ASME PCC-1–2022

(Revision of ASME PCC-1–2019)

Pressure Boundary Bolted Flange Joint Assembly

AN AMERICAN NATIONAL STANDARD

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The American Society of Mechanical Engineers
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CONTENTS

Foreword vi
Committee Roster iii
Correspondence With the PCC Committee ix
Summary of Changes xi

1 Scope 1
2 Introduction 1
3 Training and Qualification of Bolted Joint Assembly Personnel 2
4 Cleaning of Gasket Seating Surfaces of Flanges 2
5 Examination of Flange and Fastener Contact Surfaces 2
6 Alignment of Flange Joints 3
7 Installation of Gasket 3
8 Lubrication 4
9 Installation of Bolts 4
10 Tightening Procedure 4
11 Optional Practices 5
12 Joint Pressure and Tightness Testing 6
13 Records 6
14 Joint Disassembly 6
15 References 7

Mandatory Appendix

I Definitions 10

Nonmandatory Appendices

A Training and Qualification of Bolted Joint Assembly Personnel 15
B Description of Common Terms 24
C Recommended Gasket Seating Surface Finish for Various Gasket Types 25
D Guidelines for Allowable Gasket Seating Surface Flatness and Defect Depth 26
E Flange Joint Alignment Guidelines 31
F Joint-Tightening Practices and Patterns 34
G Single-Stud Replacement 48
H Bolt Root and Tensile Stress Areas 49
I Interaction During Tightening 51
J Optional Practices for Flange Joint Assembly 52
K Nut Factor Calculation of Target Torque 56
L ASME B16.5 Flange Bolting Information 58
M Washer Usage Guidance and Purchase Specifications for Through-Hardened Washers 59

N Definitions, Commentary, and Guidelines on the Reuse of Bolts 64
O Assembly Bolt Stress Determination 66
P Troubleshooting Flange Joint Leakage 82
Q Considerations for the Use of Powered Equipment 93
R Assembly Records Management 99

Figures

8-1 Examples of Lubrication Application 5
D-2-1 Flange Circumferential Variation Tolerance, *T*1 27
D-2-2 Flange Radial Variation Tolerance, *T*2 28
D-3-1 Flange Surface Damage Assessment: Pits and Dents 29
D-3-2 Flange Surface Damage Assessment: Scratches and Gouges 29
D-4-1 RTJ Gasket Seating Surface Assessment 30
E-2-1 Centerline High/Low 32
E-2-2 Excessive Spacing Gap 32
E-2-3 Parallelism 32
E-2-4 Rotational Two-Hole 33
F-6.1.1.2.1-1 Pattern #1 (Star Pattern): 24-Bolt Basic Example 38
F-6.1.1.2.2-1 Pattern #1 (Star Pattern): 24-Bolt Modified Star Example 39
F-6.1.1.2.2-2 Modified Star Pattern With Multiple Tools 40
F-6.1.2.1-1 Pattern #2 (Quadrant Pattern): 24-Bolt Examples 41
F-6.1.2.2-1 Pattern #2 (Quadrant Pattern): 24-Bolt Accelerated Cross Example . . . 44
F-6.1.3.1-1 Pattern #3 (Circular Pattern): 24-Bolt Example 45
F-6.1.3.2-1 Pattern #3 (Circular Pattern): 24-Bolt Step-by-Step Example 46
F-6.1.3.3-1 Pattern #3 (Simultaneous Multibolt Circular Pattern): 24-Bolt Step-by-Step Example (Two Tools) 47
J-5-1 Example of Bolt Grouping for a 48-Bolt Flange 54
P-4.6.1-1 Tapered Hub-Type Flange 87
P-4.6.2-1 Slip-On-Type Flange 87
P-4.6.3-1 Lap Joint Flange 88
Q-4.5-1 24-Bolt, 24-Tool Example 96
Q-4.5-2 24-Bolt, 50% (12-Tool) Example 97
R-2.2-1 Example Long Assembly Record 100
R-2.2-2 Example Short Assembly Record 101
R-2.2-3 Example Medium-Length Assembly Record 102
R-2.2-4 Example Multipart Tear-Off Tag 103

