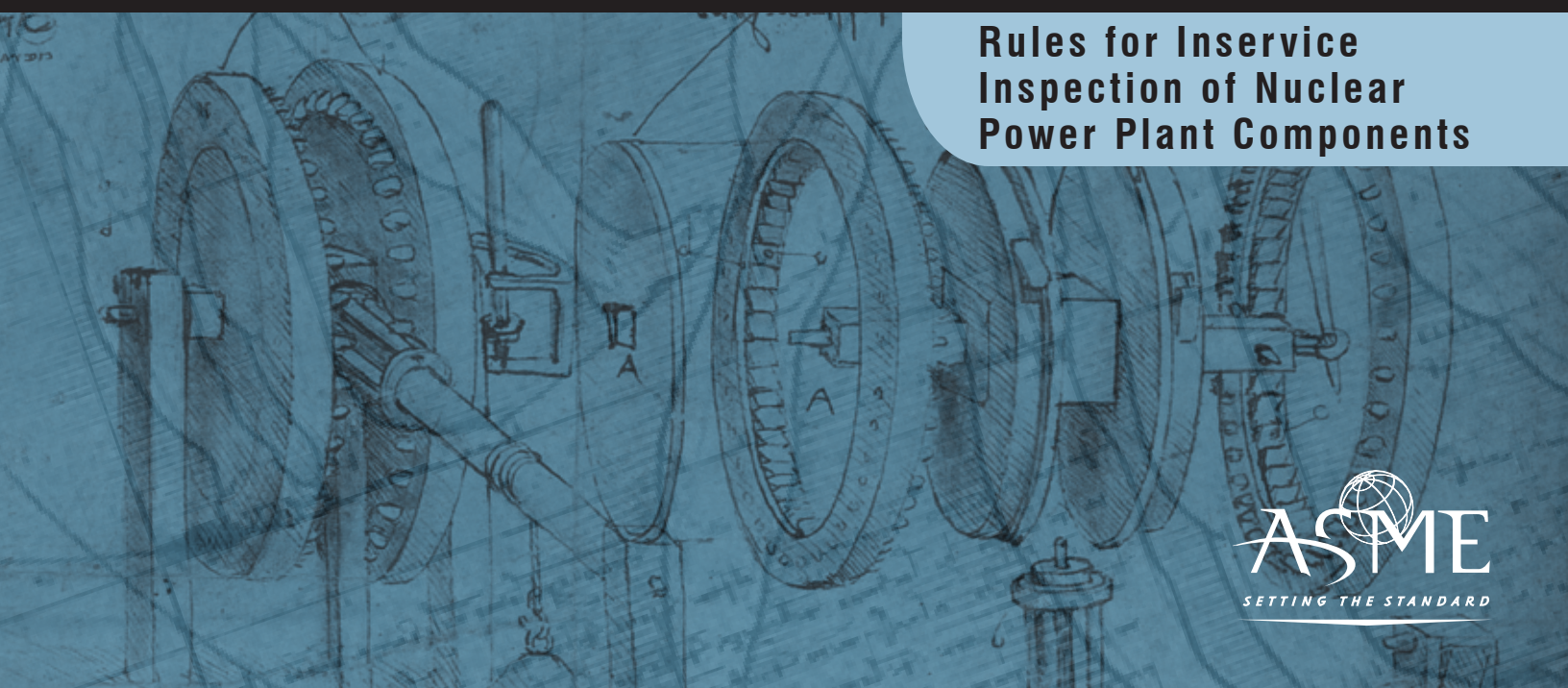
ASME BPVC.XI-2015

# SECTION XI

# 2015 ASME Boiler and Pressure Vessel Code

An International Code

## Rules for Inservice Inspection of Nuclear Power Plant Components



ASME

SETTING THE STANDARD

AN INTERNATIONAL CODE

# 2015 ASME Boiler & Pressure Vessel Code

2015 Edition July 1, 2015

# XI

# RULES FOR INSERVICE INSPECTION OF NUCLEAR POWER PLANT COMPONENTS

ASME Boiler and Pressure Vessel Committee
on Nuclear Inservice Inspection

The American Society of Mechanical Engineers

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: July 1, 2015

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.

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

## INTERPRETATIONS

Interpretations of the Code have historically been posted in January and July at http://cstools.asme.org/interpretations.cfm. Interpretations issued during the previous two calendar years are included with the publication of the applicable Section of the Code in the 2015 Edition. Interpretations of Section III, Divisions 1 and 2 and Section III Appendices are included with Subsection NCA.

Following the 2015 Edition, interpretations will not be included in editions; they will be 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 2015 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 2017 Code.

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# 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 judgement* 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.

# SUBMITTAL OF TECHNICAL INQUIRIES TO THE BOILER AND PRESSURE VESSEL STANDARDS COMMITTEES (15)

## 1 INTRODUCTION

*(a)* The following information provides guidance to Code users for submitting technical inquiries to the committees. See Guideline on the Approval of New Materials Under the ASME Boiler and Pressure Vessel Code in Section II, Parts C and D for additional requirements for requests involving adding new materials to the Code. Technical inquiries include requests for revisions or additions to the Code rules, requests for Code Cases, and requests for Code Interpretations, as described below.

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

*(2) Code Cases.* Code Cases represent alternatives or additions to existing Code rules. 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 jurisdictions or owners automatically accept Code Cases. The most common applications for Code Cases are:

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

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

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

*(3) Code Interpretations.* Code Interpretations provide clarification of the meaning of existing rules in the Code, and are also presented in question and reply format. Interpretations do not introduce new requirements. In cases where existing Code text does not fully convey the meaning that was intended, and revision of the rules is required to support an interpretation, an Intent Interpretation will be issued and the Code will be revised.

