ASME PCC-2–2022
(Revision of ASME PCC-2–2018)

Repair of Pressure Equipment and Piping

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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The American Society of Mechanical Engineers
Two Park Avenue • New York, NY • 10016 USA

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The next edition of this Standard is scheduled for publication in 2026.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Interpretations are published on the Committee web page and under http://go.asme.org/InterpsDatabase. Periodically certain actions of the ASME PCC Committee may be published as Cases. Cases are published on the ASME website under the PCC Committee Page at http://go.asme.org/PCCcommittee as they are issued.

Errata to codes and standards may be posted on the ASME website under the Committee Pages to provide corrections to incorrectly published items, or to correct typographical or grammatical errors in codes and standards. Such errata shall be used on the date posted.

The PCC Committee Page can be found at http://go.asme.org/PCCcommittee. There is an option available to automatically receive an e-mail notification when errata are posted to a particular code or standard. This option can be found on the appropriate Committee Page after selecting “Errata” in the “Publication Information” section.

The American Society of Mechanical Engineers
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FOREWORD

ASME formed an Ad Hoc Task Group on Post-Construction in 1993 in response to an increased need for recognized and generally accepted engineering standards for the inspection and maintenance of pressure equipment after it has been placed in service. At the recommendation of this Task Group, the Board on Pressure Technology Codes and Standards (BPTCS) formed the Post-Construction Committee (PCC) in 1995. The scope of this committee was to develop and maintain standards addressing common issues and technologies related to post-construction activities and to work with other consensus committees in the development of separate, product-specific codes and standards addressing issues encountered after initial construction for equipment and piping covered by Pressure Technology Codes and Standards. The BPTCS covers non-nuclear boilers, pressure vessels (including heat exchangers), piping and piping components, pipelines, and storage tanks.

The requirements and recommendations established by the Committee are not to be interpreted as approving, recommending, or endorsing any proprietary or specific design or repair method, or as limiting in any way the freedom to choose any method of design or any form of repair that conforms to these requirements and recommendations.

The Committee meets regularly to consider revisions, to develop new requirements and recommendations as dictated by technological development, Cases of the PCC Standards, and requests for interpretations. Only the Committee has the authority to provide official interpretations of these Standards. Requests for revisions, new rules, Cases of the PCC Standards, or interpretations shall be addressed to the Secretary in writing and shall give full particulars in order to receive consideration and action (see Correspondence With the PCC Committee). Proposed revisions to the Standard resulting from inquiries will be presented to the Committee for appropriate action. The action of the Committee becomes effective only after confirmation by ballot of the Committee and approval by ASME. Proposed revisions to the Standards approved by the Committee are submitted to the American National Standards Institute (ANSI) and published at http://go.asme.org/BPVCPublicReview to invite comments from all interested persons. After public review and final approval by ASME, revisions are published in the next scheduled edition of the Standard.

The PCC selects standards to be developed based on identified needs and the availability of volunteers. The PCC formed the Subcommittee on Inspection Planning and the Subcommittee on Flaw Evaluations in 1995. In 1998, a Task Group under the PCC began preparing Guidelines for Pressure Boundary Bolted Flange Joint Assembly. In 1999, the PCC formed the Subcommittee on Repair and Testing. In 2002, the Subcommittee on Flaw Evaluation was dissolved and replaced by the Joint ASME/API Committee on Fitness for Service. Other topics are under consideration and may be developed into future guideline documents.

The subcommittees were charged with preparing standards dealing with several aspects of the in-service inspection and maintenance of pressure equipment and piping. The Inspection Planning Standard provides guidance on the preparation of a risk-based inspection plan. Defects that are identified may then be evaluated, when appropriate, using the procedures provided in the Fitness for Service. Finally, if it is determined that repairs are to be made, guidance on repair procedures is provided in the Repair of Pressure Equipment and Piping Standard.

None of these documents are codes. They provide recognized and generally accepted good practices that may be used in conjunction with Post-Construction Codes, such as API 510, API 570, and NB-23, and with jurisdictional requirements.

This Standard uses the words *shall*, *should*, and *may* as follows:

(a) Shall is used to denote a requirement.

(b) Should is used to denote a recommendation.

(c) May is used to denote permission, neither a requirement nor a recommendation.

The first edition of ASME PCC-1, *Guidelines for Pressure Boundary Bolted Flange Joint Assembly*, was approved for publication in 2000. ASME PCC-1–2000 was approved by the American National Standards Institute (ANSI) as an American National Standard on November 15, 2000.

The first edition of ASME PCC-3, *Inspection Planning Using Risk-Based Methods*, was approved for publication in 2007. It was approved by ANSI as an American National Standard on October 4, 2007.

The first edition of ASME PCC-2, *Repair of Pressure Equipment and Piping*, was approved for publication in 2004. Subsequent editions were published in 2008, 2011, 2015, and 2018.

Starting with the 2018 edition, new editions are expected to be published on a 4-year cycle. ASME PCC-2–2022 was approved by ANSI as an American National Standard on April 4, 2022.

