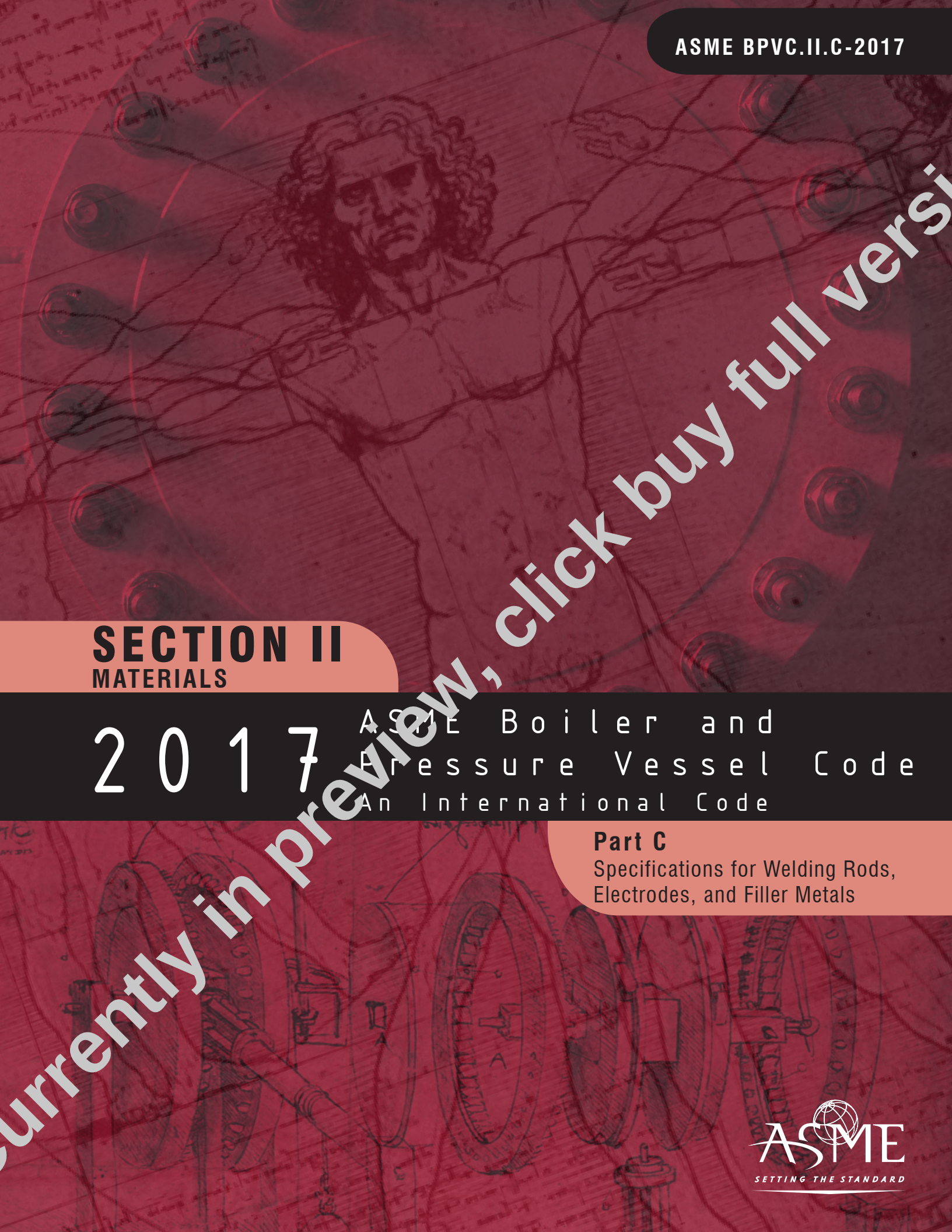
ASME BPVC.II.C-2017



SECTION II
MATERIALS

2017 ASME Boiler and Pressure Vessel Code
An International Code

Part C
Specifications for Welding Rods, Electrodes, and Filler Metals

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AN INTERNATIONAL CODE

2017 ASME Boiler & Pressure Vessel Code

2017 Edition July 1, 2017

II

MATERIALS

Part C

Specifications for Welding Rods, Electrodes, and Filler Metals

ASME Boiler and Pressure Vessel Committee
on Materials

The American Society of Mechanical Engineers

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: July 1, 2017

This international code or standard was developed under procedures accredited as meeting the criteria for American National Standards and it is an American National Standard. The Standards Committee that approved the code or standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment that provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

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The endnotes and preamble in this document (if any) are part of this American National Standard.

