

SECTION III

Rules for Construction of
Nuclear Facility Components

2015

ASME Boiler and
Pressure Vessel Code
An International Code

Division 3

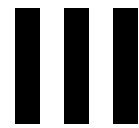
Containments for Transportation and
Storage of Spent Nuclear Fuel and High
Level Radioactive Material and Waste

AN INTERNATIONAL CODE

2015 ASME Boiler & Pressure Vessel Code

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RULES FOR CONSTRUCTION OF NUCLEAR FACILITY COMPONENTS

Division 3

Containments for Transportation and Storage of Spent Nuclear Fuel and High Level Radioactive Material and Waste

ASME Boiler and Pressure Vessel Committee
on Nuclear Power



**The American Society of
Mechanical Engineers**

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TABLE OF CONTENTS

List of Sections	xii
Foreword	xiv
Statement of Policy on the Use of the Certification Mark and Code Authorization in Advertising	xvi
Statement of Policy on the Use of ASME Marking to Identify Manufactured Items	xvi
Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees	xvii
Personnel	xix
Organization of Section III	xxxvi
Summary of Changes	xxxix
List of Changes in Record Order Number	xlii
Cross-Referencing and Stylistic Changes in the Boiler and Pressure Vessel Code	xliii
Subsection WA	
General Requirements	1
Article WA-1000	
Scope of Division 3	1
WA-1100	1
WA-1110	1
WA-1120	1
WA-1130	1
WA-1140	1
WA-1150	1
WA-1200	2
WA-1210	2
WA-1220	2
WA-1230	2
Article WA-2000	
Design Basis for Containments	3
WA-2100	3
WA-2110	3
WA-2120	3
WA-2130	4
Article WA-3000	
Responsibilities and Duties	5
WA-3100	5
WA-3110	5
WA-3120	5
WA-3130	6
WA-3300	6
WA-3320	6
WA-3330	7
WA-3340	7
WA-3350	7
WA-3360	8
WA-3370	9
WA-3380	9
WA-3390	9
WA-3400	9
WA-3420	9
WA-3430	9
WA-3440	9
WA-3450	9
WA-3460	10

WA-3470	Data Report	10
WA-3800	Metallic Material	10
WA-3810	Scope and Applicability	10
WA-3820	Material Organizations	10
Article WA-4000	Quality Assurance	11
WA-4100	Requirements	11
WA-4110	Scope and Applicability	11
WA-4120	Definitions	11
WA-4130	Establishment and Implementation	11
Article WA-5000	Authorized Inspection	13
WA-5100	Introduction	13
WA-5110	Applicability	13
WA-5120	Performance of Inspection	13
WA-5130	Access for Inspection Agency Personnel	13
WA-5200	Duties of Inspector	13
WA-5210	General Inspection Duties	13
WA-5220	Categories of Inspector's Duties	14
WA-5230	Scope of Work, Design Specifications, Design Reports, and Fabrication Specifications	14
WA-5240	Quality Assurance Programs	14
WA-5250	Qualification Records	14
WA-5260	Materials, Parts, and Heat Treatment	15
WA-5270	Examinations and Tests	15
WA-5280	Final Tests	15
WA-5290	Data Reports	15
WA-5300	Responsibilities of the Authorized Inspection Agency	15
Article WA-7000	Reference Standards	16
WA-7100	General Requirements	16
Article WA-8000	Certificates of Authorization, Nameplates, Certification Mark, and Data Reports	18
WA-8100	Authorization to Perform Code Activities	18
WA-8110	General	18
WA-8120	Scope of Authorization	18
WA-8130	Inspection Agreement Required	18
WA-8140	Quality Assurance Program Requirements	19
WA-8150	Application for Authorization	19
WA-8160	Evaluation for Authorization	19
WA-8170	Issuance of Authorization	19
WA-8180	Renewal of Authorization	19
WA-8200	Nameplates and Stamping With Certification Mark	19
WA-8210	General Requirements	19
WA-8220	Nameplates	20
WA-8230	Nameplates for Certification Mark with NPT Designator Items	20
WA-8300	Certification Mark	20
WA-8310	General Requirements	20
WA-8330	Removable Items	21
WA-8400	Data Reports	21
WA-8410	General Requirements	21
Article WA-9000	Glossary	27
WA-9100	Introduction	27
WA-9200	Definitions	27
Subsection WB	Class TC Transportation Containments	29
Article WB-1000	Introduction	29
WB-1100	Scope	29
WB-1120	Rules for Class TC Transportation Containments	29

