sound engineering judgment by the owner and designer.

To the greatest possible extent, Code requirements for design are stated in terms of basic design principles and formulas. These are supplemented as necessary with specific requirements to ensure uniform application of principles and to guide selection and application of piping elements. The Code prohibits designs and practices known to be unsafe and contains warnings where caution, but not prohibition, is warranted.

(a) This Code Section includes

(1) references to acceptable material specifications and component standards, including dimensional requirements and pressure–temperature ratings

(2) requirements for design of components and assemblies, including pipe supports

(3) requirements and data for evaluation and limitation of stresses, reactions, and movements associated with pressure, temperature changes, and other forces

(4) guidance and limitations on the selection and application of materials, components, and joining methods

(5) requirements for the fabrication, assembly, and erection of piping

(6) requirements for examination, inspection, and testing of piping

It is intended that this edition of Code Section B31.9 not be retroactive. Unless agreement is specifically made between contracting parties to use another issue, or the regulatory body having jurisdiction imposes the use of another issue, the latest edition issued at least 6 months prior to the original contract date for the first phase of activity covering a piping system or systems shall be the governing document for all design, materials, fabrication, erection, examination, and testing for the piping until the completion of the work and initial operation.

Users of this Code are cautioned against making use of revisions without assurance that they are acceptable to the proper authorities in the jurisdiction where the piping is to be installed.

Code users will note that clauses in the Code are not necessarily numbered consecutively. Such discontinuities result from following a common outline, insofar as practicable, for all Code Sections. In this way, corresponding material is correspondingly numbered in most Code Sections, thus facilitating reference by those who have occasion to use more than one Section.

The Code is under the direction of ASME Committee B31, Code for Pressure Piping, which is organized and operates under ASME procedures that have been accredited by the American National Standards Institute. The Committee is a continuing one and keeps all Code Sections current with new developments in materials, construction, and industrial practice. New editions are published at intervals of 3 to 5 years.

It is the owner's responsibility to select the Code Section that most nearly applies to a proposed piping installation. Different Code Sections may apply to different parts of an installation. Factors to be considered by the owner include limitations of the Code Section, jurisdictional requirements, and the applicability of other codes and standards. All applicable requirements of the selected Code Section shall be met, and the owner should impose additional requirements supplementing those of the Code in order to ensure safe piping for the proposed installation.

(b) Rules for each Code Section have been developed considering the need for application-specific requirements for the pressure piping involved. Applications considered for each Code Section include

(1) B31.1, Power Piping — piping typically found in electric power generating stations, industrial and institutional plants, geothermal heating systems, and central and district heating and cooling systems

(2) B31.3, Process Piping — piping typically found in petroleum refineries; onshore and offshore petroleum and natural gas production facilities; chemical, pharmaceutical, textile, paper, ore-processing, semiconductor, and cryogenic plants; food- and beverage-processing facilities; and related processing plants and terminals

(3) B31.4, Pipeline Transportation Systems for Liquids and Slurries — piping transporting products that are predominately liquid between plants and terminals, and within terminals and pumping, regulating, and metering stations

(4) B31.5, Refrigeration Piping and Heat Transfer Components — piping for refrigerants and secondary coolants

(5) B31.8, Gas Transportation and Distribution Piping Systems — piping transporting products that are predominately gas between sources and terminals, including compressor, regulating, and metering stations; and gas gathering pipelines

(6) B31.9, Building Services Piping — piping typically found in industrial, institutional, commercial, and public buildings, and in multi-unit residences, which does not require the range of sizes, pressures, and temperatures covered in ASME B31.1

(7) B31.12, Hydrogen Piping and Pipelines — piping in gaseous and liquid hydrogen service, and pipelines in gaseous hydrogen service

(c) Certain piping within a facility may be subject to other codes and standards, including but not limited to

