ASME PCC-2–2015
(Revision of ASME PCC-2–2011)

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

Date of Issuance: February 23, 2015

The next edition of this Standard is scheduled for publication in 2017.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Interpretations are published on the Committee Web page and under go.asme.org/InterpsDatabase.

Errata to codes and standards may be posted on the ASME Web site 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.

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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 nonnuclear boilers, pressure vessels (including heat exchangers), piping and piping components, pipelines, and storage tanks.

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 are then evaluated, when appropriate, using the procedures provided in the Fitness for Service. Finally, if it is determined that repairs are required, guidance on repair procedures is provided in the Repair of Pressure Equipment and Piping Standard. These documents are in various stages of preparation.

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.

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-2, *Repair of Pressure Equipment and Piping*, was approved for publication in 2004. This revision was approved by ANSI as an American National Standard on January 13, 2015.

PREPARATION OF TECHNICAL INQUIRIES

INTRODUCTION

The ASME Post-Construction Standards Committee will consider written requests for interpretations and revisions of the rules of this Standard and develop new rules if dictated by technological development. The Committee's activities in this regard are limited strictly to interpretations of the rules or to the consideration of revisions to the present rules on the basis of new data or technology. As a matter of published policy, ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity, and, accordingly, inquiries requiring such consideration will be returned. Moreover, ASME does not act as a consultant on specific engineering problems or on the general application or understanding of the rules. If, based on the inquiry information submitted, it is the opinion of the Committee that the inquirer should seek professional assistance, the inquiry will be returned with the recommendation that such assistance be obtained.

An inquiry that does not provide the information needed for the Committee's full understanding will be returned.

REQUIREMENTS

Inquiries shall be limited strictly to interpretations of the rules or to the consideration of revisions to the present rules on the basis of new data or technology. Inquiries shall meet the following requirements:

(a) Scope. Involve a single rule or closely related rules in the scope of the standard. An inquiry letter concerning unrelated subjects will be returned.

(b) Background. State the purpose of the inquiry, which may be either to obtain an interpretation of rules of this Standard, or to propose consideration of a revision to the present rules. Provide concisely the information needed for the Committee's understanding of the inquiry, being sure to include reference to the applicable Part, Article, Edition, Addenda, paragraphs, figures, and tables. If sketches are provided, they shall be limited to the scope of the inquiry.

(c) Inquiry Structure

(1) Proposed Question(s). The inquiry shall be stated in condensed and precise question format, omitting superfluous background information, and, where appropriate, composed in such a way that "yes" or "no" (perhaps with provisos) would be an acceptable reply. The inquiry statement should be technically and editorially correct.

(2) Proposed Reply(ies). Provide a proposed reply stating what the inquirer believes that the standard requires.

If in the inquirer's opinion, a revision to the standard is needed, recommended wording shall be provided in addition to information justifying the change.

SUBMITTAL

Inquiries shall be submitted in typewritten form; however, legible handwritten inquiries will be considered. They shall include the name and mailing address of the inquirer, and may either be sent by email to SecretaryPCC@asme.org, or by mail to the following address:

Secretary
ASME Post-Construction
Two Park Avenue
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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, 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

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.

Interpretations. Upon request, the PCC 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.

The request for 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.
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. 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 this format may be rewritten in the appropriate format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

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 that are open to the public. Persons wishing to attend any meeting should contact the Secretary of the PCC Standards Committee.

ASME PCC-2–2015
SUMMARY OF CHANGES

Following approval by the ASME Post-Construction Committee and ASME, and after public review, ASME PCC-2–2015 was approved by the American National Standards Institute on January 13, 2015.

ASME PCC-2–2015 includes editorial changes, revisions, and corrections introduced in ASME PCC-2–2011, as well as the following changes identified by a margin note, **(15)**.

Page	*Location*	*Change*
7	Article 2.1, 4.1.3	Equations in subparas. (a) and (b) transposed
11–16	Article 2.2	Revised in its entirety
43	Article 2.9, 2.3	Correctly redesignated, and remaining paragraphs redesignated
64	Article 2.12, 1	Subparagraph (a) revised
	Article 2.12, 2	Subparagraph (c) revised
65	Figure 1	Revised
66–68	Article 2.12, 3.3	Subparagraphs (a) and (c) revised
	Article 2.12, 3.4	Subparagraphs (a) and (b), eq. (4), and illustration in subpara. (c) revised
	Article 2.12, 4	Subparagraphs (c), (d), (e)(2), (e)(4), and (f) revised
	Article 2.12, 5	Subparagraph (a) revised
	Article 2.12, 6	Subparagraph (c) revised
143–153	Article 4.1, 1	Revised in its entirety
	Article 4.1, 2.2	Subparagraphs (a) and (b) revised
	Article 4.1, 3	Revised in its entirety
	Table 1	Revised in its entirety
	Article 4.1, 4.1	Revised
	Article 4.1, 4.3	Subparagraph (a) revised
154	Article 4.1, 4.4.4	Subparagraphs (d) and (e) added
	Article 4.1, 4.4.5	Revised