ASME collective membership mark

Certification Mark

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[*] The 2015 Edition of Section III was the last edition in which Section III, Division 1, Subsection NH, *Class 1 Components in Elevated Temperature Service*, was published. The requirements located within Subsection NH were moved to Section III, Division 5, Subsection HB, Subpart B for the elevated temperature construction of Class A components.

INTERPRETATIONS

Interpretations are issued in real time in ASME's Interpretations Database at http://go.asme.org/Interpretations. Historical BPVC interpretations may also be found in the Database.

CODE CASES

The Boiler and Pressure Vessel Code committees meet regularly to consider proposed additions and revisions to the Code and to formulate Cases to clarify the intent of existing requirements or provide, when the need is urgent, rules for materials or constructions not covered by existing Code rules. Those Cases that have been adopted will appear in the appropriate 2017 Code Cases book: "Boilers and Pressure Vessels" or "Nuclear Components." Supplements will be sent or made available automatically to the purchasers of the Code Cases books up to the publication of the 2019 Code.

FOREWORD[*]

In 1911, The American Society of Mechanical Engineers established the Boiler and Pressure Vessel Committee to formulate standard rules for the construction of steam boilers and other pressure vessels. In 2009, the Boiler and Pressure Vessel Committee was superseded by the following committees:

(a) Committee on Power Boilers (I)

(b) Committee on Materials (II)

(c) Committee on Construction of Nuclear Facility Components (III)

(d) Committee on Heating Boilers (IV)

(e) Committee on Nondestructive Examination (V)

(f) Committee on Pressure Vessels (VIII)

(g) Committee on Welding, Brazing, and Fusing (IX)

(h) Committee on Fiber-Reinforced Plastic Pressure Vessels (X)

(i) Committee on Nuclear Inservice Inspection (XI)

(j) Committee on Transport Tanks (XII)

(k) Technical Oversight Management Committee (TOMC)

Where reference is made to "the Committee" in this Foreword, each of these committees is included individually and collectively.

The Committee's function is to establish rules of safety relating only to pressure integrity, which govern the construction[**] of boilers, pressure vessels, transport tanks, and nuclear components, and the inservice inspection of nuclear components and transport tanks. The Committee also interprets these rules when questions arise regarding their intent. The technical consistency of the Sections of the Code and coordination of standards development activities of the Committees is supported and guided by the Technical Oversight Management Committee. This Code does not address other safety issues relating to the construction of boilers, pressure vessels, transport tanks, or nuclear components, or the inservice inspection of nuclear components or transport tanks. Users of the Code should refer to the pertinent codes, standards, laws, regulations, or other relevant documents for safety issues other than those relating to pressure integrity. Except for Sections XI and XII, and with a few other exceptions, the rules do not, of practical necessity, reflect the likelihood and consequences of deterioration in service related to specific service fluids or external operating environments. In formulating the rules, the Committee considers the needs of users, manufacturers, and inspectors of pressure vessels. The objective of the rules is to afford reasonably certain protection of life and property, and to provide a margin for deterioration in service to give a reasonably long, safe period of usefulness. Advancements in design and materials and evidence of experience have been recognized.

This Code contains mandatory requirements, specific prohibitions, and nonmandatory guidance for construction activities and inservice inspection and testing activities. The Code does not address all aspects of these activities and those aspects that are not specifically addressed should not be considered prohibited. The Code is not a handbook and cannot replace education, experience, and the use of engineering judgment. The phrase *engineering judgment* refers to technical judgments made by knowledgeable engineers experienced in the application of the Code. Engineering judgments must be consistent with Code philosophy, and such judgments must never be used to overrule mandatory requirements or specific prohibitions of the Code.

The Committee recognizes that tools and techniques used for design and analysis change as technology progresses and expects engineers to use good judgment in the application of these tools. The designer is responsible for complying with Code rules and demonstrating compliance with Code equations when such equations are mandatory. The Code neither requires nor prohibits the use of computers for the design or analysis of components constructed to the

[*] The information contained in this Foreword is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. Therefore, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Code.

[**] *Construction*, as used in this Foreword, is an all-inclusive term comprising materials, design, fabrication, examination, inspection, testing, certification, and pressure relief.

requirements of the Code. However, designers and engineers using computer programs for design or analysis are cautioned that they are responsible for all technical assumptions inherent in the programs they use and the application of these programs to their design.