*(b)* The Code rules, Code Cases, and Code Interpretations established by the committees 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 rules.

*(c)* Inquiries that do not comply with these provisions or that do not provide sufficient information for a committee's full understanding may result in the request being returned to the inquirer with no action.

## 2 INQUIRY FORMAT

Submittals to a committee shall include:

*(a) Purpose.* Specify one of the following:

*(1)* revision of present Code rules

*(2)* new or additional Code rules

*(3)* Code Case

*(4)* Code Interpretation

*(b) Background.* 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, provide a copy of the specific referenced portions of the Code.

*(c) Presentations.* The inquirer may desire 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 committee meeting shall be at the expense of the inquirer. The inquirer's attendance or lack of attendance at a meeting shall not be a basis for acceptance or rejection of the inquiry by the committee.

## 3 CODE REVISIONS OR ADDITIONS

Requests for Code revisions or additions shall provide the following:

*(a) Proposed Revisions or Additions.* For revisions, identify the rules of the Code that require revision and submit a copy of the appropriate rules as they appear in the Code, marked up with the proposed revision. For additions, provide the recommended wording referenced to the existing Code rules.

*(b) Statement of Need.* Provide a brief explanation of the need for the revision or addition.

*(c) Background Information.* 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 proposed revision or addition. Sketches, tables, figures, and graphs should be submitted as appropriate. When applicable, identify any pertinent paragraph in the Code that would be affected by the revision or addition and identify paragraphs in the Code that reference the paragraphs that are to be revised or added.

## 4 CODE CASES

Requests for Code Cases shall provide a Statement of Need and Background Information similar to that defined 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, etc.) must be defined and it must be confirmed 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 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 proposed Code Case applies.

## 5 CODE INTERPRETATIONS

*(a)* Requests for Code Interpretations shall provide the following:

*(1) Inquiry.* Provide a condensed and precise question, omitting superfluous background information and, when possible, composed in such a way that a "yes" or a "no" *Reply,* with brief provisos if needed, is acceptable. The question should be technically and editorially correct.

*(2) Reply.* Provide a proposed *Reply* that will clearly and concisely answer the *Inquiry* question. Preferably, the *Reply* should be "yes" or "no," with brief provisos if needed.

*(3) Background Information.* Provide any background information that will assist the committee in understanding the proposed *Inquiry* and *Reply.*

*(b)* Requests for Code Interpretations must be limited to an interpretation of a particular requirement in the Code or a Code Case. The committee cannot 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

Submittals to and responses from the committees shall meet the following:

*(a) Submittal.* Inquiries from Code users shall be in English and preferably be submitted in typewritten form; however, legible handwritten inquiries will also be considered. They shall include the name, address, telephone number, fax number, and e-mail address, if available, of the inquirer and be mailed to the following address:

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

As an alternative, inquiries may be submitted via e-mail to: SecretaryBPV@asme.org or via our online tool at http://go.asme.org/InterpretationRequest.

*(b) Response.* The Secretary of the appropriate committee shall acknowledge receipt of each properly prepared inquiry and shall provide a written response to the inquirer upon completion of the requested action by the committee.

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# PREFACE TO SECTION XI

## INTRODUCTION

Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, of the ASME Boiler and Pressure Vessel Code provides requirements for examination, testing, and inspection of components and systems, and repair/replacement activities in a nuclear power plant. Application of this Section of the Code begins when the requirements of the Construction Code have been satisfied.

## GENERAL

The rules of this Section constitute requirements to maintain the nuclear power plant and to return the plant to service, following plant outages, in a safe and expeditious manner. The rules require a mandatory program of examinations, testing, and inspections to evidence adequate safety and to manage deterioration and aging effects. The rules also stipulate duties of the Authorized Nuclear Inservice Inspector to verify that the mandatory program has been completed, permitting the plant to return to service in an expeditious manner.

## INSERVICE TESTING OF PUMP AND VALVES

With the 1998 Edition with the 2000 Addenda, all requirements for testing pumps and valves have been removed from Section XI, Division 1. These requirements are now located in the ASME Code for Operation and Maintenance of Nuclear Power Plants.

## OWNER RESPONSIBILITIES

The Owner of the nuclear power plant is assigned the responsibilities to develop a program which will demonstrate conformance to the requirements of this Section of the Code.

These responsibilities include:

*(a)* provision of access in the design and arrangement of the plant to conduct the examination and tests;

*(b)* development of plans and schedules, including detailed examination and testing procedures for filing with the enforcement and regulatory authorities having jurisdiction at the plant site;

*(c)* conduct of the program of examination and tests, system leakage and hydrostatic pressure tests; and

*(d)* recording of the results of the examinations and tests, including corrective actions required and the actions taken.

## DUTIES OF THE AUTHORIZED NUCLEAR INSERVICE INSPECTOR

Section XI differs from Section VI, Recommended Rules for the Care and Operation of Heating Boilers, and Section VII, Recommended Guidelines for the Care of Power Boilers, in that the requirements for Inservice Inspection of Nuclear Power Plants are mandatory, while the other two Sections are recommended practices. Duties of the Authorized Nuclear Inservice Inspector are assigned by Section XI to verify that the responsibilities of the Owner and the mandatory requirements of this Section are met. Duties of the Authorized Nuclear Inservice Inspector include the following:

*(a)* verifying system pressure tests;

*(b)* reviewing nondestructive examination procedures and Repair/Replacement Programs and Plans; and

*(c)* verifying that the visual examinations and tests have been completed and the results recorded.

Listed as one of the duties is the prerogative of the Inspector to require requalification of any operator or procedure when he has reason to believe the requirements are not being met.