Tables

A-1.4-1 Training Matrix 16
A-2.1-1 Training of Fundamentals Curriculum 18
A-2.2-1 Piping Endorsement Curriculum 20
A-2.3-1 Powered-Equipment Endorsement Curriculum 21
A-2.4-1 Heat Exchanger Endorsement Curriculum 21
C-1 Recommended Gasket Seating Surface Finish for Various Gasket Types 25
D-2-1M Flange Seating Face Flatness Tolerances (Metric) 27

D-2-1 Flange Seating Face Flatness Tolerances (U.S. Customary) 27
D-3-1M Allowable Defect Depth vs. Width Across Face (Metric) 28
D-3-1 Allowable Defect Depth vs. Width Across Face (U.S. Customary) 28
E-2-1 Common Alignment Tolerances 33
F-4-1 Example Tightening Practices Based on Service Application 35
F-6.1.1.1-1 Star and Modified Star Pattern Sequencing 36
F-6.1.2.1.1-1 Quadrant Pattern Cross Sequence 4
F-6.1.2.1.2-1 Quadrant Pattern Circular Sequence 43
H-1M Bolt Root and Tensile Stress Areas (Metric Threads) 49
H-1 Bolt Root and Tensile Stress Areas (Inch Series) 50
J-6-1 Legacy Cross-Pattern Tightening Sequence and Bolt-Numbering System When Using a Single Tool 55
L-1 ASME B16.5 Flange Bolting Information 58
M-1.3-1 Recommended Washer Temperature Limits 59
M-2.4-1 Chemical Requirements 61
M-2.6.1-1 Dimensional Requirements for Metric Washers 62
M-2.6.1-2 Dimensional Requirements for U.S. Customary Washers 62
M-2.6.1-3 Dimensional Tolerances for Metric Washers 63
M-2.6.1-4 Dimensional Tolerances for U.S. Customary Washers 63
M-2.8.2-1 Sampling 63
O-3.2-1M Reference Values (Target Torque Index) for Calculating Target Torque Values for Low-Alloy Steel Bolting Based on Unit Prestress of 1 MPa (Root Area) (Metric Series Threads) 71
O-3.2-1 Reference Values (Target Torque Index) for Calculating Target Torque Values for Low-Alloy Steel Bolting Based on Unit Prestress of 1 ksi (Root Area) (Inch Series Threads) 72
O-4.1-1M Pipe Wall Thicknesses Used for Following Tables (mm) 73
O-4.1-1 Pipe Wall Thickness Used for Following Tables (in.) 73
O-4.1-2M Bolt Stress Limit for SA-105 Steel Flanges Using Elastic–Plastic FEA (MPa) 74
O-4.1-2 Bolt Stress Limit for SA-105 Steel Flanges Using Elastic–Plastic FEA (ksi) 74
O-4.1-3 Flange Rotation for SA-105 Steel Flanges Loaded to Table O-4.1-2M/Table O-4.1-2 Bolt Stress Using Elastic–Plastic FEA (deg) 75
O-4.1-4M Bolt Stress Limit for SA-105 Steel Flanges Using Elastic Closed Form Analysis (MPa) 76
O-4.1-4 Bolt Stress Limit for SA-105 Steel Flanges Using Elastic Closed Form Analysis (ksi) 76
O-4.1-5 Flange Rotation for SA-105 Steel Flanges Loaded to Table O-4.1-4M/Table O-4.1-4 Bolt Stress Using Elastic Closed Form Analysis (deg) 77
O-4.1-6M Bolt Stress Limit for SA-182 F304 Steel Flanges Using Elastic–Plastic FEA (MPa) 78
O-4.1-6 Bolt Stress Limit for SA-182 F304 Steel Flanges Using Elastic–Plastic FEA (ksi) 78
O-4.1-7 Flange Rotation for SA-182 F304 Steel Flanges Loaded to Table O-4.1-6M/Table O-4.1-6 Bolt Stress Using Elastic–Plastic FEA (deg) 79
O-4.2-1 Example Bolt Stress for SA-105 Steel Weld-Neck Flanges, SA-193 B7 Steel Bolts, and Spiral-Wound Gasket With Inner Ring (ksi) 80
O-4.2-2 Example Assembly Bolt Torque for SA-105 Steel Weld-Neck Flanges, SA-193 B7 Steel Bolts, and Spiral-Wound Gasket With Inner Ring (ft-lb) 81