WB-1130	Boundaries of Jurisdiction	29
Article WB-2000	Material	31
WB-2100	General Requirements for Material	31
WB-2110	Scope of Principal Terms Employed	31
WB-2120	Containment Material	31
WB-2130	Certification of Material	32
WB-2140	Welding Material	32
WB-2150	Material Identification	32
WB-2160	Deterioration of Material in Service	33
WB-2170	Heat Treatment to Enhance Impact Properties	33
WB-2180	Procedures for Heat Treatment of Material	33
WB-2190	Material Not Performing a Containment Function	33
WB-2200	Material Test Coupons and Specimens for Ferritic Steel Material and Ductile Cast Iron	33
WB-2210	Heat Treatment Requirements	33
WB-2220	Procedure for Obtaining Test Coupons and Specimens for Quenched and Tempered Material and for Ductile Cast Iron	34
WB-2300	Fracture Toughness Requirements for Material	35
WB-2310	Material to Be Toughness Tested	35
WB-2320	Impact Test Procedures	35
WB-2330	Test Requirements and Acceptance Standards	36
WB-2340	Number of Toughness Tests Required	38
WB-2350	Retests	39
WB-2360	Calibration of Instruments and Equipment	39
WB-2400	Welding Material	39
WB-2410	General Requirements	39
WB-2420	Required Tests	39
WB-2430	Weld Metal Tests	40
WB-2440	Storage and Handling of Welding Material	42
WB-2500	Examination and Repair of Containment Material	43
WB-2510	Examination of Containment Material	43
WB-2520	Examination After Quenching and Tempering	43
WB-2530	Examination and Repair of Plate	43
WB-2540	Examination and Repair of Forgings and Bars	45
WB-2550	Examination and Repair of Seamless and Welded Tubular Products and Fittings ...	47
WB-2570	Examination and Repair of Cast Products	50
WB-2580	Examination of Bolts, Studs, and Nuts	51
WB-2600	Material Organization's Quality System Programs	53
WB-2610	Documentation and Maintenance of Quality System Programs	53
WB-2700	Dimensional Standards	53
Article WB-3000	Design	54
WB-3100	General Design	54
WB-3110	Loading Criteria	54
WB-3120	Special Considerations	55
WB-3130	General Design Rules	55
WB-3200	Design of Containments	59
WB-3210	Design Criteria	59
WB-3220	Stress Limits for Other Than Bolts	62
WB-3230	Stress Limits for Bolts	72
WB-3240	Nozzles or Openings	73
WB-3250	Design of Welded Construction	74
WB-3260	Special Containment Requirements	77
WB-3700	Strain-Based Acceptance Criteria	77
Article WB-4000	Fabrication	79
WB-4100	General Requirements	79
WB-4110	Introduction	79

