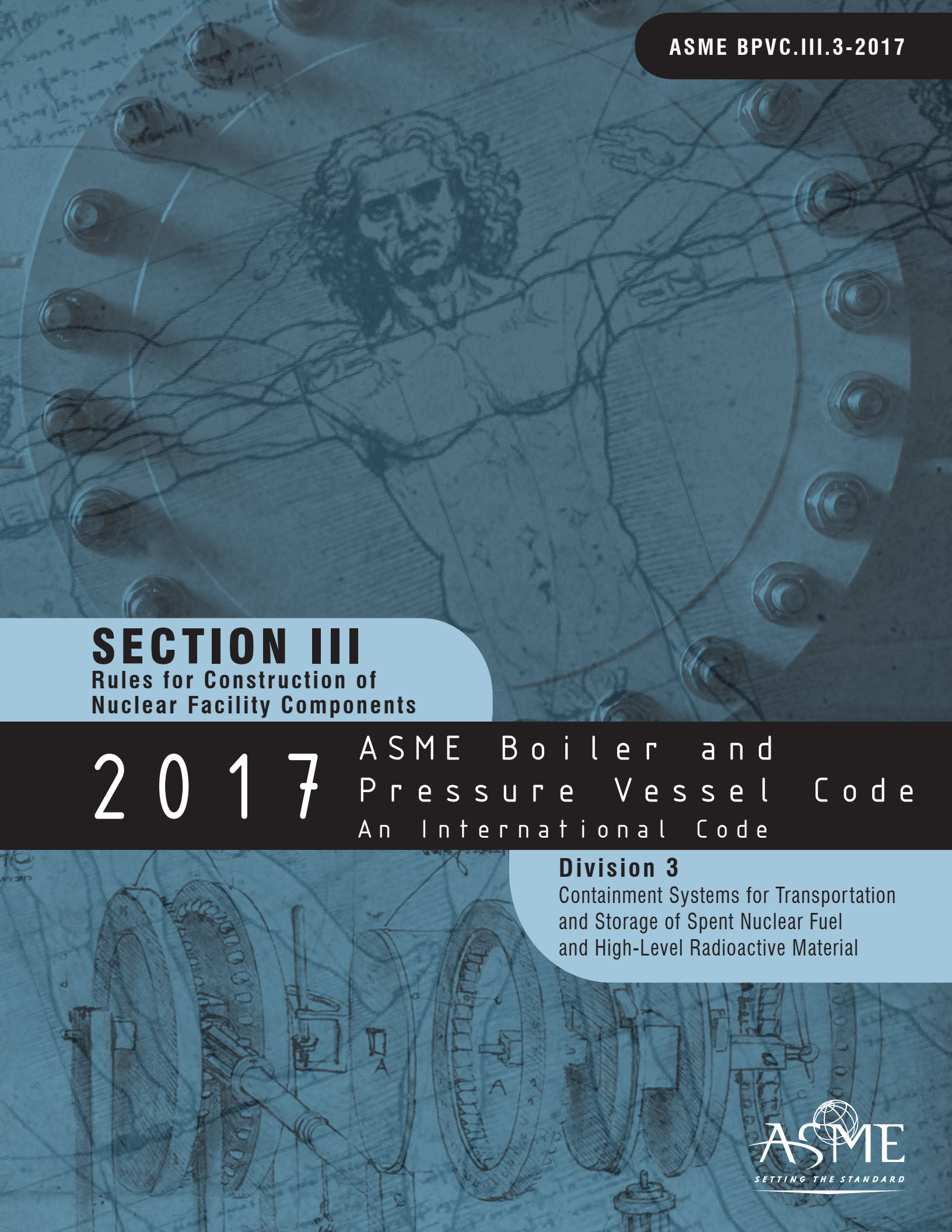

ASME BPVC.III.3-2017

SECTION III

Rules for Construction of Nuclear Facility Components

2017 ASME Boiler and Pressure Vessel Code

An International Code

Division 3

Containment Systems for Transportation and Storage of Spent Nuclear Fuel and High-Level Radioactive Material

