ASME B16.51-2018
(Revision of ASME B16.51-2013)

Copper and Copper Alloy Press-Connect Pressure Fittings

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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Two Park Avenue • New York, NY • 10016 USA

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FOREWORD

Standardization of cast and wrought press-connect pressure fittings was initiated by Subcommittee J of the ASME B16 Committee in 2000. The first draft of the Standard was based on International Association of Plumbing and Mechanical Officials (IAPMO) Interim Guide Criteria IGC 137-2000. The general requirements of ASME B16.22-2000 and ASME B16.24-1998 were added to the first draft. The development of the Standard was necessary to regulate the strength of the joint in copper press-connect fittings. The performance test requirements of this Standard are an important aspect for determining the quality of the fittings.

Following approval by the Standards Committee and the ASME Board on PTCS, approval as an American National Standard was given by the American National Standards Institute (ANSI) on December 21, 2011 with the designation ASME B16.51-2011.

In the 2013 edition, provisions were included to recognize low-lead alloys to comply with an amendment to the U.S. Safe Drinking Water Act that went into effect in January 2014. Following approval by the ASME B16 Standards Committee, approval as an American National Standard was given by ANSI on July 29, 2013 with the designation ASME B16.51-2013.

In this 2018 edition, the acceptance criteria for the maximum slippage of the fitting during hydrostatic testing was revised for the $^{3}/_{4}$-in. nominal size to reflect the appropriate correlation to tube diameter used for all other fitting sizes. Also, in response to an inquiry on the test requirements for the elastomeric sealing components, para. 6.3 was revised to change the durometer values from a nominal value with tolerances to an absolute minimum value of 55 points on the Shore A scale. In addition, tolerances were added to all of the dimensional requirements shown in the figures throughout the Standard. The U.S. Customary tables formerly in Mandatory Appendix I have been merged with the SI tables in the main text; the tables and figures have been redesignated, Mandatory Appendix I has been deleted, and the cross-references have been updated accordingly. In addition, all reference standards in what was formerly Mandatory Appendix II were updated. Following approval by the ASME B16 Standards Committee, approval as an American National Standard was given by ANSI on September 6, 2018, with the new designation ASME B16.51-2018.

ASME B16 COMMITTEE
Standardization of Valves, Flanges, Fittings, and Gaskets

(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, B16 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 B16 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 B16 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 e-mail the request to the Secretary of the B16 Standards Committee at SecretaryB16@asme.org, or mail it to 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 B16 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 B16 Standards Committee.

ASME B16.51-2018
SUMMARY OF CHANGES

Following approval by the ASME B16 Standards Committee and ASME, and after public review, ASME B16.51 was approved by the American National Standards Institute on September 6, 2018.

In ASME B16.51-2018, the U.S. Customary tables formerly in Mandatory Appendix I have been merged with the SI tables in the main text; the tables and figures have been redesignated, Mandatory Appendix I has been deleted, and the cross-references have been updated accordingly. In addition, this edition includes the following changes identified by a margin note, **(18)**. The Record Numbers listed below are explained in more detail in the "List of Changes in Record Number Order" following this Summary of Changes.

Page	*Location*	*Change*
1	1	In second paragraph, breakdowns editorially rearranged
2	6.1	Subparagraph *(a)* editorially revised
2	6.3	(1) First entry of in-text table revised *(14-2068)*
		(2) Subparagraph *(c)* editorially revised
4	14.2.2	Second sentence editorially revised
4	14.5.1	First sentence editorially revised
4	14.7.1	Last sentence editorially revised
10	Figure 14.2.1-1	Tolerances added *(11-2038)*
11	Table 14.2.2-1	(1) Second column head editorially revised
		(2) Third entry in second column revised *(12-611)*
12	Figure 14.5.1-1	Tolerances added *(11-2038)*
13	Figure 14.8.1-1	Tolerances added *(11-2038)*
13	Figure 14.9.1-1	Tolerances added *(11-2038)*
14	Figure 14.10.1-1	Tolerances added *(11-2038)*
15	Mandatory Appendix I	Formerly Mandatory Appendix II, updated *(18-798)*