WB-4120	Certification of Materials and Fabrication by Certificate Holder	79
WB-4130	Repair of Material	80
WB-4200	Forming, Fitting, and Aligning	80
WB-4210	Cutting, Forming, and Bending	80
WB-4220	Forming Tolerances	81
WB-4230	Fitting and Aligning	84
WB-4240	Requirements for Weld Joints in Containments	84
WB-4300	Welding Qualifications	87
WB-4310	General Requirements	87
WB-4320	Welding Qualifications, Records, and Identifying Stamps	91
WB-4330	General Requirements for Welding Procedure Qualification Tests	92
WB-4400	Rules Governing Making, Examining, and Repairing Welds	95
WB-4410	Precautions to Be Taken Before Welding	95
WB-4420	Rules for Making Welded Joints	95
WB-4430	Welding of Attachments	96
WB-4450	Repair of Weld Metal Defects	97
WB-4600	Heat Treatment	99
WB-4610	Welding Preheat Requirements	99
WB-4620	Postweld Heat Treatment	99
WB-4630	Heat Treatment of Welds Other Than the Final Postweld Heat Treatment	109
WB-4700	Mechanical Joints	109
WB-4710	Bolting and Threading	109
WB-4720	Bolting Flanged Joints	109
Article WB-5000	Examination	110
WB-5100	General Requirements for Examination	110
WB-5110	Procedures, Qualifications, and Evaluation	110
WB-5120	Time of Examination of Welds and Weld Metal Cladding	110
WB-5130	Examination of Weld Edge Preparation Surfaces	112
WB-5140	Examination of Adjacent Base Material	112
WB-5200	Required Examination of Welds	112
WB-5210	Category A Welded Joints	112
WB-5220	Category B Welded Joints	112
WB-5230	Category C Welded Joints	112
WB-5240	Category D Welded Joints	112
WB-5260	Fillet, Partial Penetration, Socket, and Attachment Welded Joints	113
WB-5270	Special Welded Joints	113
WB-5300	Acceptance Standards	113
WB-5320	Radiographic Acceptance Standards	113
WB-5330	Ultrasonic Acceptance Standards	114
WB-5340	Magnetic Particle Acceptance Standards	114
WB-5350	Liquid Penetrant Acceptance Standards	114
WB-5400	Final Examination of Containments	114
WB-5410	Examination After Hydrostatic Test	114
WB-5500	Qualifications and Certification of Nondestructive Examination Personnel	115
WB-5510	General Requirements	115
WB-5520	Personnel Qualification, Certification, and Verification	115
WB-5530	Records	116
Article WB-6000	Testing	117
WB-6100	General Requirements	117
WB-6110	Scope	117
WB-6120	Testing of Containments	117
WB-6130	Preparation for Testing	117
WB-6200	Hydrostatic Tests	118
WB-6210	Hydrostatic Test Procedure	118
WB-6220	Hydrostatic Test Pressure Requirements	118

WB-6300	Pneumatic Tests	118
WB-6310	Pneumatic Testing Procedures	118
WB-6320	Pneumatic Test Pressure Requirements	118
WB-6400	Test Gages	119
WB-6410		119
WB-6600	Special Test Pressure Situations	119
WB-6610	Containments Designed for External Pressure	119
WB-6620	Testing of Combination Units	119
WB-6700	Leak Testing	119
WB-6710	Helium Leak Testing	119
Article WB-8000	Nameplates, Stamping With Certification Mark, and Reports	120
WB-8100	General Requirements	120
Subsection WC	Class SC Storage Containments	121
Article WC-1000	Introduction	121
WC-1100	Scope	121
WC-1120	Rules for Class SC Containments	121
WC-1130	Boundaries of Jurisdiction	121
Article WC-2000	Material	123
WC-2100	General Requirements for Material	123
WC-2110	Scope of Principal Terms Employed	123
WC-2120	Containment Material	123
WC-2130	Certification of Material	124
WC-2140	Welding Materials	124
WC-2150	Material Identification	125
WC-2160	Deterioration of Material in Service	125
WC-2170	Heat Treatment to Enhance Impact Properties	125
WC-2180	Procedures for Heat Treatment of Material	125
WC-2190	Attachment Material	125
WC-2200	Material Test Coupons and Specimens for Ferritic Steel Material and Ductile Cast Iron	125
WC-2210	Heat Treatment Requirements	125
WC-2220	Procedure for Obtaining Test Coupons and Specimens for Quenched and Tempered Material and for Ductile Cast Iron	126
WC-2300	Fracture Toughness Requirements for Material	127
WC-2310	Material to Be Impact Tested	127
WC-2320	Impact Test Procedures	128
WC-2330	Test Requirements and Acceptance Standards	129
WC-2340	Number of Impact Tests Required	130
WC-2350	Retests	131
WC-2360	Calibration of Instruments and Equipment	131
WC-2400	Welding Material	131
WC-2410	General Requirements	131
WC-2420	Required Tests	132
WC-2430	Weld Metal Tests	133
WC-2440	Storage and Handling of Welding Material	135
WC-2500	Examination and Repair of Containment Material	135
WC-2510	Containment Material	135
WC-2530	Examination and Repair of Plate	135
WC-2540	Examination and Repair of Forgings and Bars	137
WC-2550	Examination and Repair of Seamless and Welded (Without Filler Metal) Tubular Products and Fittings	138
WC-2560	Examination and Repair of Tubular Products and Fittings Welded With Filler Metal	140
WC-2570	Examination and Repair of Cast Products	140
WC-2580	Examination of Bolts, Studs, and Nuts	142