ASME

SETTING THE STANDARD

AN INTERNATIONAL CODE

2017 ASME Boiler & Pressure Vessel Code

2017 Edition July 1, 2017

III

RULES FOR CONSTRUCTION OF NUCLEAR FACILITY COMPONENTS

Division 3

Containment Systems for Transportation and Storage of Spent Nuclear Fuel and High-Level Radioactive Material

ASME Boiler and Pressure Vessel Committee
on Construction of Nuclear Facility Components

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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(17)

ORGANIZATION OF SECTION III

1 GENERAL

Section III consists of Division 1, Division 2, Division 3, and Division 5. These Divisions are broken down into Subsections and are designated by capital letters preceded by the letter "N" for Division 1, by the letter "C" for Division 2, by the letter "W" for Division 3, and by the letter "H" for Division 5. Each Subsection is published separately, with the exception of those listed for Divisions 2, 3, and 5.

- Subsection NCA — General Requirements for Division 1 and Division 2
- Appendices
- Division 1[*]
  - Subsection NB — Class 1 Components
  - Subsection NC — Class 2 Components
  - Subsection ND — Class 3 Components
  - Subsection NE — Class MC Components
  - Subsection NF — Supports
  - Subsection NG — Core Support Structures
- Division 2 — Code for Concrete Containments
  - Subsection CC — Concrete Containments
- Division 3 — Containment Systems for Transportation and Storage of Spent Nuclear Fuel and High-Level Radioactive Material
  - Subsection WA — General Requirements for Division 3
  - Subsection WB — Class TC Transportation Containments
  - Subsection WC — Class SC Storage Containments
  - Subsection WD — Class ISS Internal Support Structures
- Division 5 — High Temperature Reactors
  - Subsection HA — General Requirements
    - Subpart A — Metallic Materials
    - Subpart B — Graphite Materials
    - Subpart C — Composite Materials
  - Subsection HB — Class A Metallic Pressure Boundary Components
    - Subpart A — Low Temperature Service
    - Subpart B — Elevated Temperature Service
  - Subsection HC — Class B Metallic Pressure Boundary Components
    - Subpart A — Low Temperature Service
    - Subpart B — Elevated Temperature Service
  - Subsection HF — Class A and B Metallic Supports
    - Subpart A — Low Temperature Service
  - Subsection HG — Class A Metallic Core Support Structures
    - Subpart A — Low Temperature Service
    - Subpart B — Elevated Temperature Service
  - Subsection HH — Class A Nonmetallic Core Support Structures
    - Subpart A — Graphite Materials
    - Subpart B — Composite Materials

2 SUBSECTIONS

Subsections are divided into Articles, subarticles, paragraphs, and, where necessary, subparagraphs and subsubparagraphs.

[*] 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.

3 ARTICLES

Articles are designated by the applicable letters indicated above for the Subsections followed by Arabic numbers, such as NB-1000. Where possible, Articles dealing with the same topics are given the same number in each Subsection, except NCA, in accordance with the following general scheme:

Article Number	Title
1000	Introduction or Scope
2000	Material
3000	Design
4000	Fabrication and Installation
5000	Examination
6000	Testing
7000	Overpressure Protection
8000	Nameplates, Stamping With Certification Mark, and Reports

The numbering of Articles and the material contained in the Articles may not, however, be consecutive. Due to the fact that the complete outline may cover phases not applicable to a particular Subsection or Article, the rules have been prepared with some gaps in the numbering.

4 SUBARTICLES

Subarticles are numbered in units of 100, such as NB-1100.

5 SUBSUBARTICLES

Subsubarticles are numbered in units of 10, such as NB-2130, and generally have no text. When a number such as NB-1110 is followed by text, it is considered a paragraph.

6 PARAGRAPHS

Paragraphs are numbered in units of 1, such as NB-2121.

