

ASME BPVC.III.A-2023

SECTION III
Rules for Construction of
Nuclear Facility Components

2023 ASME Boiler and
Pressure Vessel Code
An International Code

APPENDICES



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AN INTERNATIONAL CODE

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RULES FOR CONSTRUCTION OF NUCLEAR FACILITY COMPONENTS

Appendices

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



The American Society of
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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 In 2009, the Boiler and Pressure Vessel Committee was superseded by the following committees: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) Committee on Overpressure Protection (XIII)
- (l) 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 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. For nuclear items other than pressure-retaining components, the Committee also establishes rules of safety related to structural integrity. 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 and, for nuclear items other than pressure-retaining components, structural 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 components addressed by the Code. 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

* 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 overpressure protection.

neither requires nor prohibits the use of computers for the design or analysis of components constructed to the 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 the ASME Single 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.

The words "shall," "should," and "may" are used in this Standard as follows:

- *Shall* is used to denote a requirement.
- *Should* is used to denote a recommendation.
- *May* is used to denote permission, neither a requirement nor a recommendation.

STATEMENT OF POLICY ON THE USE OF THE ASME SINGLE 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 ASME Single 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 ASME Single Certification Mark for the benefit of the users, the enforcement jurisdictions, and the holders of the ASME Single 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 ASME Single 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 ASME Single 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 ASME Single 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 ASME Single Certification Mark who may also use the facsimile in advertising to show that clearly specified items will carry the ASME Single Certification Mark.

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 ASME Single Certification Mark described in the governing Section of the Code.

Markings such as “ASME,” “ASME Standard,” or any other marking including “ASME” or the ASME Single 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.

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B. R. Ganta	D. J. Shim
R. G. Gilada	S. Smith
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| T. E. Hansen | Y.-S. Kim, <i>Alternate</i> |
| W. Hibdon | B. Morelock, <i>Alternate</i> |
| B. L. Krasiun | M. Prefumo, <i>Alternate</i> |
| L. E. McDonald | R. Rockwood, <i>Alternate</i> |
| N. Murugappan | K. Roewe, <i>Alternate</i> |
| I. Powell | B. C. Turczynski, <i>Alternate</i> |
| D. E. Tuttle | J. Yu, <i>Alternate</i> |
| E. A. Whittle | D. Cheetham, <i>Contributing Member</i> |
| P. Williams | A. J. Spencer, <i>Honorary Member</i> |

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| J. C. Krane | I. Olson, <i>Alternate</i> |
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| T. N. Rezk | S. F. Harrison, Jr., <i>Contributing Member</i> |
| D. M. Vickery | |
| E. A. Whittle | |

CORRESPONDENCE WITH THE COMMITTEE

(23)

General

ASME codes and standards are developed and maintained by committees with the intent to represent the consensus of concerned interests. Users of ASME codes and standards may correspond with the committees to propose revisions or cases, report errata, or request interpretations. Correspondence for this Section of the ASME Boiler and Pressure Vessel Code (BPVC) should be sent to the staff secretary noted on the Section's committee web page, accessible at <https://go.asme.org/CSCcommittees>.

NOTE: See ASME BPVC Section II, Part D for guidelines on requesting approval of new materials. See Section II, Part C for guidelines on requesting approval of new welding and brazing materials ("consumables").

Revisions and Errata

The committee processes revisions to this Code on a continuous basis to incorporate changes that appear necessary or desirable as demonstrated by the experience gained from the application of the Code. Approved revisions will be published in the next edition of the Code.

In addition, the committee may post errata and Special Notices at <http://go.asme.org/BPVCerrata>. Errata and Special Notices become effective on the date posted. Users can register on the committee web page to receive e-mail notifications of posted errata and Special Notices.

This Code is always open for comment, and the committee welcomes proposals for revisions. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent background information and supporting documentation.

Cases

(a) The most common applications for cases are

(1) to permit early implementation of a revision based on an urgent need

(2) to provide alternative requirements

(3) to allow users to gain experience with alternative or potential additional requirements prior to incorporation directly into the Code

(4) to permit use of a new material or process

(b) Users are cautioned that not all jurisdictions or owners automatically accept cases. Cases 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.