# ORGANIZATION OF SECTION XI (15)

## 1 DIVISIONS

Section XI consists of three Divisions, as follows:

*Division 1* = Rules for Inspection and Testing of Components of Light-Water-Cooled Plants
*Division 2* = Rules for Inspection and Testing of Components of Gas-Cooled Plants
*Division 3* = Rules for Inspection and Testing of Components of Liquid-Metal-Cooled Plants

## 2 SUBSECTIONS

The Divisions are broken down into Subsections which are designated by capital letters, preceded by the letters IW in Division 1, by the letters IG in Division 2, and by the letters IM in Division 3.

Division 1 consists of Subsections covering the following aspects of the rules:

| Subsection | Title |
|---|---|
| IWA | General Requirements |
| IWB | Class 1 Components |
| IWC | Class 2 Components |
| IWD | Class 3 Components |
| IWE | Class MC and CC Components |
| IWF | Class 1, 2, 3, and MC Component Supports |
| IWG | Core Internal Structures (In course of preparation) |
| IWL | Class CC Concrete Components |

Division 2 consists of Subsections covering the following aspects of the rules:

| Subsection | Title |
|---|---|
| IGA | General Requirements |
| IGB | Class 1 Components |
| IGC | Class 2 Components |
| IGD | Class 3 Components |
| IGG | Reactor Internals |
| IGH | Elevated Temperature Material |
| IGI | Graphite and Thermal Insulation Materials |
| IGK | Concrete Reactor Vessels |
| IGP | Pumps |
| IGQ | Compressors |
| IGV | Valves |

Division 3 consists of Subsections covering the following aspects of the rules:

| Subsection | Title |
|---|---|
| IMA | General Requirements |
| IMB | Class 1 Components |
| IMC | Class 2 Components |
| IMD | Class 3 Components |
| IMF | Class 1, 2, and 3 Component Supports |
| IMV | Valves |

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

## 3 ARTICLES

Articles are designated by the applicable letters indicated above for the Subsections, followed by Arabic numbers, such as IWA-1000 or IWB-2000. Where possible, Articles dealing with the same general topics are given the same number in each Subsection, in accordance with the following scheme:

| Article Number | Title |
|---|---|
| 1000 | Scope and Responsibility |
| 2000 | Examination and Inspection |
| 3000 | Acceptance Standards |
| 4000 | Repair/Replacement Activities |
| 5000 | System Pressure Tests |
| 6000 | Records and Reports |

The numbering of Articles and 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 requirements have been prepared with some gaps in the numbering.

## 4 SUBARTICLES

Subarticles are numbered in units of 100, such as IWA-1100 or IWA-1200.

## 5 SUBSUBARTICLES

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

## 6 PARAGRAPHS

Paragraphs are numbered in units of 1, such as IWA-2131 or IWA-2132.

## 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 IWA-1111.1 or IWA-1111.2. When they are *minor* subdivisions of a paragraph, subparagraphs may be designated by lowercase letters in parentheses, such as IWA-1111(a) or IWA-1111(b).

## 8 REFERENCES

References used within this Section generally fall into one of six categories, as explained below.

*(a) References to Other Portions of This Section.* When a reference is made to another Article, Subarticle, or paragraph number, all numbers subsidiary to that reference shall be included. For example, reference to IWA-2000 includes all materials in Article IWA-2000; reference to IWA-2200 includes all material in Subarticle IWA-2200; reference to IWA-2220 includes all paragraphs in IWA-2220, IWA-2221, and IWA-2222.

*(b) References to Other Sections.* Other Sections referred to in Section XI are as follows:

*(1) Section II, Material Specifications.* 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." Materials conforming to ASTM specifications may be used in accordance with the provisions of the last paragraph of the Foreword to the Boiler Code.

*(2) Section III, Nuclear Power Plant Components.* Section III references begin with the letter "N" and relate to nuclear power plant design or construction requirements.

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

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

*(c) References 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. For example, reference to ASTM E71-64 refers to the specification so designated and published by American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428.

*(2)* Recommended practices for qualifying and certifying nondestructive examination personnel are published by the American Society for Nondestructive Testing (ASNT). These documents are designated SNT-TC-1A and CP-189. A reference to SNT-TC-1A or CP-189 shall be understood to mean the practice and its supplements, so designated and published by the American Society for Nondestructive Testing (ASNT), 1711 Arlingate Lane, P. O. Box 28518, Columbus, OH 43228-0518.

*(3)* Specifications and standards for materials, processes, examination and test procedures, qualifications of personnel, and other requirements of the Code approved by the American National Standards Institute are designated by the letters ANSI followed by the serialization for the particular specification or standard. Standards published by ASME are available from ASME (https://www.asme.org/).

*(4)* Specifications and standards for materials, processes, examination and test procedures, and other requirements of the Code relating to concrete are listed in Table IWA-1600-1, designated by the letters ACI, and are approved and published by the American Concrete Institute. Standards published by the American Concrete Institute can be obtained by writing ACI, Box 19150, 22400 West Seven Mile Road, Detroit, MI 48219.

*(5)* Specifications and standards for determining water chemistry as identified in Table IWA-1600-1 by the letter designation APHA are approved and published by the American Public Health Association. Standards published by the American Public Health Association can be obtained by writing APHA, 1015 15th Street, NW, Washington, D.C. 20005.

*(6)* Specifications and standards for welding are listed in Table IWA-1600-1 and are approved and published by the American Welding Society. Standards published by the American Welding Society can be obtained by writing AWS, 550 N.W. LeJeune Road, P.O. Box 351040, Miami, FL 33135.