P-5-1 Leak During Pressure Test 89
P-5-2 Leak During Heat-Up or Initial Operation 90
P-5-3 Leak Corresponding to Thermal or Pressure Upset 91
P-5-4 Leak After Long-Term Operation 91
P-5-5 Leak During Shutdown 92

Form

P-3-1 Sample Flange Joint Leak Report 83

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 Evaluation in 1995. In 1998, a task group under the PCC began preparation of Guidelines for Pressure Boundary Bolted Flange Joint Assembly, and in 1999 the Subcommittee on Repair and Testing was formed. 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. ASME PCC-1, Pressure Boundary Bolted Flange Joint Assembly, is the standard for bolted flange joint assemblies. ASME PCC-3, Inspection Planning Using Risk-Based Methods, provides guidance on the preparation of a risk-based inspection plan. Imperfections found at any stage of assembly, installation, inspection, operation, or maintenance are then evaluated, when appropriate, using the procedures provided in API 579-1/ASME FFS-1, Fitness-for-Service. Guidance on repair procedures is provided in the appropriate portion of ASME PCC-2, Repair of Pressure Equipment and Piping. To provide all stakeholders involved in pressure equipment with a guide to identify publications related to pressure equipment integrity, ASME PTB-2, Guide to Life Cycle Management of Pressure Equipment Integrity, has been prepared.

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 NBBI 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, which is neither a requirement nor a recommendation.

The first edition of ASME PCC-1 was approved for publication in 2000. The 2010 edition was approved by the American National Standards Institute (ANSI) as an American National Standard on January 14, 2010. The 2013 edition included many updates and a major new Appendix A titled "Training and Qualification of Bolted Joint Assembly Personnel" and was approved by ANSI as an American National Standard on August 12, 2013. The 2019 edition contained a number of updates. The most notable of these updates were the removal of the reference torque tables (Tables 1M and 1) for similar tables in Appendix O introducing the Target Torque Index and the insertion of a new Appendix Q titled "Considerations for the Use of Powered Equipment." ASME PCC-1–2019 was approved by ANSI as an American National Standard on January 17, 2019.

This 2022 edition is a major revision of ASME PCC-1. Requirements and recommendations have replaced the guidelines of previous editions. "Guidelines for" has been deleted from the title. The main text and many of the appendices have been revised in their entirety. ASME PCC-1–2022 was approved by ANSI as an American National Standard on August 18, 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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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-1–2022
SUMMARY OF CHANGES

Following approval by the ASME PCC Committee and ASME, and after public review, ASME PCC-1–2022 was approved by the American National Standards Institute on August 18, 2022.

In ASME PCC-1–2022, "Guidelines for" has been deleted from the title. The main text has been revised in its entirety. Appendices A through Q have been redesignated as "Nonmandatory." All figures, tables, and forms have been redesignated based on their parent paragraph. Cross-references have been updated. In addition, ASME PCC-1–2022 includes the following changes, identified by a margin note, **(22)**.

Page	*Location*	*Change*
10	Mandatory Appendix I	Added
15	Nonmandatory Appendix A	Revised in its entirety
24	Nonmandatory Appendix B	Definitions moved to Mandatory Appendix I
25	Nonmandatory Appendix C	(1) "Contact surface" revised to "seating surface" throughout (2) In Table C-1, "Gasket Seating Surface Finish" column editorially revised
26	Nonmandatory Appendix D	(1) Title revised (2) Sections D-1 through D-3 revised
31	Nonmandatory Appendix E	Revised in its entirety
34	Nonmandatory Appendix F	Revised in its entirety
48	Nonmandatory Appendix G	Revised in its entirety
49	Table H-1M	Note (2) revised
51	Nonmandatory Appendix I	Deleted
52	Nonmandatory Appendix J	Revised in its entirety
56	Nonmandatory Appendix K	Revised in its entirety
59	M-1.1	Last paragraph revised
61	M-2.10	Added and former para. M-2.10 redesignated as M-2.11
64	N-1	Revised
65	N-4	Added
66	O-1.1	Revised
66	O-1.3	Definitions of $G_{\text{I.D.}}$ and $G_{\text{O.D.}}$ revised
67	O-2	Subparagraphs (b) through (d) revised
67	O-3.1	First sentence revised
67	O-3.2	Second and third paragraphs and eq. (O-3) revised
68	O-4.1	Revised
68	O-4.2	First paragraph and footnotes revised
69	O-4.3	Revised
69	O-5.1	Revised
71	Table O-3.2-1M	In General Note (b), cross-reference revised
72	Table O-3.2-1	In General Note (b), cross-reference revised
82	Nonmandatory Appendix P	Revised in its entirety