7 SUBPARAGRAPHS

Subparagraphs, when they are *major* subdivisions of a paragraph, are designated by adding a decimal followed by one or more digits to the paragraph number, such as NB-1132.1. When they are *minor* subdivisions of a paragraph, subparagraphs may be designated by lowercase letters in parentheses, such as NB-2121(a).

8 SUBSUBPARAGRAPHS

Subsubparagraphs are designated by adding lowercase letters in parentheses to the *major* subparagraph numbers, such as NB-1132.1(a). When further subdivisions of *minor* subparagraphs are necessary, subsubparagraphs are designated by adding Arabic numerals in parentheses to the subparagraph designation, such as NB-2121(a)(1).

9 REFERENCES

References used within Section III generally fall into one of the following four categories:

(a) References to Other Portions of Section III. When a reference is made to another Article, subarticle, or paragraph, all numbers subsidiary to that reference shall be included. For example, reference to Article NB-3000 includes all material in Article NB-3000; reference to NB-3100 includes all material in subarticle NB-3100; reference to NB-3110 includes all paragraphs, NB-3111 through NB-3113.

(b) References to Other Sections. Other Sections referred to in Section III are the following:

(1) Section II, Materials. When a requirement for a material, or for the examination or testing of a material, is to be in accordance with a specification such as SA-105, SA-370, or SB-160, the reference is to material specifications in Section II. These references begin with the letter “S.”

(2) Section V, Nondestructive Examination. Section V references begin with the letter "T" and relate to the nondestructive examination of material or welds.

(3) Section IX, Welding and Brazing Qualifications. Section IX references begin with the letter "Q" and relate to welding and brazing requirements.

(4) Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components. When a reference is made to inservice inspection, the rules of Section XI shall apply.

(c) Reference to Specifications and Standards Other Than Published in Code Sections

(1) Specifications for examination methods and acceptance standards to be used in connection with them are published by the American Society for Testing and Materials (ASTM). At the time of publication of Section III, some such specifications were not included in Section II of this Code. A reference to ASTM E94 refers to the specification so designated by and published by ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

(2) Dimensional standards covering products such as valves, flanges, and fittings are sponsored and published by The American Society of Mechanical Engineers and approved by the American National Standards Institute.[**] When a product is to conform to such a standard, for example ASME B16.5, the standard is approved by the American National Standards Institute. The applicable year of issue is that suffixed to its numerical designation in Table NCA-7100-1, for example ASME B16.5-2003. Standards published by The American Society of Mechanical Engineers are available from ASME (https://www.asme.org/).

(3) Dimensional and other types of standards covering products such as valves, flanges, and fittings are also published by the Manufacturers Standardization Society of the Valve and Fittings Industry and are known as Standard Practices. When a product is required by these rules to conform to a Standard Practice, for example MSS SP-100, the Standard Practice referred to is published by the Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS), 127 Park Street, NE, Vienna, VA 22180. The applicable year of issue of such a Standard Practice is that suffixed to its numerical designation in Table NCA-7100-1, for example MSS SP-89-2003.

(4) Specifications for welding and brazing materials are published by the American Welding Society (AWS), 8669 Doral Boulevard, Suite 130, Doral, FL 33166. Specifications of this type are incorporated in Section II and are identified by the AWS designation with the prefix "SF," for example SFA-5.1.

(5) Standards applicable to the design and construction of tanks and flanges are published by the American Petroleum Institute and have designations such as API-605. When documents so designated are referred to in Section III, for example API-605–1988, they are standards published by the American Petroleum Institute and are listed in Table NCA-7100-1.

(d) References to Appendices. Section III uses two types of appendices that are designated as either Section III Appendices or Subsection Appendices. Either of these appendices is further designated as either Mandatory or Nonmandatory for use. Mandatory Appendices are referred to in the Section III rules and contain requirements that must be followed in construction. Nonmandatory Appendices provide additional information or guidance when using Section III.