The rules established by the Committee are not to be interpreted as approving, recommending, or endorsing any proprietary or specific design, or as limiting in any way the manufacturer's freedom to choose any method of design or any form of construction that conforms to the Code rules.

The Committee meets regularly to consider revisions of the rules, new rules as dictated by technological development, Code Cases, and requests for interpretations. Only the Committee has the authority to provide official interpretations of this Code. Requests for revisions, new rules, Code Cases, or interpretations shall be addressed to the Secretary in writing and shall give full particulars in order to receive consideration and action (see Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees). Proposed revisions to the Code 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 Code 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 at regular intervals in Editions of the Code.

The Committee does not rule on whether a component shall or shall not be constructed to the provisions of the Code. The scope of each Section has been established to identify the components and parameters considered by the Committee in formulating the Code rules.

Questions or issues regarding compliance of a specific component with the Code rules are to be directed to the ASME Certificate Holder (Manufacturer). Inquiries concerning the interpretation of the Code are to be directed to the Committee. ASME is to be notified should questions arise concerning improper use of an ASME Certification Mark.

When required by context in this Section, the singular shall be interpreted as the plural, and vice versa, and the feminine, masculine, or neuter gender shall be treated as such other gender as appropriate.

STATEMENT OF POLICY ON THE USE OF THE CERTIFICATION MARK AND CODE AUTHORIZATION IN ADVERTISING

ASME has established procedures to authorize qualified organizations to perform various activities in accordance with the requirements of the ASME Boiler and Pressure Vessel Code. It is the aim of the Society to provide recognition of organizations so authorized. An organization holding authorization to perform various activities in accordance with the requirements of the Code may state this capability in its advertising literature.

Organizations that are authorized to use the Certification Mark for marking items or constructions that have been constructed and inspected in compliance with the ASME Boiler and Pressure Vessel Code are issued Certificates of Authorization. It is the aim of the Society to maintain the standing of the Certification Mark for the benefit of the users, the enforcement jurisdictions, and the holders of the Certification Mark who comply with all requirements.

Based on these objectives, the following policy has been established on the usage in advertising of facsimiles of the Certification Mark, Certificates of Authorization, and reference to Code construction. The American Society of Mechanical Engineers does not "approve," "certify," "rate," or "endorse" any item, construction, or activity and there shall be no statements or implications that might so indicate. An organization holding the Certification Mark and/or a Certificate of Authorization may state in advertising literature that items, constructions, or activities "are built (produced or performed) or activities conducted in accordance with the requirements of the ASME Boiler and Pressure Vessel Code," or "meet the requirements of the ASME Boiler and Pressure Vessel Code." An ASME corporate logo shall not be used by any organization other than ASME.

The Certification Mark shall be used only for stamping and nameplates as specifically provided in the Code. However, facsimiles may be used for the purpose of fostering the use of such construction. Such usage may be by an association or a society, or by a holder of the Certification Mark who may also use the facsimile in advertising to show that clearly specified items will carry the Certification Mark. General usage is permitted only when all of a manufacturer's items are constructed under the rules.

STATEMENT OF POLICY ON THE USE OF ASME MARKING TO IDENTIFY MANUFACTURED ITEMS

The ASME Boiler and Pressure Vessel Code provides rules for the construction of boilers, pressure vessels, and nuclear components. This includes requirements for materials, design, fabrication, examination, inspection, and stamping. Items constructed in accordance with all of the applicable rules of the Code are identified with the official Certification Mark described in the governing Section of the Code.

Markings such as "ASME," "ASME Standard," or any other marking including "ASME" or the Certification Mark shall not be used on any item that is not constructed in accordance with all of the applicable requirements of the Code.

Items shall not be described on ASME Data Report Forms nor on similar forms referring to ASME that tend to imply that all Code requirements have been met when, in fact, they have not been. Data Report Forms covering items not fully complying with ASME requirements should not refer to ASME or they should clearly identify all exceptions to the ASME requirements.

(17) # SUBMITTAL OF TECHNICAL INQUIRIES TO THE BOILER AND PRESSURE VESSEL STANDARDS COMMITTEES

1 INTRODUCTION

(a) The following information provides guidance to Code users for submitting technical inquiries to the applicable Boiler and Pressure Vessel (BPV) Standards Committee (hereinafter referred to as the Committee). See the guidelines on approval of new materials under the ASME Boiler and Pressure Vessel Code in Section II, Part D for requirements for requests that involve adding new materials to the Code. See the guidelines on approval of new welding and brazing materials in Section II, Part C for requirements for requests that involve adding new welding and brazing materials ("consumables") to the Code.