(1) ASME Boiler and Pressure Vessel Code, Section III — nuclear power piping

(2) ANSI Z223.1, National Fuel Gas Code — fuel gas piping from the point of delivery to the connections of each gas utilization device

(3) NFPA Fire Protection Standards — fire protection systems using water and other materials such as carbon dioxide, halon, foam, dry chemicals, and wet chemicals

(4) NFPA 85, Boiler and Combustion Systems Hazards Code

(5) NFPA 99, Health Care Facilities — medical and laboratory gas systems

(d) Either U.S. Customary (USC) units or International System (SI, also known as metric) units may be used with this edition. Local customary units may also be used to demonstrate compliance with this Code. One system of units should be used consistently for requirements applying to installation. The equations in this Code may be used with any consistent system of units. It is the responsibility of the organization performing calculations to ensure that a consistent system of units is used.

(e) See the Correspondence With the B31 Committee page for information on Code Cases. The ASME B31 Standards Committee took action to eliminate Code Case expiration dates effective September 21, 2007. This means that all Code Cases in effect as of that date will remain available for use until annulled by the ASME B31 Standards Committee.

(f) Materials are listed in the stress tables only when sufficient usage in piping within the scope of the Code has been shown. Materials may be covered by a Case. Requests for listing shall include evidence of satisfactory usage and specific data to permit establishment of allowable stresses, maximum and minimum temperature limits, and other restrictions. (To develop usage and gain experience, unlisted materials may be used in accordance with para. 923.1.2.)

ASME B31.9-2025
SUMMARY OF CHANGES

Following approval by the ASME B31 Standards Committee and ASME, and after public review, ASME B31.9-2025 was approved by the American National Standards Institute on June 17, 2025.

ASME B31.9-2025 includes the following changes identified by a margin note, **(25)**. In addition, many of the figures and tables have been editorially redesignated. Cross-references have been updated accordingly. For the user's convenience, a table listing the former and current figure and table designations follows this Summary of Changes.

Page	*Location*	*Change*
xii	Introduction	Second paragraph revised
1	900	Third paragraph revised
3	900.2	Definition of *inspector* revised
9	901.6	Revised
11	904.1.1	Subparagraph (a)(1) revised
12	904.2.2	First paragraph revised
14	905.2	Paragraphs 905.2.1 through 905.2.3 revised
15	906.3	Revised
16	913.1	Revised
18	919.2.3	Revised
18	920.1.2	Last paragraph revised
21	921.2.1	Subparagraph (c) revised
27	923.2	In paras. 923.2.3 and 923.2.4, "flammable" revised to "combustible"
27	923.3.2	First paragraph revised
30	Table 926.1-1	In former Table 926.1, MSS SP-119 added
36	927.3.1	Subparagraph (e) added
45	935.13	Revised
46	936.6.1	Subparagraphs (c) and (g) revised
47	937.2.1	Revised
48	937.3.5	Revised
48	937.4.1	Subparagraph (f) added
48	937.4.2	Revised
48	937.4.5	Revised
48	937.5.1	Revised
48	937.5.2	Revised
50	Table I-1	Note (3) deleted
57	Table I-4	Note (1) revised
59	Mandatory Appendix III	Updated
62	Mandatory Appendix IV	Deleted
64	B-1.2	Definitions of *active components*, *critical piping*, and *design earthquake* revised

Page	*Location*	*Change*
67	B-3.6	Revised
67	B-7	Updated

Figures and Tables Redesignated in ASME B31.9-2025

Figure Designators		Table Designators	
ASME B31.9-2020	**ASME B31.9-2025**	**ASME B31.9-2020**	**ASME B31.9-2025**
900.1.2	900.1.2-1	902.4.3	902.4.3-1
904.2.2	904.2.2-1	904.2.1	904.2.1-1
921.1.3-1	No change	917.3	917.3.1-1
921.1.3-2		919.3.1	919.3.1-1
927.4.3-1		921.2.2	921.2.2-1
927.4.3-2		926.1	926.1-1
927.4.3-3		926.2	926.2-1
927.4.5-1		I-1	No change
927.4.5-2		I-2	
927.4.6-1		I-3	
927.4.6-2		I-4	
927.4.6-3		II-1	
		B-3.2.1	B-3.2-1
		B-3.3.1	B-3.3-1