(c) The committee will consider proposed cases concerning the following topics only:

(1) equipment to be marked with the ASME Single Certification Mark, or

(2) equipment to be constructed as a repair/replacement activity under the requirements of Section XI

(d) A proposed case shall be written as a question and reply in the same format as existing cases. The proposal shall also include the following information:

(1) a statement of need and background information

(2) the urgency of the case (e.g., the case concerns a project that is underway or imminent)

(3) the Code Section and the paragraph, figure, or table number(s) to which the proposed case applies

(4) the edition(s) of the Code to which the proposed case applies

(e) A case is effective for use when the public review process has been completed and it is approved by the cognizant supervisory board. Cases that have been approved will appear in the next edition or supplement of the Code Cases books, "Boilers and Pressure Vessels" or "Nuclear Components." Each Code Cases book is updated with seven Supplements. Supplements will be sent or made available automatically to the purchasers of the Code Cases books until the next edition of the Code. Annulments of Code Cases become effective six months after the first announcement of the annulment in a Code Case Supplement or Edition of the appropriate Code Case book. The status of any case is available at <http://go.asme.org/BPVCCDatabase>. An index of the complete list of Boiler and Pressure Vessel Code Cases and Nuclear Code Cases is available at <http://go.asme.org/BPVCC>.

Interpretations

(a) Interpretations clarify existing Code requirements and are written as a question and reply. Interpretations do not introduce new requirements. If a revision to resolve conflicting or incorrect wording is required to support the interpretation, the committee will issue an intent interpretation in parallel with a revision to the Code.

(b) Upon request, the committee will render an interpretation of any requirement of the Code. An interpretation can be rendered only in response to a request submitted through the online Interpretation Submittal Form at <http://go.asme.org/InterpretationRequest>. Upon submitting the form, the inquirer will receive an automatic e-mail confirming receipt.

(c) ASME does not act as a consultant for specific engineering problems or for the general application or understanding of the Code requirements. If, based on the information submitted, it is the opinion of the committee that the inquirer should seek assistance, the request will be returned with the recommendation that such assistance be obtained. Inquirers may track the status of their requests at <http://go.asme.org/Interpretations>.

(d) ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME committee or subcommittee. ASME does not “approve,” “certify,” “rate,” or “endorse” any item, construction, proprietary device, or activity.

(e) Interpretations are published in the ASME Interpretations Database at <http://go.asme.org/Interpretations> as they are issued.

Committee Meetings

The ASME BPVC committees regularly hold meetings that are open to the public. Persons wishing to attend any meeting should contact the secretary of the applicable committee. Information on future committee meetings can be found at <http://go.asme.org/BCW>.

INTRODUCTION

(23)

Section III appendices are referred to as either Section III Appendices or Subsection Appendices. These appendices are 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.

Section III Appendices are contained in this book. 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 the various articles, subarticles, and paragraphs of the appendix, such as II-1500 or XIII-2131. 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-2410.

Subsection Appendices are specifically applicable to 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, D2, HBB, 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 a part of Subsection NF Mandatory Appendix NF-II or Nonmandatory Appendix NF-A, respectively. For Subsection CC, D2-IV-1120 or D2-D-1330 would be a part of Subsection CC Mandatory Appendix D2-IV or Nonmandatory Appendix D2-D, respectively.

A Reference Table ([Table 1](#)) has been developed for Section III Appendices to provide additional guidance on appendix usage for the Code user. This Reference Table, reflecting down to a Subsection level, does not take precedence over Code rules or statements of applicability in either Section III Appendices or in the invoking Divisions and Subsections of Section III.