(1) Section III Appendices are contained in a separate book titled "Appendices." These appendices have the potential for multiple subsection applicability. Mandatory Appendices are designated by a Roman numeral followed, when appropriate, by Arabic numerals to indicate various articles, subarticles, and paragraphs of the appendix, such as II-1500 or XIII-1210. Nonmandatory Appendices are designated by a capital letter followed, when appropriate, by Arabic numerals to indicate various articles, subarticles, and paragraphs of the appendix, such as D-1200 or Y-1440.

(2) Subsection Appendices are specifically applicable to just one subsection and are contained within that subsection. Subsection-specific mandatory and nonmandatory appendices are numbered in the same manner as Section III Appendices, but with a subsection identifier (e.g., NF, NH, D2, etc.) preceding either the Roman numeral or the capital letter for a unique designation. For example, NF-II-1100 or NF-A-1200 would be part of a Subsection NF mandatory or nonmandatory appendix, respectively. For Subsection CC, D2-IV-1120 or D2-D-1330 would be part of a Subsection CC mandatory or nonmandatory appendix, respectively.

(3) It is the intent of this Section that the information provided in both Mandatory and Nonmandatory Appendices may be used to meet the rules of any Division or Subsection. In case of conflict between Appendix rules and Division/Subsection rules, the requirements contained in the Division/Subsection shall govern. Additional guidance on Appendix usage is provided in the front matter of Section III Appendices.

[**] The American National Standards Institute (ANSI) was formerly known as the American Standards Association. Standards approved by the Association were designated by the prefix "ASA" followed by the number of the standard and the year of publication. More recently, the American National Standards Institute was known as the United States of America Standards Institute. Standards were designated by the prefix "USAS" followed by the number of the standard and the year of publication. While the letters of the prefix have changed with the name of the organization, the numbers of the standards have remained unchanged.

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)*
xv	List of Sections	Updated
xx	Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees	Revised in its entirety *(13-2222)*
xxiii	Personnel	Updated
xlii	Organization of Section III	*(1)* In "1 General," title of Section III, Division 3 revised *(13-1594)* *(2)* In "1 General," for Section III, Division 3, Subsection WD added *(3)* In "1 General," entry for Subsection NH deleted and footnote editorially revised *(4)* In "9 References," subparas. (a) and (d)(1) revised *(16-148)*
1	WA-1110	*(1)* Title and paragraphs revised *(13-1594)* *(2)* Former endnote 2 deleted from Endnotes *(15-2548)*
1	WA-1130	Subparagraph (b) revised *(13-1594, 15-2548)*
1	WA-1140	Title and subparas. (a), (b), (d), and (d)(1) through (d)(3) revised *(13-1594)*
2	WA-1210	Revised *(13-1594)*
2	WA-1221	Revised *(13-1594)*
2	WA-1230	Revised *(13-1594)*
3	Article WA-2000	Title revised *(13-1594)*
3	WA-2100	*(1)* WA-2110, WA-2121, WA-2122, WA-2123(e), WA-2123.4, WA-2124, and WA-2130 revised *(13-1594)* *(2)* Former endnote 4 incorporated into WA-2121(c) and WA-2123(c) and deleted from Endnotes *(15-2548)* *(3)* Former endnote 5 incorporated into WA-2123.4(b) and deleted from Endnotes *(15-2548)*
5	WA-3110	Revised *(13-1594)*
5	WA-3111	Revised *(13-1594)*
5	WA-3112	Revised *(13-1594)*
5	WA-3113	In subpara. (a), first sentence revised *(13-1594)*
6	WA-3123	Revised in its entirety *(14-2159)*
6	WA-3124	Added *(14-2159)*