Technical inquiries can include requests for revisions or additions to the Code requirements, requests for Code Cases, or requests for Code Interpretations, as described below:

(1) Code Revisions. Code revisions are considered to accommodate technological developments, to address administrative requirements, to incorporate Code Cases, or to clarify Code intent.

(2) Code Cases. Code Cases represent alternatives or additions to existing Code requirements. Code Cases are written as a Question and Reply, and are usually intended to be incorporated into the Code at a later date. When used, Code Cases prescribe mandatory requirements in the same sense as the text of the Code. However, users are cautioned that not all regulators, jurisdictions, or Owners automatically accept Code Cases. The most common applications for Code Cases are as follows:

(-a) to permit early implementation of an approved Code revision based on an urgent need

(-b) to permit use of a new material for Code construction

(-c) to gain experience with new materials or alternative requirements prior to incorporation directly into the Code

(3) Code Interpretations

(-a) Code Interpretations provide clarification of the meaning of existing requirements in the Code and are presented in Inquiry and Reply format. Interpretations do not introduce new requirements.

(-b) If existing Code text does not fully convey the meaning that was intended, or conveys conflicting requirements, and revision of the requirements is required to support the Interpretation, an Intent Interpretation will be issued in parallel with a revision to the Code.

(b) Code requirements, Code Cases, and Code Interpretations established by the Committee 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 requirements.

(c) Inquiries that do not comply with the following guidance or that do not provide sufficient information for the Committee's full understanding may result in the request being returned to the Inquirer with no action.

2 INQUIRY FORMAT

Submittals to the Committee should include the following information:

(a) Purpose. Specify one of the following:

(1) request for revision of present Code requirements

(2) request for new or additional Code requirements

(3) request for Code Case

(4) request for Code Interpretation

(b) Background. The Inquirer should provide the information needed for the Committee's understanding of the Inquiry, being sure to include reference to the applicable Code Section, Division, Edition, Addenda (if applicable), paragraphs, figures, and tables. Preferably, the Inquirer should provide a copy of, or relevant extracts from, the specific referenced portions of the Code.

(c) Presentations. The Inquirer may desire to attend or be asked to attend a meeting of the Committee to make a formal presentation or to answer questions from the Committee members with regard to the Inquiry. Attendance at a BPV Standards Committee meeting shall be at the expense of the Inquirer. The Inquirer's attendance or lack of attendance at a meeting will not be used by the Committee as a basis for acceptance or rejection of the Inquiry by the Committee. However, if the Inquirer's request is unclear, attendance by the Inquirer or a representative may be necessary for the Committee to understand the request sufficiently to be able to provide an Interpretation. If the Inquirer desires to make a presentation at a Committee meeting, the Inquirer should provide advance notice to the Committee Secretary, to ensure time will be allotted for the presentation in the meeting agenda. The Inquirer should consider the need for additional audiovisual equipment that might not otherwise be provided by the Committee. With sufficient advance notice to the Committee Secretary, such equipment may be made available.

3 CODE REVISIONS OR ADDITIONS

Requests for Code revisions or additions should include the following information:

(a) Requested Revisions or Additions. For requested revisions, the Inquirer should identify those requirements of the Code that they believe should be revised, and should submit a copy of, or relevant extracts from, the appropriate requirements as they appear in the Code, marked up with the requested revision. For requested additions to the Code, the Inquirer should provide the recommended wording and should clearly indicate where they believe the additions should be located in the Code requirements.

(b) Statement of Need. The Inquirer should provide a brief explanation of the need for the revision or addition.

(c) Background Information. The Inquirer should provide background information to support the revision or addition, including any data or changes in technology that form the basis for the request, that will allow the Committee to adequately evaluate the requested revision or addition. Sketches, tables, figures, and graphs should be submitted, as appropriate. The Inquirer should identify any pertinent portions of the Code that would be affected by the revision or addition and any portions of the Code that reference the requested revised or added paragraphs.