Chapter I
Scope and Definitions

(25) 900 GENERAL

This Building Services Piping Code is a Section of The American Society of Mechanical Engineers (ASME) Code for Pressure Piping, B31. This Section, herein called the Code, is published as a separate document for convenience.

Standards and specifications incorporated by reference in this Code are shown in Table 926.1-1, Mandatory Appendix I, and elsewhere. It is not considered practical to refer to a dated edition of each standard or specification where referenced. Instead, the dated edition references are included in Mandatory Appendix III.

The user is cautioned that the local building code shall be observed and adhered to when its requirements are more stringent than those of this Code.

Components of piping systems shall conform to the specifications and standards listed in this Code. Piping elements neither specifically approved nor specifically prohibited by this Code may be used, provided they are qualified for use as set forth in applicable chapters of this Code.

The Code generally specifies a simplified approach for many of its requirements. A designer may choose to use a more rigorous analysis to develop design and construction requirements. When the designer decides to take this approach, the designer shall provide to the owner details and calculations demonstrating that design, construction, examination, and testing are consistent with the criteria of this Code. These details shall be adequate for the owner to verify the validity and shall be approved by the owner. The details shall be documented in the engineering design.

900.1 Scope

900.1.1 Coverage and Application. This Code Section has rules for the piping in industrial, institutional, commercial, and public buildings, and in multi-unit residences, which does not require the range of sizes, pressures, and temperatures covered in ASME B31.1. This Code prescribes requirements for the design, materials, fabrication, installation, inspection, examination, and testing of piping systems for building services. It includes piping systems in the building or within the property limits.

900.1.2 Services and Limits

(a) Services. This Code applies to the following building services, except as excluded in para. 900.1.3:

(1) water and antifreeze solutions for heating and cooling
(2) condensing water
(3) steam or other condensate
(4) other nontoxic liquids
(5) steam
(6) vacuum
(7) compressed air
(8) other nontoxic, nonflammable gases
(9) combustible liquids including fuel oil

(b) Boiler External Piping. The scope of this Code includes boiler external piping within the following limits:

(1) for steam boilers, 15 psig (103 kPa gage) max.
(2) for water heating units, 160 psig (1 103 kPa gage) max. and 250°F (121°C) max.

Boiler external piping above these pressure or temperature limits is within the scope of ASME B31.1. Boiler external piping is the piping connected to the boiler and extending to the points identified in Figure 900.1.2-1.

(c) Material and Size Limits. Piping systems of the following materials are within the scope of this Code, through the indicated maximum size (and wall thickness if noted):

(1) carbon steel: NPS 48 (DN 1200) and 0.50 in. (12.7 mm) wall
(2) stainless steel: NPS 24 (DN 600) and 0.50 in. (12.7 mm) wall
(3) aluminum: NPS 12 (DN 300)
(4) brass and copper: NPS 12 (DN 300) and 12.125 in. (308 mm) O.D. for copper tubing
(5) thermoplastics: NPS 24 (DN 600)
(6) ductile iron: NPS 48 (DN 1200)
(7) reinforced thermosetting resin (RTR): 24 in. (600 mm) nominal

Other materials may be used as noted in Chapter III.

(d) Pressure Limits. Piping systems with working pressures not in excess of the following limits are within the scope of this Code:

(1) steam and condensate: 150 psig (1 034 kPa gage)
(2) liquids: 350 psig (2 413 kPa gage)
(3) vacuum: 1 atm external pressure
(4) compressed air and gas: 150 psig (1 034 kPa gage)