WC-2600	Material Organizations' Quality System Programs	142
WC-2610	Documentation and Maintenance of Quality System Programs	142
WC-2700	Dimensional Standards	142
Article WC-3000	Design	143
WC-3100	General Design	143
WC-3110	Loading Criteria	143
WC-3120	Special Considerations	144
WC-3130	General Design Rules	144
WC-3200	Design Rules for Containments	147
WC-3210	General Requirements	147
WC-3220	Design Consideration	151
WC-3230	Openings and Reinforcement	154
WC-3250	Design of Welded Construction	158
WC-3260	Special Containment Requirements	161
WC-3700	Strain-Based Acceptance Criteria	162
Article WC-4000	Fabrication	163
WC-4100	General Requirements	163
WC-4110	Introduction	163
WC-4120	Certification of Materials and Fabrication by Certificate Holder	163
WC-4130	Repair of Material	164
WC-4200	Forming, Cutting, and Aligning	164
WC-4210	Cutting, Forming, and Bending	164
WC-4220	Forming Tolerances	165
WC-4230	Fitting and Aligning	166
WC-4260	Requirements for Weld Joints in Containments	168
WC-4300	Welding Qualifications	170
WC-4310	General Requirements	170
WC-4320	Welding Qualifications, Records, and Identifying Stamps	171
WC-4330	General Requirements for Welding Procedure Qualification Tests	172
WC-4400	Rules Governing Making, Examining, and Repairing Welds	178
WC-4410	Precautions to Be Taken Before Welding	178
WC-4420	Rules for Making Welded Joints	179
WC-4430	Welding of Attachments	179
WC-4450	Repair of Weld Metal Defects	181
WC-4500	Brazing	183
WC-4510	Rules for Brazing	183
WC-4520	Brazing Qualification Requirements	184
WC-4530	Fitting and Aligning of Parts to Be Brazed	184
WC-4540	Examination of Brazed Joints	184
WC-4600	Heat Treatment	184
WC-4610	Welding Preheat Requirements	184
WC-4620	Postweld Heat Treatment	185
WC-4630	Heat Treatment of Welds Other Than the Final Postweld Heat Treatment	194
WC-4700	Mechanical Joints	195
WC-4710	Bolting and Threading	195
WC-4720	Bolting Flanged Joints	195
Article WC-5000	Examination	196
WC-5100	General Requirements for Examination	196
WC-5110	Procedures, Qualifications, and Evaluation	196
WC-5120	Time of Examination of Welds and Weld Metal Cladding	196
WC-5130	Examination of Weld Edge Preparation Surfaces	198
WC-5140	Examination of Adjacent Base Material	198
WC-5200	Required Examination of Welds	198
WC-5210	Category A Longitudinal Welded Joints	198
WC-5220	Category B Circumferential Welded Joints	198