LIST OF CHANGES IN RECORD NUMBER ORDER

Record Number	Change
11-2038	Added tolerances to all of the dimensional requirements shown in the figures throughout the standard.
12-611	Revised the acceptance criteria for the maximum slippage of the fitting during hydrostatic testing for the $^{3}/_{4}$-in. nominal size to reflect the appropriate correlation to tube diameter used for all other fitting sizes.
14-2068	Revised the durometer hardness value in para. 6.3 from a nominal value with tolerances to an absolute minimum value of 55 points on the Shore A scale.
18-802	Updated references in Mandatory Appendix I, formerly Mandatory Appendix II.

Copper and Copper Alloy Press-Connect Pressure Fittings

(18) 1 SCOPE

This Standard establishes requirements for cast copper alloy, wrought copper, and wrought copper alloy press-connect pressure fittings for use with hard-drawn seamless copper water tube conforming to ASTM B88 for piping systems conveying water. The press-connect system (tube, fitting, and joint) conforming to this Standard is for use at a maximum pressure of 1 380 kPa (200 psi) over the temperature range from 0°C to 93°C (32°F to 200°F).

This Standard provides requirements for fittings suitable for press-connect joining and covers the following:

(a) terminology
(b) size designations
(c) marking
(d) material
(e) dimensions and tolerances
(f) required installation instructions
(g) pressure–temperature ratings
(h) design qualification

2 GENERAL

2.1 Convention

For determining conformance with this Standard, the convention for fixing significant digits where limits (maximum and minimum values) are specified shall be as defined in ASTM E29. This requires that an observed or calculated value be rounded off to the nearest unit in the last right-hand digit used for expressing the limit. Decimal values and tolerances do not imply a particular method of measurement.

2.2 Relevant Units

This Standard states values in both SI (metric) and U.S. Customary units. These systems of units are to be regarded separately as standard. Within the text, the U.S. Customary units are shown in parentheses. The values stated in each system are not exact equivalents; therefore, it is required that each system of units be used independently of the other. Combining values from the two systems constitutes nonconformance with the Standard.

2.3 References

Codes, standards, and specifications containing provisions to the extent referenced herein constitute requirements of this Standard. These referenced documents are listed in Mandatory Appendix I.

2.4 Quality Systems

Requirements relating to the product manufacturer's Quality System Program are described in Nonmandatory Appendix A.

3 TERMINOLOGY

3.1 Abbreviations

The following abbreviations are used to designate the type of fitting end as shown in Figure 3.1-1:

F = internal ASME B1.20.1 taper pipe-thread end (NPTI)
FTG = solder-joint fitting end made to copper tube outside diameter
M = external ASME B1.20.1 taper pipe-thread end (NPTE)
P = internal press-connect joint end made to receive copper tube diameter

3.2 Definitions

This paragraph defines the terms used in this Standard.

joining, press-connect: the act of joining a fitting or piping component to a tube by use of a tool that mechanically compresses the wall of the fitting end over the tubing, encasing an elastomeric seal between the mating surfaces.

out-of-roundness: the maximum measured diameter minus the minimum measured diameter.

press-connect fitting: a type of piping component (e.g., coupling, tee, elbow) used to connect tubing or other accessories by mechanically compressing the wall of the fitting end over the tube, using an elastomeric material to provide a seal between the inside surface of the fitting and the outside surface of the tube.

4 SIZE

The size designations of the fittings shown in the tables of this Standard correspond to standard water tube sizes as shown in ASTM B88. The size designations of the threaded ends correspond to nominal pipe sizes as shown in ASME B1.20.1.

Fittings shall be designated by the size of the openings in the sequence illustrated in Figure 3.1-1.

5 MARKING

Each fitting shall be permanently marked with the manufacturer's name or trademark in accordance with MSS SP-25. Marking on fittings less than nominal size