Page	*Location*	*Change (Record Number)*
7	WA-3320	Subparagraphs (d) and (f) revised *(13-1594)*
7	WA-3330	Revised *(13-1594)*
7	WA-3340	Revised *(13-1594)*
7	WA-3351	WA-3351.1, WA-3351.2(d), WA-3351.2(g), WA-3351.2(h), WA-3351.2(i), WA-3351.3, and WA-3351.4 revised *(13-1594, 15-209)*
8	WA-3352.1	Subparagraphs (a), (b), (d), and (e) revised *(13-1594)*
8	WA-3356	Revised in its entirety *(13-1594, 15-209)*
9	WA-3357	Subparagraph (c) revised *(13-1594)*
9	WA-3361	*(1)* WA-3361.1, WA-3361.2, and WA-3361.4 revised *(13-1594)* *(2)* WA-3361.3 revised *(13-1594, 15-209)*
10	WA-3461	Revised *(13-1594)*
10	WA-3800	*(1)* WA-3810 and WA-3812 revised *(13-1594, 16-2075)* *(2)* WA-3811(b) and WA-3820 revised *(16-2075)*
12	WA-4110	In subpara. (a), first sentence revised *(13-1594)*
12	WA-4120	*(1)* New subpara. (b) added *(15-226)* *(2)* Former subpara. (b) redesignated as (c) and (d) *(15-226)*
13	Table WA-4134.17-1	Revised *(13-1594)*
13	Table WA-4134.17-2	Revised *(13-1594)*
14	WA-5122	Revised *(13-1594)*
14	WA-5125	Subparagraph (a) revised *(13-1594)*
14	WA-5210	Subparagraph (b) revised *(13-1594)*
15	WA-5230	Subparagraph (c) revised *(15-209)*
16	WA-5262	Subparagraph (c) revised *(13-1594)*
17	Article WA-7000	Revised in its entirety *(13-1594)*
19	Table WA-8100-1	Revised *(13-1594)*
20	WA-8150	WA-8151, WA-8152, and WA-8154 revised *(13-1594)*
20	WA-8161	In subpara. (b), last sentence revised *(13-1594, 15-209)*
20	WA-8211	Subparagraphs (a) and (a)(5) revised *(13-1594)*
21	Figure WA-8212-1	Revised *(13-1594, 16-961)*
21	WA-8220	*(1)* Subparagraph (b) revised *(13-1594)* *(2)* Subparagraph (c) added *(16-961)*
21	WA-8230	Second sentence revised *(13-1594)*
21	WA-8300	*(1)* WA-8310(b) revised *(13-1594)* *(2)* In WA-8311, first paragraph and subpara. (b) revised *(13-1594)*
23	Form N-7	Revised *(13-1594)*
25	Form N-8	Revised *(13-1594)*
26	Form N-9	Revised *(13-1594)*
28	Form N-11	Added *(13-1594)*

Page	*Location*	*Change (Record Number)*
29	WA-9200	*(1)* Definitions of *component, containment, containment closure weld, disposal, energy-limited dynamic event, internal support structure, qualified source material, regulatory authority, source material, storage*, and *transportation* revised *(13-1594, 16-2075)* *(2)* Definition of *Certification Mark* deleted *(13-1594)* *(3)* Definitions of *Class ISS, Containment Systems,* and *Lowest Service Temperature (LST)* added *(13-1594, 15-2548)*
31	WB-1100	Subparagraphs (a) and (b) revised *(13-1594, 16-148, 16-1537)*
31	WB-1120	*(1)* Title revised *(14-1895)* *(2)* Former subparagraph (a) deleted and former subpara. (c) redesignated as (a) and revised *(14-1895)*
33	WB-2122	First sentence revised *(16-2075)*
34	WB-2123	Last line revised *(16-2075)*
34	WB-2150	First sentence revised *(16-2075)*
35	WB-2211	*(1)* Title revised *(15-2548)* *(2)* Former endnote 8 incorporated into paragraph and deleted from Endnotes *(15-2548)*
36	WB-2222.2	Fraction "1/2" corrected by errata to "1/4" *(13-140)*
36	WB-2222.3	Fraction "1/2" corrected by errata to "1/4" *(13-140)*
36	WB-2223.1	Fraction "1/2" corrected by errata to "1/4" *(13-140)*
38	WB-2321.3	Revised and former endnote 9 deleted from Endnotes *(15-2548)*
38	WB-2321.4	Revised and former endnote 9 deleted from Endnotes *(15-2548)*
38	WB-2331.1	Subparagraph (a) revised *(15-2548)*
39	WB-2331.2	Subparagraph (a) revised *(15-2548)*
39	WB-2332	Subparagraphs (a)(1) and (b) revised *(15-2548)*
40	WB-2333	Revised *(15-2548)*
41	WB-2360	Subparagraphs (a) and (b) revised *(16-2075)*
42	WB-2431.1	Former endnote 8 incorporated into subpara. (c) and deleted from Endnotes *(15-2548)*
43	WB-2432.1	Former endnote 12 incorporated into subpara. (c) and deleted from Endnotes *(15-2548)*
49	WB-2551	Former endnote 13 incorporated into subpara. (a) and deleted from Endnotes *(15-2548)*
53	WB-2581	Revised *(14-1396)*
53	WB-2582	Revised *(14-1396)*
55	WB-2610	Subparagraph (b) revised *(16-2075)*
56	WB-3113	Former endnote 15 deleted from Endnotes *(15-2548)*
59	Table WB-3133.4-1	Reformatted editorially
63	WB-3215	Former endnote 18 added after last paragraph as in-text Note and deleted from Endnotes *(15-2548)*
66	WB-3222.4	First sentence revised *(16-336)*