*(d) References to Government Regulations.* U.S. Federal regulations issued by executive departments and agencies, as published in the Federal Register, are codified in the Code of Federal Regulations. The Code of Federal Regulations is published by the Office of the Federal Register, National Archives and Records Service, General Service Administration, and may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Title 10 of the Code of Federal Regulations contains the regulations for atomic energy. The abbreviated reference "10 CFR 50" is used to mean "Title 10, Code of Federal Regulations, Part 50."

*(e) References to Appendices.* Two types of Appendices are used in Section XI and are designated Mandatory and Nonmandatory.

*(1)* Mandatory Appendices contain requirements which must be followed in Section XI activities; such references are designated by a Roman numeral followed by Arabic numerals. A reference to III-1100, for example, refers to a Mandatory Appendix.

*(2)* Nonmandatory Appendices provide information or guidance for the use of Section XI; such references are designated by a capital letter followed by Arabic numerals. A reference to A-3300, for example, refers to a Nonmandatory Appendix.

*(f) References to Technical Reports.* The following reports prepared at the request of the American Society of Mechanical Engineers and published by Electric Power Research Institute are relevant to Code-related articles of Section XI. Requests for copies should be directed to EPRI Research Reports Center, Box 50490, Palo Alto, CA 94303.

*(1)* NP-1406-SR — Nondestructive Examination Acceptance Standards Technical Basis and Development for Boiler and Pressure Vessel Code, ASME Section XI, Division 1, Special Report, May 1980.

*(2)* NP-719-SR — Flaw Evaluation Procedures — Background and Application of ASME Section XI Appendix A — Special Report, August 1978.

## SUMMARY OF CHANGES

After publication of the 2015 Edition, 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, **(15)**, 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)* |
|---|---|---|
| xiv | Foreword | *(1)* Revised<br>*(2)* New footnote added by errata *(13-860)* |
| xvii | Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees | In last line of 6(a), URL revised |
| xix | Personnel | Updated |
| xxxvii | Organization of Section XI | Last line of 8(c)(3) editorially revised |
| 2 | IWA-1400 | *(1)* Endnote in subpara. (a) revised *(12-1455)*<br>*(2)* Subparagraphs (l) and (m) revised *(12-552)* |
| 3 | Table IWA-1600-1 | *(1)* Third row added *(14-921)*<br>*(2)* Year updated in fourth, 20th, and 24th rows *(14-260, 14-921)*<br>*(3)* Thirteenth row revised *(14-260)* |
| 6 | IWA-2210 | Revised *(13-1241)* |
| 7 | Table IWA-2211-1 | Second row added *(13-1241)* |
| 6 | IWA-2212 | Subparagraph (c) added *(13-1241)* |
| 8 | IWA-2234 | First paragraph corrected by errata *(13-2077)* |
| 8 | IWA-2310 | Subparagraph (a) revised *(14-921, 14-922)* |
| 11 | IWA-2350 | Revised *(14-921)* |
| 11 | IWA-2360 | Subparagraph (c) added *(14-921)* |
| 14 | IWA-3200 | Subparagraph (a) revised *(12-552)* |
| 14 | IWA-3300 | Subparagraph (b) corrected by errata *(13-1249)* |
| 28 | IWA-4150 | Subparagraph (c) revised *(09-1679)* |
| 39 | IWA-4621 | Subparagraph (c) revised *(12-1239)* |
| 48 | IWA-4651 | *(1)* Subparagraph (g) revised *(12-1239)*<br>*(2)* Subparagraph (i) added *(12-1239)* |
| 48 | IWA-4652.4 | Former subpara. (b)(12) deleted, and remaining subparagraphs redesignated *(12-1239)* |
| 51 | Figure IWA-4652.4-2 | Revised editorially |

| *Page* | *Location* | *Change (Record Number)* |
|---|---|---|
| 53 | Figure IWA-4655-2 | Revised editorially |
| 51 | IWA-4661 | Subparagraphs (d) and (e) revised *(13-1691)* |
| 51 | IWA-4662.1 | First paragraph revised *(13-1691)* |
| 55 | IWA-4664 | Subparagraph (a) added, and remaining subparagraphs redesignated *(13-1691)* |
| 67 | IWA-5213 | Subparagraph (a)(4) added *(13-1599)* |
| 69 | IWA-5246 | Added *(13-781)* |
| 71 | IWA-6200 | Revised in its entirety *(09-1679)* |
| 73 | Article IWA-9000 | *(1)* Definition of "*analytical evaluation*" added *(12-552)*<br>*(2)* Definitions of "*text information*" and "*unit of data storage*" deleted by errata *(14-776)* |
| 83 | Table IWB-2500-1 (B-A) | Third and fourth entries in final column revised *(12-1353)* |
| 88 | Table IWB-2500-1 (B-G-1) | General Note added *(14-771)* |
| 91 | Table IWB-2500-1 (B-G-2) | General Note added *(14-771)* |
| 98 | Table IWB-2500-1 (B-O) | *(1)* First and second entries in sixth column revised *(12-45)*<br>*(2)* Note (1) added, and remaining Note redesignated *(12-45)* |
| 111 | Figure IWB-2500-8 | *(1)* Illustration (f) added *(12-1979)*<br>*(2)* General Notes (a) through (c) added, and original General Note revised and designated as (d) *(12-1979)* |
| 117 | Figure IWB-2500-12(a) | Revised in its entirety *(14-699)* |
| 118 | Figure IWB-2500-12(b) | Added *(14-699)* |
| 119 | Figure IWB-2500-12(c) | Added *(14-699)* |
| 125 | IWB-3112 | Subparagraph (a) revised *(09-1679)* |
| 126 | IWB-3132.1 | Revised *(09-1679)* |
| 126 | IWB-3132.3 | Revised *(12-1411)* |
| 127 | IWB-3142.4 | Subparagraph (a) and designator (b) added *(13-1257)* |
| 130 | IWB-3514 | Subparagraph (b) added, and remaining subparagraph redesignated *(12-1411)* |
| 130 | IWB-3514.1 | In subpara. (a), last cross-reference revised *(12-1411)* |
| 133 | IWB-3514.8 | Revised *(12-552)* |
| 139 | IWB-3610 | Subparagraphs (a), (b), (b)(1), (b)(2), and (e) revised *(12-552)* |
| 140 | Figure IWB-3610-1 | Revised editorially |
| 141 | IWB-3613 | First sentence revised *(12-552)* |
| 142 | IWB-3640 | Revised in its entirety *(12-552)* |
| 143 | IWB-3662 | Subparagraph (f) revised *(12-552)* |
| 143 | IWB-3700 | Title revised *(12-552)* |
| 143 | IWB-3720 | Subparagraph (a) revised *(12-552)* |
| 146 | IWC-1221 | Subparagraph (d) revised *(14-1159)* |
| 146 | IWC-1222 | Subparagraph (d) revised *(14-1159)* |