**Table 1
Section III Appendices Reference Table**

Appendix Identifier	Division 1														Division 5									
	Div. 1&2	Subsections						Div. 2	Subsections				Subsections											
	Sub.	Subsections						Sub.	Subsections				HA		HB		HC		HF	HG		HH		
	NCA	NB	NCD	NE	NF	NG	CC	WA	WB	WC	WD	Sub-part A	Sub-part B	Sub-part A	Sub-part B (1)	Sub-part A	Sub-part B (1)	Sub-part A	Sub-part A	Sub-part B (1)	Sub-part A	Sub-part B		
MANDATORY APPENDICES																								
I		X	X	X	X	X				X		X		(3)		(3)		(3)	(3)	X				
II		X	X	X	X	X			X	X	X			(3)	X	(3)		(3)	(3)	X				
III		X		X	X	X			X		X			(3)		(3)		(3)	(3)					
IV		X												(3)		(3)		(3)	(3)					
V	X	(2)	(2)	(2)	(2)	(2)	X			X		(2)	X	(3)	(2)	(3)	(2)	(3)	(3)	(2)	(4)	(4)		
VI		X	X	X		X	X		X	X	X			(3)	(5)	(3)		(3)	(3)					
VII	Not in use																							
VIII	Not in use																							
IX	Not in use																							
X	Not in use																							
XI		X	X	X					X					(3)		(3)		(3)	(3)					
XII														(3)		(3)		(3)	(3)					
XIII		X	X			X				X				(3)		(3)		(3)	(3)					
XIV	Not in use																							
XV	Not in use																							
XVI	Not in use																							
XVII	Not in use																							
XVIII		X	X	X										(3)		(3)		(3)	(3)					
XIX			X											(3)		(3)		(3)	(3)					
XX	Not in use																							
XXI	X	(2)	(2)	(2)	(2)	(2)	(2)					(2)		(3)	(2)	(3)	(2)	(3)	(3)	(2)				
XXII			(8)											(3)		(3)		(3)	(3)					
XXIII	X	X	X	X	(2)	(2)	(2)	X	(6)	(6)	(6)	(2)	X	(3)	(5)	(3)	(2)	(3)	(3)	(2)	(4)	(4)		
XXIV								X	(6)	(6)	(6)			(3)		(3)		(3)	(3)					
XXV																								
XXVI			(8)																					
XXVII		X	X	X	X	X			X	X				(3)	X	(3)	X	(3)	(3)	X				
NONMANDATORY APPENDICES																								
A		X	X	X	X	X				X				(3)	X	(3)		(3)	(3)	X				
B	X	(2)	(2)	(2)	(2)	(2)	(2)																	
C	X	(2)	(9)	(2)	(2)	(2)	(2)			X		(2)	X	(3)	(2)	(3)	(2)	(3)	(3)	(2)	(4)	(4)		
D		X	X	X	X	X			X	X	X			(3)	(5)	(3)		(3)	(3)					
E		X							X					(3)	X	(3)		(3)	(3)					
F											X													
G	X	X	(9)	X	X	X	(2)		X	X	X	(2)		(3)	X	(3)	(2)	(3)	(3)	X				
H	Not in use																							
I	Not in use																							
J	Not in use																							
K	Not in use																							
L			X											(3)		(3)		(3)	(3)					
M														(3)		(3)		(3)	(3)					
N														(3)		(3)		(3)	(3)					
O														(3)		(3)		(3)	(3)					
P														(3)		(3)		(3)	(3)					
Q														(3)		(3)		(3)	(3)					
R			(10)	X						X				(3)		(3)		(3)	(3)					
S		X	X											(3)		(3)		(3)	(3)					
T					X									(3)		(3)		(3)	(3)					
U														(3)		(3)		(3)	(3)					
V	Not in use																							

**Table 1
Section III Appendices Reference Table (Cont'd)**

Appendix Identifier	Div. 1&2	Division 1						Div. 2	Division 3				Division 5										
	Sub.	Subsections						Sub.	Subsections				Subsections										
		NCA	NB	NCD	NE	NF	NG	CC	WA	WB	WC	WD	HA		HB		HC		HF	HG		HH	
													Sub-part A	Sub-part B	Sub-part A	Sub-part B (1)	Sub-part A	Sub-part B (1)	Sub-part A	Sub-part A	Sub-part B (1)	Sub-part A	Sub-part B
W	X	(2)	(2)	(2)	(2)	(2)	(2)					X		(3)	X	(3)	(2)	(3)	(3)	(2)			
X	Not in use																						
Y		X	X											(3)		(3)		(3)	(3)				
Z														(3)		(3)		(3)	(3)				
AA	X	(2)	(2)	(2)	(2)	(2)	(2)					(2)	X	(3)	(2)	(3)	(2)	(3)	(3)	(2)	(4)	(4)	
BB			X											(3)		(3)		(3)	(3)				
CC	X				(2)							(2)		(3)		(3)		(3)	(3)				
DD	X		(11)									(2)		(3)		(3)		(3)	(3)				
EE																							
FF									X	X													
GG		X	X											(3)	(3)	(3)	(3)						
HH														(3)	(3)	(3)	(3)						
JJ		X												(3)	(3)								
KK								X	(6)	(6)	(6)												
LL												X	X	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(4)	(4)	