ASME PRESSURE TECHNOLOGY POST-CONSTRUCTION COMMITTEE

(The following is the roster of the Committee at the time of approval of this Standard.)

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CORRESPONDENCE WITH THE PCC COMMITTEE

General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions or a case, and attending Committee meetings. Correspondence should be addressed to:

Secretary, PCC Standards Committee
The American Society of Mechanical Engineers
Two Park Avenue
New York, NY 10016-5990
http://go.asme.org/Inquiry

Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Proposing a Case. Cases may be issued to provide alternative rules when justified, to permit early implementation of an approved revision when the need is urgent, or to provide rules not covered by existing provisions. Cases are effective immediately upon ASME approval and shall be posted on the ASME Committee web page.

Requests for Cases shall provide a Statement of Need and Background Information. The request should identify the Standard and the paragraph, figure, or table number(s), and be written as a Question and Reply in the same format as existing Cases. Requests for Cases should also indicate the applicable edition(s) of the Standard to which the proposed Case applies.

Interpretations. Upon request, the PCC Standards Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the PCC Standards Committee.

Requests for interpretation should preferably be submitted through the online Interpretation Submittal Form. The form is accessible at http://go.asme.org/InterpretationRequest. Upon submittal of the form, the Inquirer will receive an automatic e-mail confirming receipt.

If the Inquirer is unable to use the online form, he/she may mail the request to the Secretary of the PCC Standards Committee at the above address. The request for an interpretation should be clear and unambiguous. It is further recommended that the Inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry in one or two words.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. Please provide a condensed and precise question, composed in such a way that a "yes" or "no" reply is acceptable.
Proposed Reply(ies):	Provide a proposed reply(ies) in the form of "Yes" or "No," with explanation as needed. If entering replies to more than one question, please number the questions and replies.
Background Information:	Provide the Committee with any background information that will assist the Committee in understanding the inquiry. The Inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in the format described above may be rewritten in the appropriate format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

Moreover, ASME does not act as a consultant for specific engineering problems or for the general application or understanding of the Standard requirements. If, based on the inquiry information submitted, it is the opinion of the Committee that the Inquirer should seek assistance, the inquiry will be returned with the recommendation that such assistance be obtained.

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.

Attending Committee Meetings. The PCC Standards Committee regularly holds meetings and/or telephone conferences that are open to the public. Persons wishing to attend any meeting and/or telephone conference should contact the Secretary of the PCC Standards Committee.

ASME PCC-2–2022
SUMMARY OF CHANGES

Following approval by the ASME PCC Committee and ASME, and after public review, ASME PCC-2–2022 was approved by the American National Standards Institute on April 4, 2022.

References to ASME PCC-1 have been updated throughout ASME PCC-2–2022. ASME PCC-2–2022 also includes the following changes identified by a margin note, **(22)**.

Page	*Location*	*Change*
1	101-3.2	Revised in its entirety
16	202-7	API address updated
30	206-2.6	Revised
30	206-2.7	Revised
31	206-2.8	Revised
31	206-2.10	Last two sentences added
33	206-3.7	First sentence revised
33	206-3.8	Revised in its entirety
35	206-5.3	Revised
35	206-5.5	Revised
35	206-6	First paragraph revised
36	206-7	(1) API address updated (2) Last ASME reference added
37	207-3.1	(1) Subparagraph (c) revised (2) Subparagraph (h) added
41	207-4	Subparagraph (f)(3) added, and subsequent subparagraphs redesignated
42	207-7	API address updated
47	208-7	(1) ANSI/NB-23–2007 publisher corrected (2) API address updated
51	209-7	(1) ANSI/NB-23–2007 designation and publisher corrected (2) API address updated (3) WRC publisher added
58	210-7	(1) AGA and API addresses updated (2) AWS and NBBI publishers added
64	211-1.5	Revised in its entirety
68	211-7	(1) ANSI/NB-23–2007 publisher corrected (2) API address updated
74	212-7	API address updated
77	213-7	PFI address updated
82	214-4.3	Revised in its entirety
84	214-7	API address and WRC website updated
88	215-1.1	Last sentence and Table 215-1.1-1 deleted