| *Page* | *Location* | *Change (Record Number)* |
|---|---|---|
| 154 | Table IWC-2500-1 (C-D) | General Note added *(14-771)* |
| 162 | Figure IWC-2500-4 | *(1)* Revised in its entirety *(13-790)*<br>*(2)* Note (3) added, and remaining Note redesignated *(13-790)* |
| 166 | Figure IWC-2500-5 | Revised editorially |
| 167 | Figure IWC-2500-6(a) | Revised in its entirety *(14-845)* |
| 168 | Figure IWC-2500-6(b) | Added *(14-845)* |
| 169 | Figure IWC-2500-6(c) | Added *(14-845)* |
| 177 | IWC-3112 | Subparagraph (a) revised *(09-1679)* |
| 177 | IWC-3122.1 | Revised *(09-1679)* |
| 183 | IWC-3514 | Subparagraph (b) added, and remaining subparagraph redesignated *(12-1411)* |
| 183 | IWC-3514.1 | In subpara. (a), last cross-reference revised *(12-1411)* |
| 185 | IWC-3514.6 | Revised *(12-552)* |
| 185 | IWC-3600 | Revised in its entirety *(12-552)* |
| 187 | IWC-5222 | *(1)* Subparagraphs (a) and (b) revised *(13-1592)*<br>*(2)* Subparagraph (c) added *(13-1592)* |
| 197 | Table IWD-3410-1 | First entry in final column corrected by errata *(14-776, 14-1395)* |
| 197 | IWD-3600 | Revised in its entirety *(12-552)* |
| 199 | IWD-5222 | Revised in its entirety *(13-1592)* |
| 214 | IWF-1230 | Revised *(13-2071)* |
| 214 | IWF-1300 | Subparagraph (e) revised *(13-114)* |
| 215 | Figure IWF-1300-1 | Illustration (e) corrected by errata *(14-2304)* |
| 222 | IWF-3122.1 | Revised *(09-1679)* |
| 235 | IWL-3221.1 | Subparagraph (b) revised in its entirety *(10-142)* |
| 243 | I-3200 | Subparagraph (c) revised *(14-1375)* |
| 248 | Mandatory Appendix I, Supplement 11 | Subparagraph (a) corrected by errata *(13-2077)* |
| 250 | Mandatory Appendix II | Revised in its entirety *(09-1679)* |
| 256 | III-1100 | Subparagraph (b) revised *(13-301)* |
| 266 | Mandatory Appendix III Supplements | *(1)* Supplement 1 revised in its entirety *(13-301)*<br>*(2)* Supplement 2 added *(13-301)* |
| 276 | Mandatory Appendix IV, Supplement 2, 1.0 | Subparagraph (d)(2) revised *(12-2015)* |
| 296 | VIII-2100 | Subparagraph (d)(3)(-b) revised *(14-1378)* |
| 297 | VIII-3110 | Subparagraph (b) added, and remaining subparagraphs redesignated *(14-1380)* |
| 297 | VIII-3120 | Subparagraph (b) added, and remaining subparagraphs redesignated *(14-1380)* |

| *Page* | *Location* | *Change (Record Number)* |
|---|---|---|
| 315 | Mandatory Appendix VIII, Supplement 10 | *(1)* 2.2 revised *(14-1375)*<br>*(2)* 3.0(b) added *(14-1375)*<br>*(3)* 3.2(b) and (c) revised *(14-1375)*<br>*(4)* 3.3(a) and (b) revised *(14-1375)* |
| 319 | Mandatory Appendix VIII, Supplement 12 | In 3.0(a)(3), cross-reference corrected by errata *(14-776, 14-1418)* |
| 320 | Mandatory Appendix VIII, Supplement 14 | 3.3(b) revised *(14-1381)* |
| 324 | A-1100 | First paragraph and subpara. (h) revised *(12-552)* |
| 326 | Article A-3000 | Revised in its entirety *(10-783)* |
| 369 | A-4200 | *(1)* Third equation corrected by errata *(14-1395)*<br>*(2)* Subparagraph (c) added *(14-940)* |
| 378 | A-5200 | Subparagraph (b)(1)(-d) revised *(12-552)* |
| 382 | Article A-9000 | Definition of *flaw evaluation* deleted *(12-552)* |
| 384 | Nonmandatory Appendix C | Title revised *(12-552)* |
| 384 | C-1100 | Revised in its entirety *(12-552)* |
| 385 | C-1200 | Subparagraph (h) revised *(12-552)* |
| 385 | C-1300 | Definition of "*N*" revised *(12-552)* |
| 388 | Article C-2000 | Title revised *(12-552)* |
| 389 | C-2400 | Second sentence revised *(12-552)* |
| 389 | C-2500 | Fourth sentence revised *(12-552)* |
| 392 | C-2610 | Revised *(12-552)* |
| 394 | C-2620 | Revised *(12-552)* |
| 395 | C-3200 | Last sentence revised *(12-552)* |
| 397 | C-4222 | Revised *(12-552)* |
| 397 | C-4230 | Revised *(12-552)* |
| 403 | Article C-5000 | Title revised *(12-552)* |
| 403 | C-5200 | Revised in its entirety *(12-552)* |
| 403 | C-5310 | Second sentence revised *(12-552)* |
| 403 | C-5311 | Second sentence revised *(12-552)* |
| 405 | Table C-5310-1 | Note (2) revised *(12-552)* |
| 406 | Table C-5310-2 | Note (2) revised *(12-552)* |
| 407 | Table C-5310-3 | Note (2) revised *(12-552)* |
| 408 | Table C-5310-4 | Note (2) revised *(12-552)* |
| 403 | C-5312 | Second sentence revised *(12-552)* |
| 409 | Table C-5310-5 | Note (2) revised *(12-552)* |
| 408 | C-5410 | Second sentence revised *(12-552)* |
| 410 | Table C-5410-1 | Notes (2) and (3) revised *(12-552)* |