GENERAL NOTE: This reference table is not intended to provide specific Code requirements. It provides general guidance only. Mandatory and Nonmandatory Appendices marked with an "X" in the table are specifically referred to in the identified Subsection rules. Section III Mandatory Appendices are not to be interpreted as being a requirement for all Section III Subsections. However, certain Mandatory or Nonmandatory Section III Appendices may be appropriate for use in other subsections as long as the respective subsection rules are satisfied. Sub. = Subsection; Div. = Division.

NOTES:

- (1) Subpart B for Subsections HB, HC, and HG contain provisions for the use of all or portions of the rules in Division 1, Subsections NB, NCD, and NG, respectively, if creep effects are negligible. In those circumstances, the reference to the Appendices is governed by the reference defined for those respective subsections of Division 1.
- (2) The Appendix reference determined by Subsection NCA (or, for Division 5, via Subsection HA, Subpart A referencing Subsection NCA) shall apply.
- (3) The Appendix reference determined by the referenced Division 1 Subsection shall apply.
- (4) The Appendix reference determined by Subsection HA, Subpart B shall apply.
- (5) The Appendix reference determined by Subsection NB shall apply.
- (6) The Appendix reference determined by Subsection WA shall apply.
- (7) The Appendix reference determined by Subsection HA, Subpart A shall apply.
- (8) Class 3 only.
- (9) Class 2 with Note [2], and Class 3 with Note [2].
- (10) Class 2 only.
- (11) Class 3 with Note [2].

ORGANIZATION OF SECTION III

1 GENERAL

Section III consists of Division 1, Division 2, Division 3, Division 4, 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, by the letter “F” for Division 4, and by the letter “H” for Division 5. Each Subsection is published separately, with the exception of those listed for Divisions 2, 3, 4, and 5.

- Subsection NCA — General Requirements for Division 1 and Division 2
- Appendices
- Division 1
 - Subsection NB — Class 1 Components
 - Subsection NCD — Class 2 and 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 4 — Fusion Energy Devices
 - Subsection FA — Fusion Energy Device Facilities
 - Subsection FB — Pressure Boundary Components
- 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 SM Metallic Core Support Structures
 - Subpart A — Low Temperature Service
 - Subpart B — Elevated Temperature Service
 - Subsection HH — Class SN Nonmetallic Core Components
 - Subpart A — Graphite Materials
 - Subpart B — Composite Materials

2 SUBSECTIONS

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

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-58-2009.

(4) Specifications for welding and brazing materials are published by the American Welding Society (AWS), 8669 NW 36 Street, No. 130, Miami, 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

Changes listed below are identified on the pages by a margin note, **(23)**, placed next to the affected area. In addition, gender pronouns have been eliminated throughout Section III Appendices.