Page	*Location*	*Change (Record Number)*
69	WB-3222.6	Former endnote 19 added as in-text Note and deleted from Endnotes *(15-2548)*
69	WB-3222.9	Former endnote 21 incorporated into subpara. (d)(3) and deleted from Endnotes *(15-2548)*
71	WB-3222.11	In subpara. (a), former endnote 22 added as in-text Note below nomenclature *y'* and deleted from Endnotes *(15-2548)*
71	WB-3224.1	Subparagraphs (c) and (e) revised *(15-2529)*
73	WB-3224.2	Revised *(15-2529)*
75	WB-3234	Subparagraph (a) revised *(15-2529)*
76	WB-3251.1	Former endnote 23 deleted from Endnotes *(15-2548)*
81	WB-4121.1	Revised *(16-2106)*
83	WB-4221.1	Revised *(13-542)*
84	WB-4221.3	Last two lines revised *(15-209)*
84	WB-4222.1	Revised *(13-542)*
87	WB-4243	Former endnote 24 incorporated into subpara. (c)(1) and deleted from Endnotes *(15-2548)*
97	WB-4335.2(e)(1)	Revised *(15-2548)*
99	Figure WB-4427-1	Editorially updated
101	WB-4622.1	Former endnote 8 incorporated into paragraph and deleted from Endnotes *(15-2548)*
123	WC-1100	*(1)* In subpara. (a), last line revised *(13-1594)* *(2)* In subpara. (b), first sentence revised *(16-148, 16-1537)*
123	WC-1120	*(1)* Title revised *(14-1895)* *(2)* Former subpara. (a) deleted and former subpara. (c) redesignated as (a) and revised *(14-1895)*
125	WC-2122	In first paragraph, first sentence revised *(16-2075)*
126	WC-2124	In first paragraph, first sentence revised *(16-2075)*
126	WC-2125	Former endnote 31 added as second paragraph and deleted from Endnotes *(16-2075)*
127	WC-2150	First sentence revised *(16-2075)*
127	WC-2211	Former endnote 8 added to the end of the paragraph and deleted from Endnotes *(15-2548)*
129	WC-2311	Subparagraphs (a)(7), (a)(8), and (b) revised *(15-2548)*
130	WC-2321.3	Revised *(15-2548)*
131	WC-2331	Subparagraphs (a)(1) and (a)(2) revised and former endnote 33 deleted from Endnotes *(15-2548)*
131	WC-2332	*(1)* Title and WC-2332.3 revised *(15-2548)* *(2)* Former endnote 35 incorporated into the first paragraph of WC-2332.1 and WC-2332.2 and deleted from Endnotes *(15-2548)* *(3)* WC-2332.3 revised *(15-2548)*