| *Page* | *Location* | *Change (Record Number)* |
|---|---|---|
| 411 | Article C-6000 | Title revised *(12-552)* |
| 411 | C-6200 | Revised in its entirety *(12-552)* |
| 411 | C-6310 | Second sentence revised *(12-552)* |
| 411 | C-6311 | Second sentence and Step 2 revised *(12-552)* |
| 411 | C-6312 | Step 2 revised *(12-552)* |
| 416 | C-6410 | Second sentence revised *(12-552)* |
| 422 | Article C-7000 | Title revised *(12-552)* |
| 422 | C-7200 | Title and subpara. (b) revised *(12-552)* |
| 426 | C-8200 | Subparagraph (a) revised *(12-552)* |
| 426 | C-8300 | First sentence revised *(12-552)* |
| 426 | C-8310 | Subparagraphs (a) and (b) revised *(12-552)* |
| 428 | C-8330 | Last sentence revised *(12-552)* |
| 440 | Table C-8520-1 | Note (3) revised *(12-552)* |
| 441 | Table C-8520-1M | Note (3) revised *(12-552)* |
| 443 | Nonmandatory Appendix D | Revised in its entirety *(04-1097)* |
| 444 | E-1100 | First sentence revised *(12-552)* |
| 444 | E-1300 | Definition of $K_{IC}$ corrected by errata *(14-1989)* |
| 445 | Table E-2 | *(1)* Ninth entry under second column corrected by errata *(14-1989)*<br>*(2)* Note (2) revised *(12-552)* |
| 447 | G-2110 | Second equation corrected by errata *(14-320)* |
| 458 | G-2223 | Equation (3) corrected by errata *(13-1249)* |
| 459 | G-2400 | Subparagraph (b) revised *(12-552)* |
| 464 | Nonmandatory Appendix H | Title revised *(12-552)* |
| 464 | H-1100 | First and last paragraphs revised *(12-552)* |
| 467 | Article H-2000 | Title revised *(12-552)* |
| 468 | Article H-3000 | Last word revised *(12-552)* |
| 469 | H-4100 | First sentence revised *(12-552)* |
| 469 | H-4200 | First sentence revised *(12-552)* |
| 489 | K-4322 | Penultimate sentence corrected by errata *(14-320)* |
| 491 | K-4331 | Metric version of eq. (5) and last paragraph before subpara. (c) corrected by errata *(14-320)* |
| 499 | L-2210 | Subparagraph (a) revised *(12-552)* |
| 505 | L-4300 | Subparagraph (a) revised *(09-1679)* |
| 506 | M-1100 | Last two sentences added *(12-1471)* |
| 507 | M-2200 | First paragraph revised *(12-1471)* |
| 507 | M-2500 | Revised *(12-1471)* |

| *Page* | *Location* | *Change (Record Number)* |
|---|---|---|
| 513 | O-1200 | Subparagraph (e) revised *(12-552)* |
| 516 | O-3100 | Revised *(12-552)* |
| 517 | O-3300 | Title revised *(12-552)* |
| 526 | R-1220 | Revised in its entirety *(10-1820)* |
| 526 | R-1300 | *(1)* Title of R-1310 revised *(13-2138)*<br>*(2)* New R-1320 added, and remaining paragraph redesignated *(13-2138)*<br>*(3)* Table R-1320-1 added *(13-2138)*<br>*(4)* R-1330 revised *(13-2138)* |
| 530 | Table R-2500-1 | Sixth and seventh entries for third through fifth and eighth columns and Note (7) revised *(10-1820)* |
| 547 | Table R-S2-1 | SCC section revised *(10-1820)* |
| 552 | Nonmandatory Appendix R, Supplement 2, 4.1 | Subparagraphs (a) through (c) revised *(10-1820)* |
| 578 | Figure U-S2-2.2-1 | Upper left corner of illustration corrected by errata *(14-776)* |
| 579 | Figure U-S2-2.2-2 | Upper left corner of illustration corrected by errata *(14-776)* |

**NOTE:** Volume 63 of the Interpretations to Section XI of the ASME Boiler and Pressure Vessel Code follows the last page of Section XI.