4 CODE CASES

Requests for Code Cases should be accompanied by a statement of need and background information similar to that described in 3(b) and 3(c), respectively, for Code revisions or additions. The urgency of the Code Case (e.g., project underway or imminent, new procedure) should be described. In addition, it is important that the request is in connection with equipment that will bear the Certification Mark, with the exception of Section XI applications. The proposed Code Case should identify the Code Section and Division, and should be written as a Question and a Reply, in the same format as existing Code Cases. Requests for Code Cases should also indicate the applicable Code Editions and Addenda (if applicable) to which the requested Code Case applies.

5 CODE INTERPRETATIONS

(a) Requests for Code Interpretations should be accompanied by the following information:

(1) Inquiry. The Inquirer should propose a condensed and precise Inquiry, omitting superfluous background information and, when possible, composing the Inquiry in such a way that a "yes" or a "no" Reply, with brief limitations or conditions, if needed, can be provided by the Committee. The proposed question should be technically and editorially correct.

(2) Reply. The Inquirer should propose a Reply that clearly and concisely answers the proposed Inquiry question. Preferably, the Reply should be "yes" or "no," with brief limitations or conditions, if needed.

(3) Background Information. The Inquirer should provide any need or background information, such as described in 3(b) and 3(c), respectively, for Code revisions or additions, that will assist the Committee in understanding the proposed Inquiry and Reply.

If the Inquirer believes a revision of the Code requirements would be helpful to support the Interpretation, the Inquirer may propose such a revision for consideration by the Committee. In most cases, such a proposal is not necessary.

(b) Requests for Code Interpretations should be limited to an Interpretation of a particular requirement in the Code or in a Code Case. Except with regard to interpreting a specific Code requirement, the Committee is not permitted to consider consulting-type requests such as the following:

(1) a review of calculations, design drawings, welding qualifications, or descriptions of equipment or parts to determine compliance with Code requirements

(2) a request for assistance in performing any Code-prescribed functions relating to, but not limited to, material selection, designs, calculations, fabrication, inspection, pressure testing, or installation

(3) a request seeking the rationale for Code requirements

6 SUBMITTALS

(a) Submittal. Requests for Code 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, the Inquirer may mail the request to the following address:

Secretary
ASME Boiler and Pressure Vessel Committee
Two Park Avenue
New York, NY 10016-5990

All other Inquiries should be mailed to the Secretary of the BPV Committee at the address above. Inquiries are unlikely to receive a response if they are not written in clear, legible English. They must also include the name of the Inquirer and the company they represent or are employed by, if applicable, and the Inquirer's address, telephone number, fax number, and e-mail address, if available.

(b) Response. The Secretary of the appropriate Committee will provide a written response, via letter or e-mail, as appropriate, to the Inquirer, upon completion of the requested action by the Committee. Inquirers may track the status of their Interpretation Request at http://go.asme.org/Interpretations.

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(17)

January 1, 2017

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PREFACE

On January 3, 1919, ASME participated with several other organizations in a meeting to discuss the continuation of wartime research in welding. Out of that meeting, the American Welding Society was established and since that time there has been a constant and interwoven record of development by the American Welding Society and The American Society of Mechanical Engineers of the techniques of welding. Through all of these great years of growth, many of the leaders in the field of engineering had the common interest of pressure equipment design and manufacture and the development of welding as a powerful tool in that manufacture. The evolution of this cooperative effort is contained in Professor A. M. Greene's "History of the ASME Boiler Code," which was published as a series of articles in *Mechanical Engineering* from July 1952 through August 1953 and is now available from ASME in a special bound edition. The following quotation from this history based on the minutes of the Committee notes the cooperative nature of the work done in the area of welding.

"During 1919, a number of cases involving welding were referred by the Boiler Code Committee to the Subcommittee on Welding.

"As the National Welding Council was to be discontinued, a new organization was to be formed to be known as the American Welding Society with which the American Bureau of Welding was to be affiliated. This was to be a body representing the entire industry and would eliminate commercial aspects, undertake research and standardization, and act as a judicial body providing a medium for advancing the science and art of welding."

In 1935 the AWS-ASTM Joint Committee on Filler Metal was organized to provide standard specifications for welding rods, electrodes, filler metals, and fluxes for this developing U.S. industry.

In 1969 these two sponsors agreed to dissolve this joint activity and to permit the American Welding Society to assume sole responsibility for the family of welding rods, electrodes, filler metal, and flux specifications then in being.

In 1992, the ASME Board of Pressure Technology Codes and Standards endorsed the use of materials produced to other than AWS specifications. It is the intent of ASME to follow its procedures and practices currently in use to implement the adoption of material specifications of AWS and other recognized national or international organizations.