Page	*Location*	*Change (Record Number)*
133	WC-2360	References to NCA revised *(16-2075)*
135	WC-2431.1	Former endnote 8 incorporated into subpara. (c) and deleted from Endnotes *(15-2548)*
136	WC-2432.1	Former endnote 12 incorporated into subpara. (c) and deleted from Endnotes *(15-2548)*
141	WC-2552	Former endnote 13 added as new paragraph and deleted from Endnotes *(15-2548)*
144	WC-2582	Revised *(14-1396)*
149	Table WC-3133.4-1	Reformatted editorially
150	WC-3211.1	In subpara. (a), first sentence revised *(13-1594)*
151	WC-3216.3	In subparas. (a)(2) and (c), references to Section III Appendices revised *(16-148)*
152	Table WC-3217-1	Notes (3) and (4) revised *(15-2529, 16-148)*
152	WC-3217.2	Last line and endnote 19 (formerly 36) revised *(16-148)*
153	WC-3219.1	Reference to Section III Appendices revised *(16-148)*
153	WC-3219.1.2	Revised in its entirety *(16-148)*
154	WC-3224.6	Reference to Section III Appendices revised *(16-148)*
154	WC-3224.8	Reference to Section III Appendices revised *(16-148)*
156	WC-3224.9	Reference to Section III Appendices revised *(16-148)*
157	Figure WC-3225-1	In the callout for sketches (a), (b), and (c), "0.2"corrected by errata to "0.20" *(17-335)*
158	Figure WC-3225-2	In the callout for sketches (b) through (e), "0.2" corrected by errata to "0.20" *(17-335)*
159	Figure WC-3225-3	In the callout for sketches (a), (b), and (d) through (g), "0.2" corrected by errata to "0.20" *(17-335)*
156	WC-3225.2	Former endnote 39 added as subpara. (c) and deleted from Endnotes *(15-2548)*
161	WC-3251.1	Reference to endnote 23 deleted *(15-2548)*
166	WC-4121.1	Cross-reference revised *(16-2106)*
167	WC-4130	Subparagraph (d) revised *(13-1594)*
168	WC-4221.1	Revised *(13-542)*
169	WC-4222.1	Revised *(13-542)*
174	WC-4265	Former endnote 24 incorporated into subpara. (d)(1) and deleted from Endnotes *(15-2548)*
182	WC-4335.2	Subparagraphs (b)(1) and (c)(1) revised *(15-2548)*
189	WC-4622.1	Former endnote 8 incorporated into paragraph and deleted from Endnotes *(15-2548)*
213	Subsection WD	Added *(13-1593, 14-1895, 16-960, 16-2106)*

LIST OF CHANGES IN RECORD ORDER NUMBER

Record Number	Change
13-140	Errata corrections. See Summary of Changes for details.
13-542	Revised WB/WC-4221.1 and WB/WC-4222.1 to clearly establish the equations for U.S. Customary and SI units, to be consistent across BPVC Divisions and book Sections.
13-1593	Added new Subsection WD.
13-1594	Revised the Organization of Section III to address the incorporation of a new proposed Subsection WD that addresses internal support structures.
13-2222	Revised the front guidance on interpretations in its entirety.
14-1396	Revised WB-2581, WB-2582, and WC-2582 Visual Examination and added references to ASTM F788 and ASTM F812.
14-1895	Revised to eliminate statements regarding whether components shall be constructed to Division 3 rules, also revised to make WB/WC/WD-1000 more consistent.
14-2159	Revised WA-3123 and added WA-3124 to allow approval of subcontracted calibration and testing services by acceptance of International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Agreement (MRA) approved laboratories.
15-209	Revised the term “Registered Professional Engineer” to “Certifying Engineer” and added requirements to be consistent with changes in Mandatory Appendix XXIII.
15-226	Revised WA-4120(b) to clarify applicability of NQA-1 definitions.
15-2529	Updated cross references as a result of revision of Nonmandatory Appendix F as a Mandatory Appendix.
15-2548	Updated Subsections WA/WB/WC, as well as the Division 3-related Nonmandatory Appendix EE, to incorporate and delete some endnotes into the text.
16-148	Revised numerous sections of text related to incorporation of revised Mandatory Appendix XIII.
16-336	Revised WB-3222.4 to evaluate normal loads.
16-960	Revised Table WD-2331(a)-1 so that the maximum thickness matches that established in WD-2331 and WD-2332. Clarified Table WD-2331(a)-1 column heads as being applicable to all material (not just pipe or shells) by deleting “wall,” and added an additional stress limit to WD-3229.2(c) to address those situations when buckling is not a limiting issue.
16-961	Revised WA-8220 to add alternative nameplate requirements and revised Figure WA-8212-1, removing date info since this is not mentioned in the WA requirements.
16-1537	Revised WB/WC-1100(b) for clarity.
16-2075	Made numerous revisions in WA-3810, WA-3811, WA-3812, and WA-3820 to change references to NCA-385X to NCA-425X, based on the proposed revisions identified in Record 16-341.
16-2106	Revised WB/WC/WD-4121.1 to align the phrasing of Division 1 with Divisions 2 and 3 for consistency.
17-335	Errata corrections. See Summary of Changes for details.