Page	*Location*	*Change*
90	215-7	API and WRC addresses updated
104	216-3.12	Equation in subpara. (b)(5) corrected by errata
108	216-7.1	(1) Titles of ASME BPVC Sections and publisher of ANSI/NB-23 corrected
		(2) API address updated
108	216-7.2	Last four ASME references and ANSI Z49.1 publisher corrected
111	Article 217	Added
136	304-7	API address updated
142	305-7.1	API address updated
146	306-7	API address updated
157	308-7	AISC address updated
172	312-7	(1) API address updated
		(2) HEI address corrected
175	Table 312-I-1.3-1	Fourth and fifth column heads revised
182	313-7	API address updated
183	Article 401	Revised in its entirety
204	Mandatory Appendix 401-II	Deleted
205	Mandatory Appendix 401-III	Deleted
206	Mandatory Appendix 401-IV	Deleted
207	Mandatory Appendix 401-V	Deleted
208	Mandatory Appendix 401-VI	Deleted
215	Nonmandatory Appendix 401-B	Deleted
216	Article 402	Revised in its entirety
226	Mandatory Appendix 402-II	Deleted
227	Mandatory Appendix 402-III	Deleted
238	403-7.1	(1) API address updated
		(2) ISO address corrected
239	403-7.2	SSPC-SP 8 reference designation corrected
245	403-III-1	Definition of *curing* replaced with definition of *cure or curing*
246	Article 404	Added
247	Article 405	Added
270	501-3.1	Revised in its entirety
275	501-6.2	Subparagraph (m) revised
278	501-7	(1) API RP 579-1 reference designation, ISO address, ASNT Recommended Practice No. SNT-TC-1A designation and title, and ASNT address corrected
		(2) API address and WRC website updated
282	501-III-1	First paragraph and subparas. (a) and (b) revised
288	502-7	(1) NBBI and ASNT addresses corrected
		(2) API address updated
292	503-1.1.1	(1) First paragraph revised
		(2) Subparagraph (b) added, and subsequent subparagraphs redesignated
292	503-1.1.2	Title and first paragraph revised
293	Figure 503-1.1.2-1	Title revised

Page	*Location*	*Change*
292	503-1.1.3	Added
292	503-1.2	Definition of *local hydrostatic test* revised
292	503-2.2	Subparagraph (d) revised
293	503-3	Subparagraph (a) designator and subpara. (b) added
294	Figure 503-1.1.3-1	Added
295	503-3.3	Subparagraph (b) revised
295	503-3.4	Subparagraph (c) revised
295	503-4	Subparagraphs (a) through (c) revised
296	503-4.1	Subparagraphs (a), (c), and (d) revised
296	503-4.2	(1) Subparagraphs (a) through (c) revised (2) Former subparas. (d) and (e) transposed
296	503-4.5	Added
297	503-5.2	Subparagraphs (a) and (b) revised
297	503-5.3	Revised
298	503-7	WRC address updated

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PART 1
SCOPE, ORGANIZATION, AND INTENT

Article 101
Introduction

101-1 SCOPE

This Standard provides methods for repair of equipment, piping, pipelines, and associated ancillary equipment within the scope of ASME Pressure Technology Codes and Standards[1] after they have been placed in service. These repair methods include relevant design, fabrication, examination, and testing practices and may be temporary or permanent, depending on the circumstances.

The methods provided in this Standard address the repair of components when repair is deemed necessary based on appropriate inspection and flaw assessment. These inspection and flaw evaluation methods are not covered in this Standard, but are covered in other post-construction codes and standards.

This Standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this Standard to establish appropriate safety and health practices, and determine the applicability of regulatory limitations prior to use.

Only technical procedures and information are provided; administrative or policy requirements are outside of the scope of this Standard.

101-2 ORGANIZATION

This Standard is divided into five Parts.

(a) Part 1 covers the scope, organization, and intent and is applicable to all articles in this Standard.

(b) Part 2 covers repair methods and techniques that include the use of welding, brazing, soldering, or other methods involving metal deposit.

(c) Part 3 covers mechanical repairs, with or without sealant, such as bolted clamps or fixtures and includes all repair methods not covered in Part 2 or Part 4.

(d) Part 4 covers repairs using nonmetallic means, such as nonmetallic liners and wraps, and bonding (e.g., joining by epoxy), including bonding of metallic components.

(e) Part 5 covers examination and testing methods and techniques.

101-3 INTENT

101-3.1 General

This Standard provides technical information, procedures, and recommendations for repair methods that were determined by consensus to be recognized and generally accepted good engineering practice. Where equipment repair is subject to jurisdictional regulation, jurisdictional approvals may be required.

101-3.2 Acronyms and Definitions (22)

The words *shall*, *should*, and *may* are defined in the Foreword of this Standard. When used in the repair articles of this Standard, they have the following intent:

shall: indicates an action that is an essential element of the repair method that cannot be eliminated.

should: indicates an action that when performed, is generally considered to be good practice; however, there are some circumstances when the action is not appropriate or required, so the word *should* is used to provide flexibility for the article to cover a broad range of circumstances. It is not mandatory unless so specified by others in the application of these articles.

may: indicates an action that is permitted, but not required.

101-3.2.1 Acronyms

API	American Petroleum Institute
ASM (ASM International)	American Society of Metals
ASME	The American Society of Mechanical Engineers
ASNT	American Society for Nondestructive Testing
AWS	American Welding Society
AWWA	American Water Works Association
BPVC	Boiler and Pressure Vessel Code

[1] Equipment and piping within the scope of ASME Pressure Technology Codes and Standards includes piping (including pipelines) and piping components (such as valves), boilers, pressure vessels (including heat exchangers), and storage tanks.