Section II, Part C contains material specifications, most of which are identical to corresponding specifications published by AWS and other recognized national or international organizations. All adopted specifications are either reproduced in the Code, where permission to do so has been obtained from the originating organization, or so referenced, and information about how to obtain them from the originating organization is provided. The ASME Committee reviews all material specifications submitted to it and if it is felt that there is any need to adapt them for Code purposes, revisions are made to them. However, there is constant liaison between ASME and AWS and other recognized national or international organizations, and there will be continuing effort to see that the specifications as produced by AWS and other recognized national or international organizations and those printed in the ASME Code are identical.

To assure that there will be a clear understanding on the part of the users of Section II, ASME publishes both the identical specifications and those amended for Code usage every 2 years.

The ASME Boiler and Pressure Vessel Code has been adopted into law by 50 states and many municipalities in the United States and by all of the Canadian provinces.

GUIDELINE ON THE APPROVAL OF NEW WELDING AND BRAZING MATERIAL CLASSIFICATIONS UNDER THE ASME BOILER AND PRESSURE VESSEL CODE

Code Policy. It is the policy of the ASME Boiler and Pressure Vessel Committee to adopt for inclusion in Section II, Part C, only such specifications as have been adopted by the American Welding Society (AWS), and by other recognized national or international organizations.

It is expected that requests for Code approval will normally be for welding and brazing materials (hereafter termed "consumables") for which there is a recognized national or international specification. For consumables made to a recognized national or international specification other than those of the AWS, the inquirer shall give notice to the standards developing organization that a request has been made to ASME for adoption of their specification under the ASME Code, and shall request that the organization to grant ASME permission to reprint the standard. For other consumables, a request shall be made to the AWS, or a recognized national or international organization, to develop a specification that can be presented to the Code Committee.

It is the policy of the ASME Boiler and Pressure Vessel Committee to consider requests to adopt new consumables for use by boiler, pressure vessel, or nuclear power plant component Manufacturers or end users. Further, such requests should be for consumables for which there is a reasonable expectation of use in a boiler, pressure vessel, or nuclear power plant component constructed to the rules of one of the Sections of this Code.

Application. The inquirer shall identify to the Committee all product forms, size ranges, and specifications for which incorporation is desired, and state whether or not the consumable is covered by patents, whether or not it is licensed, and if licensed, any limitations on its manufacture.

Weldability/Brazability. The inquirer shall furnish complete data on procedure qualification tests made in accordance with the requirements of Section IX. Such tests shall be made over the full range of base metal thickness in which the consumable is to be used. Pertinent information on deposited metal, such as effects from postweld heat treatment, susceptibility to air hardening, effects of joining processes, expected notch toughness values, and the amount of experience in use of the consumable shall be given.

Physical Changes. For new consumables, it is important to know the structural stability characteristics and the degree of retention of properties with exposure at temperature. The influence of welding or brazing and thermal treatment operations on the mechanical properties, ductility, and microstructure of the deposited metal are important, particularly where degradation in properties may occur. Where particular temperature ranges of exposure or heat treatment, cooling rates, combinations of mechanical working and thermal treatments, fabrication practices, exposure to particular environments, etc., cause significant changes in the mechanical properties, microstructure, resistance to brittle fracture, etc., it is of prime importance to call attention to those conditions that should be avoided in service or in manufacture of parts or vessels using the consumable.

Requests for Additional Data. The Committee may request additional data, including data on properties or deposited metal behavior not explicitly treated in the construction Code in which adoption is desired.

Code Case. The Code Committee will consider the issuance of an ASME Code Case, to be effective for a period of three years, permitting the treatment of a new welding or brazing material under an existing ASME Section IX grouping for qualification purposes, provided that the following conditions are met:

(a) The inquirer provides evidence that a request for coverage of the consumable in a specification has been made to the AWS or a recognized national or international organization;

(b) the consumable is commercially available and can be purchased within the proposed specification requirements;

(c) the inquirer shows that there will be a reasonable demand for the consumable by industry and that there exists an urgency for approval by means of a Code Case;

(d) the request for approval of the consumable shall clearly describe it in specification form, including applicable items as scope, process, manufacture, conditions for delivery, heat treatment, chemical and tensile requirements, testing specifications and requirements, workmanship, finish, marking, inspection, and rejection;

(e) all other requirements identified previously under Code Policy and Application apply; and

(f) the inquirer shall furnish the Code Committee with all the data specified in this Guideline.