<i>Page</i>	<i>Location</i>	<i>Change</i>
xxiii	List of Sections	(1) Under Section III, Division 4 added (2) Title of Section XI and subtitle of Section XI, Division 2 revised (3) Information on interpretations and Code cases moved to “Correspondence With the Committee”
xxvii	Personnel	Updated
xlix	Correspondence With the Committee	Added (replaces “Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees”)
li	Introduction	In Table 1, Note (1) revised
liv	Organization of Section III	In para. 1, Division 4 added
lxi	Cross-Referencing in the ASME BPVC	Updated
40	Mandatory Appendix V	(1) All forms revised (2) New tables added
95	VI-1122	Revised
95	VI-1134	Revised
103	XI-1110	Subparagraph (a) revised
122	XII-1100	Last line revised
125	XIII-1300	Subparagraphs (h) and (m) revised
127	Figure XIII-1300-1	Legend revised
131	XIII-2100	(1) In subpara. (a), first sentence revised (2) In subpara. (d), last sentence added
133	XIII-2400	Revised
134	XIII-2500	In equation and nomenclature, S_a corrected by errata to S_{alt}
134	XIII-2600	In subpara. (a), cross-references updated
137	Table XIII-2600-3	Added
139	Article XIII-3000	Title revised
139	XIII-3100	In subpara. (b), last sentence added
140	Table XIII-3110-1	Revised
139	XIII-3120	Paragraph following subpara. (b) revised
139	XIII-3130	Last paragraph revised
142	XIII-3150	Added
143	Table XIII-3200-1	Revised
142	XIII-3300	Last sentence added

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143	XIII-3420	Fourth sentence revised
143	XIII-3430	In Nomenclature, definition of z' revised
144	XIII-3440	In subpara. (a), second sentence revised
144	XIII-3450	In subpara. (b), S_a corrected by errata to S_{alt}
144	XIII-3500	(1) In subpara. (a), first sentence revised (2) Subparagraph (b) revised
145	XIII-3510	Revised
146	XIII-3520	In first paragraph, third sentence revised
147	XIII-3600	First paragraph revised
152	Article XIII-5000	Added
155	Supplement XIII-I	(1) In XIII-I-100, first line revised (2) Title of XIII-I-200 revised (3) In Table XIII-I-1, first entry under last column revised
158	Supplement XIII-II	Added
174	XXII-1100	In subpara. (c), cross-reference updated
174	XXII-1200	In definitions of T , T_e , and T_s , cross-references updated
175	XXII-1300	In Step 8, last cross-reference updated
178	XXIII-1100	Subparagraphs (e)(1), (e)(1)(-b), and (e)(2) revised
179	XXIII-1223	Revised
180	XXIII-1310	Revised
201	Table XXVI-2221-1	Revised
203	XXVI-2234	Subparagraph (b) revised
205	XXVI-2238	Subparagraph (e) added and subsequent subparagraph redesignated
205	XXVI-2239	Added
206	XXVI-2310	(1) Subparagraphs (e) and (f) revised (2) Subparagraph (g) added and subsequent subparagraph redesignated
206	XXVI-2320	XXVI-2322 added and former XXVI-2322 redesignated as XXVI-2323
206	XXVI-2330	(1) XXVI-2331(c) and XXVI-2331(d) added (2) XXVI-2332 added and former XXVI-2332 redesignated as XXVI-2333
207	XXVI-2400	Revised in its entirety
207	Table XXVI-2400-1	Added
208	Table XXVI-2511-1	For No. 3, entry under "Test" revised
208	Table XXVI-2512-1	For No. 3, entry under "Test" revised
209	XXVI-2520	Subparagraph (b)(13) added and subsequent subparagraphs redesignated
210	Table XXVI-2520(a)-1	(1) For No. 3, entry under "Test" revised (2) Note (4) added

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211	XXVI-2530	Subparagraph (b)(13) added and subsequent subparagraphs redesignated
214	XXVI-3132	(1) Subparagraphs (a) and (c) revised (2) Subparagraph (f) added
216	XXVI-3135	Revised
224	Table XXVI-3311-1	(1) For "Electrofusion saddle fitting," entries for B1 and B2 revised (2) Below "Electrofusion saddle fitting," new entry "Sidewall fusion branch connection" added (3) In General Note (a), nomenclature revised (4) Note (7) added
228	XXVI-4110	Revised
230	Figure XXVI-4110-3	Added
229	XXVI-4130	Revised
230	XXVI-4131	First paragraph revised
230	XXVI-4131.3	Revised
231	XXVI-4240	Revised
231	XXVI-4312	(1) Subparagraphs (a)(1) and (b)(2) revised (2) Subparagraph (a)(3) added
231	XXVI-4321	Subparagraph (c) revised
234	XXVI-4334	Revised
235	Table XXVI-4334-1	Title revised
235	Table XXVI-4334-2	Description of "Saddle clamp" revised
236	Table XXVI-4334-3	Added
236	XXVI-4342	Revised
236	XXVI-4412	Revised
237	XXVI-4424	Added
237	XXVI-4440	Subparagraph (a) revised
237	XXVI-4451	Subparagraph (b) revised
239	XXVI-4700	Revised
240	XXVI-5113	Subparagraph (a) revised
240	XXVI-5114	Revised
241	XXVI-5200	XXVI-5210(b) and XXVI-5220 revised
242	Figure XXVI-5220-1	Title revised
242	Figure XXVI-5220-2	Revised
243	Figure XXVI-5220-3	Added
243	XXVI-5330	Subparagraphs (a) and (b)(2) revised
245	XXVI-5421	Subparagraph (b)(3) added
246	XXVI-6115	Revised
252	Table XXVI-I-100-1	Entry for ASTM F905 added