## LIST OF CHANGES IN RECORD NUMBER ORDER

| Record Number | Change |
|---|---|
| 04-1097 | Revised Nonmandatory Appendix D completely. This provides the owner guidance when making a new weld to reduce the weld crown flush with the base material. Research has found that having the weld crown above the base material can distort the UT signal/response. |
| 09-1679 | Incorporated Code Case N-532-5 by revising Article IWA-5000, replacing Mandatory Appendix II Form NIS-1 with N-532-5 Form OAR-1, and revising Mandatory Appendix II Form NIS-2 to incorporate the content of Form NIS-2A from Code Case N-532-5 to avoid administrative revision of 24 affected Code Cases. |
| 10-142 | For Class CC containments with unbonded post-tensioning systems, revised tendon prestress force terminology used for tendon "acceptance by examination" to preclude acceptance of an individual tendon force that is below minimum design without verifying that the average force of the subject tendon and its adjacent tendons are above minimum design. Under IWL-3221 Acceptance by Examination (specifically, IWL-3221.1 Tendon Force and Elongation), revised terminology from "predicted force" to "lower limit force" in several places under IWL-3221.1(b), defining the term "lower limit force" in its first usage in the subsubparagraph. |
| 10-783 | Improved the flaw evaluation procedures in A-3000 by updating the surface flaw equations to a fourth order polynomial for stress, providing fracture mechanics coefficients derived specifically for a cylindrical geometry and included closed form equations for computing G coefficients in addition to the tables. For subsurface, a similar nonlinear expression for stress has been added with G coefficients provided in tabular format. The changes are a complete rewrite of the article to permit the future expansion of the methods to other flaw geometries. |
| 10-1820 | Revised Tables R-2500-1 and R-S2-1 and para. 4.1 of Supplement 2 to define examination for PWSCC or IGSCC susceptible locations in accordance with the existing PWSCC or IGSCC inspection program, respectively, when the only degradation mechanism present at the location is PWSCC or IGSCC. |
| 12-45 | Added note to Table IWB-2500-1, Examination Category B-O, Item No. B14.10 that provides alternative extent of examination requirements. |
| 12-552 | The following "Proposed Definition" was added to the Article IWA-9000 glossary. Revised all uses of this term to reflect the definition throughout Article IWA-3000, IWB/C/D-3400-3700 (except IWB-3522, IWC-3516, and IWD-3511), Figures IWB/C/D-2500-X (secondary to SGWCS), and Nonmandatory Appendices A, C, and H. Two instances of "flaw evaluation" were corrected in IWA-1400. Note that IWB-3630, IWB-3700, IWB-3660, and Nonmandatory Appendices E, G, K, L, and O were not revised in their entirety because they deal with postulated flaws. As a result, they do not meet the new definition of "analytical evaluation" where acceptance standards are exceeded. For these cases, the term "evaluation" was maintained. Some other revisions were made to some of these sections to eliminate misuse of all uses of "evaluation" terms. |
| 12-1239 | Revised IWA-4621 and IWA-4651 to clarify peening requirements. Eliminated peening as a qualification variable in IWA-4652. |
| 12-1353 | Added an "or" between Notes (3) and (5) for Item no. B1.30 and Notes (4) and (5) for Item no. B1.40. |
| 12-1411 | Provided additional guidance to use analytical evaluation when the acceptance standards of IWB-3514 and IWC-3514 are not applicable due to the material being susceptible to stress corrosion cracking. |
| 12-1455 | Revised endnote 1 in IWA-1400(a). Paragraph 1400(a) is currently supplemented by Endnote 1, which indicates, "Classification criteria are specified in 10CFR50." Endnote 1 was revised to the following: "Classification criteria are as specified in the facility's current licensing basis." |
| 12-1471 | Added the following sentences to the end of M-1100: "This Nonmandatory Appendix provides guidance. However, if used, all provisions of the appendix are mandatory." Revised the sentence in M-2200 that originally read, "The verification process for the model shall include test results from the following testing methods," to read, "The verification process for the model shall include test results from at least one of the following testing methods." This change is proposed |