WC-5230	Category C Welded Joints	198
WC-5240	Category D Welded Joints	198
WC-5250	Examination of Containment Closure Welds	199
WC-5260	Fillet, Partial Penetration, Socket, and Attachment Welded Joints	199
WC-5270	Special Welds and Brazed Joints	199
WC-5300	Acceptance Standards	200
WC-5320	Radiographic Acceptance Standards	200
WC-5330	Ultrasonic Acceptance Standards	200
WC-5340	Magnetic Particle Acceptance Standards	200
WC-5350	Liquid Penetrant Acceptance Standards	200
WC-5360	Visual Acceptance Standards for Brazed Joints	201
WC-5400	Final Examination of Containments	201
WC-5410	Examination After Pressure Test	201
WC-5500	Qualifications and Certification of Nondestructive Examination Personnel	201
WC-5510	General Requirements	201
WC-5520	Personnel Qualification, Certification, and Verification	201
WC-5530	Records	202
Article WC-6000	Testing	203
WC-6100	General Requirements	203
WC-6110	Scope	203
WC-6120	Testing of Containments	203
WC-6130	Preparation for Testing	203
WC-6200	Hydrostatic Tests	204
WC-6210	Hydrostatic Test Procedure	204
WC-6220	Hydrostatic Test Pressure Requirements	204
WC-6300	Pneumatic Tests	204
WC-6310	Pneumatic Testing Procedures	204
WC-6320	Pneumatic Test Pressure Requirements	204
WC-6400	Test Gages	205
WC-6410		205
WC-6600	Special Test Pressure Situations	205
WC-6610	Containments Designed for External Pressure	205
WC-6620	Pressure Testing of Combination Units	205
WC-6700	Leak Testing	205
WC-6710	Helium Leak Testing	205
WC-6720	Containment Closures	205
Article WC-8000	Nameplates, Stamping With Certification Mark, and Reports	207
WC-8100	General Requirements	207
 FIGURES		
WA-8212-1	Form of Stamping	20
WB-2433.1-1	Weld Metal Delta Ferrite Content	43
WB-2552.1-1	Axial Propagation of Sound in Tube Wall	48
WB-3221-1	Stress Categories and Limits of Stress Intensity for Design Loadings	65
WB-3222-1	Stress Categories and Limits of Stress Intensity for Normal Loadings	66
WB-3224.1-1	Stress Categories and Limits of Stress Intensity for Accident Loadings for Elastic Analysis	70
WB-3251-1	Welded Joint Locations Typical of Categories A, B, C, and D	74
WB-3252-1	Typical Butt Joints	75
WB-3261-1	Categories A and B Joints Between Sections of Unequal Thickness	78
WB-4221.1-1	Maximum Difference in Cross-Sectional Diameters	82
WB-4221.2(a)-1	Maximum Permissible Deviation e From a True Circular Form	82
WB-4221.2(a)-2	Maximum ARC Length for Determining Plus or Minus Deviation	83
WB-4233(a)-1	Butt Weld Alignment and Mismatch Tolerances for Unequal I.D. and O.D. When Items Are Welded From One Side and Fairing Is Not Performed	85