Page	*Location*	*Change*
96	Q-5	Added and former section Q-5 redesignated as Q-6
99	Nonmandatory Appendix R	Added

PRESSURE BOUNDARY BOLTED FLANGE JOINT ASSEMBLY

1 SCOPE

This Standard covering bolted flange joint assemblies (BFJAs) applies to pressure-boundary flange joints with ring-type gaskets that are entirely within the circle enclosed by the bolt holes and with no contact outside this circle.[1] The principles of this Standard may be selectively applied to other joint geometries. By selecting those features suitable to the specific service or need, this Standard may be used to develop effective joint assembly procedures for the broad range of sizes and service conditions normally encountered in industry.

Users [see para. 2(b)] of this Standard are cautioned that the content contained in ASME PCC-1 has been developed generically and may not necessarily be suitable for all applications. Precautionary considerations are provided in some cases but should not be considered as all-inclusive. Sound engineering judgment and practices should be used to determine the applicability of a specific method or part of a method to a specific application. Each joint assembly procedure should be subject to an appropriate review by qualified personnel. While this Standard covers joint assembly within the scope of ASME Pressure Technology Codes and Standards, it may be used on equipment constructed in accordance with other codes and standards.

Guidance on troubleshooting BFJAs not providing leak-tight performance is also provided in this Standard (see Nonmandatory Appendix P).

2 INTRODUCTION

(a) Intent. A BFJA is a complex mechanical device; therefore, BFJAs that provide leak-free service result from many selections and activities having been made and performed within a relatively narrow band of acceptable limits. One of the activities essential to leak-free performance is the joint assembly process. The content outlined in this Standard covers the assembly elements essential for a high level of leak-tightness integrity of otherwise properly designed and constructed BFJAs. Users should develop written assembly procedures based on the owner's requirements, incorporating the features contained herein that are deemed suitable to the specific application under consideration. Alternative features and methods for specific applications may be used subject to endorsement by the owner.

(b) User. The user is defined as any entity that applies the provisions of this Standard. The user could be the owner, owner's representative, manufacturer, fabricator, erector, or other contract personnel. The specific assignment of responsibilities among these entities is outside the scope of this Standard. As a result, this Standard is silent when assigning specific provisions to a single entity.

(c) Owner and Representative. Within the context of this Standard, "owner" and "representative" are defined as follows:

owner: the person, partnership, organization, or business responsible for the leak tightness of BFJAs on their pressure equipment.

representative: a person, partnership, organization, or business designated by the owner to carry out selected responsibilities on the owner's behalf.

(d) Responsibilities

(1) Owner. The owner is responsible for establishing the requirements for assembly, examination, inspection, and testing of BFJAs on their pressure equipment. The owner may designate a representative to carry out selected responsibilities in establishing such requirements; however, the owner retains ultimate responsibility for the actions of the representative.

NOTE: Within the context of this Standard, the term "owner" includes the owner and the owner's representative, as recorded in either the contract documents or the written assembly procedures [see para. 13(a)].

(2) Assembler. The assembler (see Mandatory Appendix I) of piping, pipelines, or equipment containing BFJAs is responsible for providing workmanship in conformance to the requirements of the assembly procedure.

(e) Organization of This Standard. The main body of this Standard covers the following topic areas associated with the BFJA assembly process:

(1) scope and introduction

(2) training and qualification of bolted joint assembly personnel

(3) cleaning of gasket seating surfaces of flanges

[1] Rules for the design of bolted flanges with ring-type gaskets are covered in ASME Boiler and Pressure Vessel Code (ASME BPVC), Section VIII, Division 1, Mandatory Appendix 2. See also ASME BPVC, Section VIII, Division 1, Nonmandatory Appendix S for supplementary considerations for bolted flanges that are helpful to the designer of Mandatory Appendix 2 flanges.