Requirements for Requests for ASME Acceptance of Welding and Brazing Material Specifications to Recognized National or International Standards Other Than the AWS. The Committee will consider only requests in accordance with the Boiler and Pressure Vessel Committee Operating and Administrative Procedures, OP-8.6 (English language: U.S. or SI/metric units). The Committee will consider accepting specifications of recognized national or international organizations in accordance with OP-8.6 such as, but not limited to, AWS, CSA, CEN, DIN, and JIS. Consumable specifications of other than national or international organizations, such as those of consumable producers and suppliers, will not be considered for acceptance.

Requirements for Recognized National or International Specifications. Acceptable consumable specifications will be identified by date or edition. Approved edition(s) will be stated in the subtitle of the ASME specification. Minimum requirements that must be contained in a consumable specification for which acceptance is being requested include such items as name of national or international organization, scope, reference documents, process, manufacture, conditions for delivery, heat treatment, chemical and tensile requirements, testing specifications and requirements, workmanship, finish, marking, inspection, and rejection.

Publication of Recognized National or International Specifications. Specifications for which ASME has not been given permission to publish by the originating organization will be referenced on a cover sheet in appropriate Appendices in Section II, Part C, along with information xxix on where to obtain a copy of those documents. Documents that are referenced in non-AWS consumable specifications will not be published by ASME. However, information on where to obtain a copy of those documents will be maintained in Section II, Part C. Additions and exceptions to the consumable specification will be noted in the subtitle of the specification.

New Welding and Brazing Materials Checklist. To assist inquirers desiring Code coverage for new consumables, or extending coverage of existing consumables, the Committee has developed the following checklist of items that ought to be addressed by each inquiry. The Committee reserves the right to request additional data and application information when considering new consumables.

(a) Has a qualified inquirer request been provided?

(b) Has a request for either revision to existing Code requirements or for a Code Case been defined?

(c) Has a letter to the AWS been submitted requesting coverage of the new consumable in a specification, and has a copy been submitted to the Committee? Alternatively, is this consumable already covered by a specification issued by a recognized national or international organization, and has an English language version been provided?

(d) Has the Construction Code and Division coverage been identified?

(e) Have mechanical property data been submitted (ultimate tensile strength, yield strength, reduction of area, and elongation) for each intended joining process?

(f) Have toughness considerations required by the Construction Code been defined and has appropriate data been submitted?

(g) Have joining requirements been defined and has procedure qualification test data been submitted?

(h) Has influence of fabrication practices on deposited metal properties been defined?

SUMMARY OF CHANGES

Errata to the BPV Code may be posted on the ASME Web site to provide corrections to incorrectly published items, or to correct typographical or grammatical errors in the BPV Code. Such Errata shall be used on the date posted.

Information regarding Special Notices and Errata is published by ASME at http://go.asme.org/BPVCerrata.

Changes given below are identified on the pages by a margin note, **(17)**, placed next to the affected area.

The Record Numbers listed below are explained in more detail in "List of Changes in Record Number Order" following this Summary of Changes.

Page	*Location*	*Change (Record Number)*
v	List of Sections	Updated
x	Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees	Revised in its entirety *(13-2222)*
xiii	Personnel	Updated
xxxii	AWS Personnel	Updated
xxxiv	Preface	Penultimate paragraph editorially revised
505	SFA-5.20/SFA-5.20M	Revised in its entirety *(15-2697)*
717	SFA-5.28/SFA-5.28M	Revised in its entirety *(15-2698)*
869	SFA-5.36/SFA-5.36M	Revised in its entirety *(16-1896)*

LIST OF CHANGES IN RECORD NUMBER ORDER

Record Number	Change
13-2222	Revised the front guidance on interpretations in its entirety.
15-2697	Adopted AWS A5.20/A5.20M:2005 (R2015), "Specification for Carbon Steel Electrodes for Flux Cored Arc Welding" as SFA-5.20/SFA-5.20M.
15-2698	Adopted AWS A5.28/A5.28M:2005 (R2015), "Specification for Low-Alloy Steel Electrodes and Rods for Gas Shielded Arc Welding" as SFA-5.28/SFA-5.28M.
16-1896	Adopted AWS A5.36/A5.36M:2016, "Specification for Carbon and Low-Alloy Steel Flux Cored Electrodes for Flux Cored Arc Welding and Metal Cored Electrodes for Gas Metal Arc Welding" as SFA-5.36/SFA-5.36M.