Page	*Location*	*Change*
	Article 4.1, 4.6	(1) Subparagraph (a)(3) revised (2) Subparagraph (a)(4) added, and remaining subparagraphs redesignated
155	Article 4.1, 5.4	Paragraph 5.4.1 and subhead 5.4.2 added
156–159	Article 4.1, 5.5.2	Subparagraph (c) revised
	Article 4.1, 6	(1) Subparagraph (c) revised (2) Subparagraph (e) added
	Article 4.1, 7	Updated
160–162	Article 4.1, Mandatory Appendix I	Form revised
163, 164	Article 4.1, Mandatory Appendix II, II-1	Subparagraphs (a) and (b) revised
	Article 4.1, Mandatory Appendix II, II-3	(1) Subparagraphs (a)(1)(a), (a)(2)(a), (a)(2)(b), and (b) revised (2) Original subpara. (a)(2)(c) redesignated subpara. (a)(3), original subpara. (a)(2)(c)(1) redesignated subpara. (a)(3)(a), and original subpara. (a)(2)(c)(2) redesignated subpara. (a)(3)(b)
165	Article 4.1, Mandatory Appendix III, III-2	(1) Subparagraphs (c) and (i) revised (2) Original second subpara. (f) correctly redesignated subpara. (g)
166	Article 4.1, Mandatory Appendix IV, IV-2	(1) Subparagraphs (c) and (h) revised (2) Subparagraphs (i)(1) and (i)(2) added
	Article 4.1, Mandatory Appendix IV, IV-3	Word “and” added immediately after equation in subpara. (c)
168, 169	Article 4.1, Mandatory Appendix V	Revised in its entirety
170	Article 4.1, Mandatory Appendix VI, VI-1	Revised
	Article 4.1, Mandatory Appendix VI, VI-2	Subparagraph (c) revised
171, 172	Article 4.1, Mandatory Appendix VII	Revised in its entirety
173	Article 4.1, Mandatory Appendix VIII, VIII-2	Subparagraph (b) revised
	Article 4.1, Mandatory Appendix VIII, VIII-3	Subparagraphs (c) and (e) revised
	Article 4.1, Mandatory Appendix VIII, VIII-4	Caution added
175, 176	Article 4.1, Nonmandatory Appendix A	(1) Redesignated from original Mandatory Appendix IX (2) Revised in its entirety

Page	*Location*	*Change*
177–180	Article 4.1, Nonmandatory Appendix B	Added
181	Article 4.2, 1	Revised in its entirety
182	Article 4.2, 2.2	Subparagraphs (a) and (b) revised
	Article 4.2, 2.4	Paragraph 2.5 deleted
	Article 4.2, 3.1	Revised in its entirety
	Article 4.2, 3.2	Subparagraph (a) revised
183	Table 1	Revised in its entirety
184	Article 4.2, 3.6	Revised
	Article 4.2, 4.4	Subparagraph (a) designation and subpara. (b) added
186, 187	Article 4.2, 6	Subparagraph (a)(1) revised
	Article 4.2, 7	Updated
190	Article 4.2, Mandatory Appendix II, II-1	Subparagraph (c) revised
	Article 4.2, Mandatory Appendix II, II-2	Subparagraph (d) revised
193	Article 4.2, Mandatory Appendix V, V-3	Subparagraphs (e) and (h) revised
	Article 4.2, Mandatory Appendix V, V-5	(1) First paragraph and subparas. (b)(1) and (c)(5) revised (2) Subparagraph (a)(4) added, and remaining subparagraphs redesignated
194	Article 4.2, Nonmandatory Appendix A	Redesignated from original Mandatory Appendix VI
207	Article 5.1, 1	Subparagraph (a) revised
	Article 5.1, 2	Revised in its entirety
208, 210	Article 5.1, 3.2	Subparagraph (d) added, and remaining subparagraphs redesignated
209	Figure 1	Revised in its entirety
	Article 5.1, 3.4.3	Added, and remaining paragraph redesignated
210–214	Article 5.1, 3.4.4	Revised
	Article 5.1, 6.1	Subparagraphs (m), (o), (t)(8), (t)(10), (t)(10)(a), and (t)(10)(d) revised
	Article 5.1, 6.2	Subparagraphs (b), (f)(7), (i), (k), and (l) revised
	Article 5.1, 6.2.1.5	Revised in its entirety
	Article 5.1, 6.3	Subparagraph (a) revised
215	Article 5.1, 6.3.1	Revised in its entirety
	Article 5.1, 7	Updated

Page	*Location*	*Change*
219	Article 5.1, Mandatory Appendix III, III-1	(1) Title added (2) Equation (III-1) revised
	Article 5.1, Mandatory Appendix III, III-2	Added
220	Table III-2	Added

REPAIR OF PRESSURE EQUIPMENT AND PIPING

PART 1
SCOPE, ORGANIZATION, AND INTENT

1 SCOPE

This Standard provides methods for repair of equipment and piping 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.

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

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. Table 1 provides guidance for the applicability of repair methods listed 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.

3 INTENT

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.

3.2 Definitions

The words *may*, *shall*, and *should* are used in the repair articles of PCC-2 and they have the following intent:

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

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

should: an action that is not mandatory. It 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.

3.3 Administrative Requirements

For administrative requirements such as inspection, documentation, and quality control, the user is referred to an applicable post-construction code and to the jurisdictional requirements. In the absence of an applicable post-construction code or jurisdictional requirements, the owner of the pressure equipment or piping should establish the administrative requirements. A post-construction code is one that provides requirements and guidance for inspection and/or repair of equipment

[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.