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253	XXVI-IIA-421.1	Endnote 6 added and subsequent endnotes renumbered
	XXVI-IIA-422	Endnote 6 added
253	XXVI-IIA-431.1	In subpara. (b), last sentence revised
255	XXVI-IIB-410	Revised
257	XXVI-IIB-471.1	Revised
258	Form NM(PE)-2	Information under "Certificate of Inspection" revised
259	Supplement XXVI-A	(1) Title revised (2) XXVI-A-100(c) revised and XXVI-A-100(d) added (3) XXVI-A-210(a) and XXVI-A-210(b) revised (4) XXVI-A-230(b) and XXVI-A-230(d)(5) revised (5) XXVI-A-300(b) and XXVI-A-400 revised
263	XXVI-D-100	Subparagraph (d) added
264	XXVI-D-230	Subparagraph (a) revised
264	XXVI-D-300	Subparagraph (b) revised
267	Supplement XXVI-F	Added
287	Mandatory Appendix XXVIII	Added
342	B-2123.1	In subpara. (a), first cross-reference updated
348	B-5220	In last sentence, cross-references updated
353	B-9123	Cross-reference updated
354	B-9140	Revised
356	C-1131	Second sentence revised
358	C-1340	In last line, cross-reference updated
371	G-2223	Revised in its entirety
373	Figure G-2223-1	Added
376	L-1100	Last line revised
389	L-3244	In eq. (42), B_l corrected by errata to B_1
465	Q-1110	In subpara. (a), penultimate line revised
644	KK-8123	In last line, cross-reference updated
674	Form NR-10	Information under "Certificate of Inspection" revised

CROSS-REFERENCING IN THE ASME BPVC

(23)

Paragraphs within the ASME BPVC may include subparagraph breakdowns, i.e., nested lists. The following is a guide to the designation and cross-referencing of subparagraph breakdowns:

(a) Hierarchy of Subparagraph Breakdowns

- (1) First-level breakdowns are designated as (a), (b), (c), etc.
- (2) Second-level breakdowns are designated as (1), (2), (3), etc.
- (3) Third-level breakdowns are designated as (-a), (-b), (-c), etc.
- (4) Fourth-level breakdowns are designated as (-1), (-2), (-3), etc.
- (5) Fifth-level breakdowns are designated as (+a), (+b), (+c), etc.
- (6) Sixth-level breakdowns are designated as (+1), (+2), etc.

(b) Cross-References to Subparagraph Breakdowns. Cross-references within an alphanumerically designated paragraph (e.g., PG-1, UIG-56.1, NCD-3223) do not include the alphanumeric designator of that paragraph. The cross-references to subparagraph breakdowns follow the hierarchy of the designators under which the breakdown appears. The following examples show the format:

- (1) If X.1(c)(1)(-a) is referenced in X.1(c)(1), it will be referenced as (-a).
- (2) If X.1(c)(1)(-a) is referenced in X.1(c)(2), it will be referenced as (1)(-a).
- (3) If X.1(c)(1)(-a) is referenced in X.1(e)(1), it will be referenced as (c)(1)(-a).
- (4) If X.1(c)(1)(-a) is referenced in X.2(c)(2), it will be referenced as X.1(c)(1)(-a).