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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SUBSECTION WA
GENERAL REQUIREMENTS

ARTICLE WA-1000
SCOPE OF DIVISION 3

WA-1100 SCOPE

(17) **WA-1110 NATURE OF THESE RULES AND CONTAINMENT SYSTEMS TO WHICH THEY ARE APPLICABLE**

(a) The rules of Division 3 contain the requirements for the construction of individual components (and parts where appropriate) that comprise Containment Systems (Article WA-9000). Division 3 Containment Systems are used for the transportation and/or storage, including disposal,[1] of spent nuclear fuel and high-level radioactive material.

(b) As used in Division 3, Containment Systems may be comprised of one or more components, such as containments and internal support structures. Containment System components for which Division 3 provides rules are as follows:

(1) the transportation containment (Subsection WB — Class TC)

(2) the storage containment (Subsection WC — Class SC)

(3) the internal support structure (Subsection WD — Class ISS)

WA-1120 DEFINITIONS

Definitions of key terms used in this Division are included in Article WA-9000.

(17) **WA-1130 LIMITS OF THESE RULES**

(a) The rules of this Division provide requirements for new construction including consideration of mechanical and thermal stresses due to cyclic operation. They do not cover deterioration which may occur in service as a result of radiation effects, corrosion, erosion, or instability of the material. These effects shall be addressed in the Design Specification by requiring appropriate measures to be included in the design.

(b) The rules are intended to be applicable to any item that serves a containment or internal support structure function.

WA-1140 USE OF CODE EDITIONS AND CASES (17)

(a) The Design Specification shall establish the Code Edition.

(b) The Certificate Holder shall construct the components or parts under the provisions of a Quality Assurance Program which has been accepted by the Society. The Quality Assurance Program shall be updated to meet the requirements of the latest Division 3 Edition within 6 months of issuance.

(c) Code Cases are permissible and may be used beginning with the date of approval by the ASME Council. Only Code Cases that are specifically identified as being applicable to this Division may be used. Code Cases may only be used by mutual consent of the parties involved.

(d) Materials produced and certified in accordance with Code Editions and Addenda, if applicable, other than the one specified in the Design Specification may be used, provided all of the following requirements are satisfied.

(1) The material (WA-1220) meets the applicable requirements of a material specification permitted by WB-2121, WC-2121, or WD-2121, as appropriate, of the Edition specified for construction.

(2) The material meets all the requirements of Article WB-2000, Article WC-2000, or Article WD-2000, as appropriate, of the Edition specified for construction.

(3) The material was produced under the provisions of a Quality System Program which had been accepted by the Society or qualified by a party other than the Society (NCA-3820), in accordance with the requirements of the latest Edition and Addenda, if applicable, issued at the time the material was produced. Material exempted from portions of the provisions of NCA-3800 by WB-2610, WC-2610, or WD-2610, as appropriate, may be used, provided the requirements of (1) and (2) above are met.