CROSS-REFERENCING AND STYLISTIC CHANGES IN THE BOILER AND PRESSURE VESSEL CODE

There have been structural and stylistic changes to BPVC, starting with the 2011 Addenda, that should be noted to aid navigating the contents. The following is an overview of the changes:

Subparagraph Breakdowns/Nested Lists Hierarchy

- First-level breakdowns are designated as (a), (b), (c), etc., as in the past.
- Second-level breakdowns are designated as (1), (2), (3), etc., as in the past.
- Third-level breakdowns are now designated as (-a), (-b), (-c), etc.
- Fourth-level breakdowns are now designated as (-1), (-2), (-3), etc.
- Fifth-level breakdowns are now designated as (+a), (+b), (+c), etc.
- Sixth-level breakdowns are now designated as (+1), (+2), etc.

Footnotes

With the exception of those included in the front matter (roman-numbered pages), all footnotes are treated as endnotes. The endnotes are referenced in numeric order and appear at the end of each BPVC section/subsection.

Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees

Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees has been moved to the front matter. This information now appears in all Boiler Code Sections (except for Code Case books).

Cross-References

It is our intention to establish cross-reference link functionality in the current edition and moving forward. To facilitate this, cross-reference style has changed. Cross-references within a subsection or subarticle will not include the designator/identifier of that subsection/subarticle. Examples follow:

- *(Sub-)Paragraph Cross-References.* The cross-references to subparagraph breakdowns will follow the hierarchy of the designators under which the breakdown appears.
  - If subparagraph (-a) appears in X.1(c)(1) and is referenced in X.1(c)(1), it will be referenced as (-a).
  - If subparagraph (-a) appears in X.1(c)(1) but is referenced in X.1(c)(2), it will be referenced as (1)(-a).
  - If subparagraph (-a) appears in X.1(c)(1) but is referenced in X.1(e)(1), it will be referenced as (c)(1)(-a).
  - If subparagraph (-a) appears in X.1(c)(1) but is referenced in X.2(c)(2), it will be referenced as X.1(c)(1)(-a).
- *Equation Cross-References.* The cross-references to equations will follow the same logic. For example, if eq. (1) appears in X.1(a)(1) but is referenced in X.1(b), it will be referenced as eq. (a)(1)(1). If eq. (1) appears in X.1(a)(1) but is referenced in a different subsection/subarticle/paragraph, it will be referenced as eq. X.1(a)(1)(1).

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WELDING CONSUMABLES — PROCUREMENT OF FILLER MATERIALS AND FLUXES

SFA-5.01M/SFA-5.01

(Identical with AWS Specification A5.01M/A5.01:2013 (ISO 14344:2010 MOD). In case of dispute, the original AWS text applies.)

Welding Consumables—Procurement of Filler Materials and Fluxes

1 Scope

This standard identifies various information necessary for communication between a purchaser and a supplier of welding consumables. This standard, together with an AWS, ISO, or other recognized welding consumable standard, provides a method for preparing those specific details needed for welding consumable procurement which consist of the following:

a) the welding consumable classification (selected from the pertinent AWS, ISO, or other applicable welding consumable standard);

b) the lot class (selected from Clause 4 of this standard);

c) the testing schedule (selected from Clause 5 of this standard).

Selection of the specific welding consumable classification, lot class and testing schedule will depend upon the requirements of the application for which the welding consumable is being procured.

2 Normative References

The following normative documents contain provisions which, through references in this text, constitute provisions of this standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest editions of the normative documents referred to apply. Members of ISO and IEC maintain registers of currently valid International Standards.

2.1 The following AWS standards[1] are referenced in the mandatory section of this document.

AWS A3.0 M/A3.0, *Standard Welding Terms and Definitions, Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying*

AWS A5.02/A5.02M, *Specification for Filler Metal Standard Sizes, Packaging, and Physical Attributes*

2.2 The following ASTM standard[2] is referenced in the mandatory section of this document:

ASTM E29, *Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications*

2.3 The following ISO standard[3] is referenced in the mandatory section of this document.

ISO 544, *Welding Consumables — Technical Delivery Conditions for Welding Filler Materials — Type of Product, Dimensions, Tolerances and Markings*

[1] AWS standards are published by the American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.
[2] ASTM standards are published by ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.
[3] ISO standards are published by the International Organization for Standardization, 1 rue de Varembé, Case postale 56, CH-1211 Geneva 20, Switzerland.