| Record Number | Change |
|---|---|
| | because it is not always possible to implement each of the four test methods. For example, it is not always possible to perform experiments or hand calculations for model verification. Revised the last sentence in M-2500 to read, "The mathematical model shall be considered acceptable when the test problems included in the verification process agree with known solutions within the greater of ±1 in. (25 mm) or 10% of the metal path." This change is consistent with the qualification acceptance criteria included in para. 3.6a of Mandatory Appendix VIII, Supplement 5 (Qualification Requirements for Nozzle Examination from the Outside Surface) for examination procedures, equipment, and personnel. |
| 12-1979 | Added Figure IWB-2500-8(f) for a double-groove alternative configuration for NPS 4 (DN 100) or larger. |
| 12-2015 | Revised Mandatory Appendix IV, Supplement 2, para. 1.0 (d)(2) to add the option for qualification of an eddy current procedure with flaws $^{1}/_{16}$ in. or less in length. |
| 13-114 | Revised IWF-1300(e) to clarify insulation removal requirements for support examinations. |
| 13-301 | Added Mandatory Appendix III, Supplement 2 specific to cast austenitic welds, which will include the requirements in N-824. Revised Mandatory Appendix III, Supplement 1 to exclude cast materials. |
| 13-781 | Added IWA-5246 to define pressure test requirements for ISI-classed portions of the reactor vessel head flange leak detection piping. |
| 13-790 | Revised Figures IWC-2500-4(a) through (d) to clarify requirements for Class 2 nozzle-to-vessel volumetric examinations. |
| 13-860 | In the Foreword, the subtitle has been deleted and replaced with an ANSI disclaimer as a footnote. |
| 13-1241 | Revised IWA-2210 and Table IWA-2211-1 to clarify the illumination, distance, and resolution demonstration requirements for VT-2 visual examinations and to clarify that the angle-of-view requirements for direct visual in Section V only apply to VT-1 examination. |
| 13-1249 | Errata correction. See Summary of Changes for details. |
| 13-1257 | Revised IWB-3142.4. |
| 13-1592 | Clarified the guidance for visual examination of Class 2 open-ended piping into IWC-5222(b) and new IWC-5222(c), and clarified the guidance for visual examination of Class 3 open-ended piping into IWD-5222(b) and (c). |
| 13-1599 | Applied Class 1 holding time requirements to Class 2 or Class 3 segments pressurized and examined in conjunction with the Class 1 system leakage test. |
| 13-1691 | Reduced testing requirements for bare filler metal used for dry underwater welding, added requirement for qualification in accordance with Construction Code as well as Section IX, and added LBW to Code requirements. |
| 13-2071 | Revised IWF-1230 to clarify support exemptions. |
| 13-2077 | Errata correction. See Summary of Changes for details. |
| 13-2138 | Revised R-1310 to be only applicable to Supplement 1. Renumbered existing R-1320 to R-1330. Added new R-1320 containing PRA guidance for the method contained in Supplement 2. |
| 14-260 | Updated reference information in Table IWA-1600-1. |
| 14-320 | Errata correction. See Summary of Changes for details. |
| 14-699 | Added illustrations for bolts with integral heads to Figure IWB-2500-12. Edited dimensions $D_b$ and $D_s$ to read "Depth = $D_b$" and "Depth = $D_s$," respectively, in Figure IWB-2500-12(a). Moved point "M" to a location at the base of the threads. Rotated dimension line $D_s$ at the top of the stud to show the minor diameter. Extended threads at the top of the stud through the nut. Added words "as measured from the thread root" every place where the dimension $^{1}/_{4}$ in. or 1 in. is used to help define the examination volume for Figures 2500-12 (a) through (c). |
| 14-771 | Added Notes (4) and (8) to Table IWB-2500-1 and Note (7) to Table IWC-2500-1. |
| 14-776 | Errata correction. See Summary of Changes for details. |
| 14-845 | Added illustrations for bolts with integral heads to Figure IWC-2500-6. Added threads to Figure IWC-2500-6(a). Added words "as measured from the thread root" every place where the dimension $^{1}/_{4}$ in. is used to help define an examination volume. |
| 14-921 | Updated ANSI/ASNT CP-189 from the 1995 Edition to the 2006 Edition. |
| 14-922 | Revised IWA-2300 to remove reference to SNT-TC-1A and ANSI N45.2.6 |

| Record Number | Change |
|---|---|
| 14-940 | Revised the section in A-4200 that describes the methods for using $RT_{T0}$ to index the $K_{Ia}$ curve to add a separate equation ($RTK_{Ia}$) to index the $K_{Ia}$ curve as a function of temperature. |
| 14-1159 | Revised IWC-1221(d) and IWC-1222(d). |
| 14-1375 | Revised I-3200(c) to remove demonstration requirements from the examination coverage section. Revised Supplement 10, para. 2.2 to define the flaw location for these configurations, and added 3.0(b) to describe single-side qualifications if no austenitic base material exists. |
| 14-1378 | Revised VIII-2100(d)(3)(b) to add "+1 ft (300 mm) to allow for manufacturing tolerances." |
| 14-1380 | Provided directions on how the qualification test specimens may be segments of full-scale mockups or separate specimens cut from full-scale segments, provided that security sample is maintained. |
| 14-1381 | Added requirement that flaws in ferritic material for depth sizing qualification must be circumferentially oriented. |
| 14-1395 | Errata correction. See Summary of Changes for details. |
| 14-1418 | Errata correction. See Summary of Changes for details. |
| 14-1989 | Errata correction. See Summary of Changes for details. |
| 14-2304 | Errata correction. 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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# DIVISION 1
# RULES FOR INSPECTION AND TESTING OF COMPONENTS OF LIGHT-WATER-COOLED PLANTS

# SUBSECTION IWA
# GENERAL REQUIREMENTS

## ARTICLE IWA-1000
## SCOPE AND RESPONSIBILITY

### IWA-1100 SCOPE

This Division provides requirements for inservice inspection and testing of light-water-cooled nuclear power plants. The requirements identify the areas subject to inspection, responsibilities, provisions for accessibility and inspectability, examination methods and procedures, personnel qualifications, frequency of inspection, record keeping and report requirements, procedures for evaluation of inspection results and subsequent disposition of results of evaluations, and repair/replacement activity requirements, including procurement, design, welding, brazing, defect removal, fabrication, installation, examination, and pressure testing.

### IWA-1200 JURISDICTION

The jurisdiction of this Division covers individual components and complete plants that have met all the requirements of the Construction Code, commencing when the Construction Code requirements have been met, irrespective of physical location. When portions of systems or plants are completed at different times, jurisdiction of this Division shall cover only those portions for which all of the construction requirements have been met. Prior to installation, an item that has met all requirements of the Construction Code may be corrected using the rules of either the Construction Code or this Division, as determined by the Owner.

### IWA-1300 APPLICATION

#### IWA-1310 COMPONENTS SUBJECT TO INSPECTION AND TESTING

Components identified in this Division for inspection and testing shall be included in the inservice inspection plan. These components include nuclear power plant items such as vessels, containments, piping systems, pumps, valves, core support structures, and storage tanks, including their respective supports. The selection of components for the inservice inspection plan is subject to review by the regulatory and enforcement authorities having jurisdiction at the plant site.

#### IWA-1320 CLASSIFICATIONS

*(a)* Application of the rules of this Division shall be governed by the group classification criteria of the regulatory authority having jurisdiction at the plant site as follows.

*(1)* The rules of Subsection IWB shall be applied to those systems whose components are classified ASME Class 1.