WB-4243-1	Acceptable Full Penetration Weld Details for Category C Joints	86
WB-4243-2	Typical Flat Heads With Hubs	87
WB-4244(a)-1	Nozzles Attached by Full Penetration Butt Welds	88
WB-4244(b)-1	Nozzles Attached by Full Penetration Corner Welds	89
WB-4244(c)-1	Deposited Weld Metal Used as Reinforcement of Openings for Nozzles	90
WB-4244(d)-1	Nozzles Attached by Partial Penetration Welds	91
WB-4427-1	Fillet Weld Details	96
WB-4433-1	Types of Attachment Welds	98
WB-4622.9(c)(8)-1	Temper Bead Weld Repair and Weld Temper Bead Reinforcement	103
WB-4622.9(c)(8)-2	Temper Bead Reinforcement	104
WB-4622.9(f)-1	Qualification Test Plate	105
WB-4622.11(c)(6)-1	Temper Bead Weld Repair and Weld Temper Bead Reinforcement of Dissimilar Metal Welds or Buttering	108
WC-2433.1-1	Weld Metal Delta Ferrite Content	136
WC-3224.6-1	Design Curves for Torispherical Heads and 2:1 Ellipsoidal Heads for Use With WC-3224.8 and WC-3224.6	153
WC-3225-1	Typical Flat Heads	155
WC-3225-2	Some Acceptable Types of Unstayed Flat Heads and Covers	156
WC-3225-3	Attachment of Flat Heads to Containment Shell	157
WC-3232.2-1	Chart for Determining the Value of F	158
WC-3251-1	Welded Joint Locations Typical of Categories A, B, C, and D	159
WC-3251-2	Typical Butt Joints	160
WC-3261-1	Categories A and B Joints Between Sections of Unequal Thickness	162
WC-4221.1-1	Maximum Difference in Cross-Sectional Diameters	166
WC-4221.2(a)-1	Maximum Permissible Deviation e From a True Circular Form	167
WC-4221.2(a)-2	Maximum ARC Length for Determining Plus or Minus Deviation	168
WC-4233-1	Butt Weld Alignment and Mismatch Tolerances for Unequal I.D. and O.D. When Items Are Welded From One Side and Fairing Is Not Performed	169
WC-4265-1	Acceptable Full Penetration Weld Details for Category C Joints	171
WC-4265-2	Typical Partial Penetration Weld Detail for Category C Flat Head Closure Joints	172
WC-4265-3	Typical Flat Heads	173
WC-4266(a)-1	Nozzles Attached by Full Penetration Butt Welds	174
WC-4266(b)-1	Full Penetration Corner-Welded Attachments	175
WC-4266(c)-1	Deposited Weld Metal Used as Reinforcement of Openings for Nozzles	176
WC-4266(d)-1	Fittings With Internal Threads	176
WC-4266(e)-1	Partial Penetration Weld Connections	177
WC-4427-1	Fillet and Socket Weld Details and Dimensions	180
WC-4433-1	Typical Types of Attachment Welds	182
WC-4433-2	Typical Attachments	183
WC-4622.10(c)(7)-1	Temper Bead Weld Repair and Weld Temper Bead Reinforcement	189
WC-4622.10(c)(7)-2	Temper Bead Reinforcement	190
WC-4622.10(f)-1	Qualification Test Plate	191
WC-4622.12(c)(6)-1	Temper Bead Weld Repair and Weld Temper Bead Reinforcement of Dissimilar Metal Welds or Buttering	193

TABLES

WA-4134.17-1	Lifetime Quality Assurance Records	12
WA-4134.17-2	Nonpermanent Quality Assurance Records	12
WA-7100-1	Dimensional Standards	16
WA-7100-2	Standards and Specifications Referenced in Text	17
WA-8100-1	Authorizations and Certification Mark Issued by the Society for the Construction of Transportation and Storage Containments and Parts	18
WB-2331.2-1	Required $LST-R T_{NDT}$ Values for Ferritic Steel Material for Containment Material	37
WB-2331.2-2	Required Fracture Toughness Values for Ferritic Steel Material for Containments Having a Specified Yield Strength of 50 ksi (350 000 kPa) or Less at 100°F (38°C)	37
WB-2332(a)-1	Required C_v Values for Piping	38

WB-2333-1	Required C_v Values for Bolting Material	38
WB-2432.1-1	Sampling of Welding Materials for Chemical Analysis	41
WB-2432.2-1	Chemical Analysis for Welding Material	42
WB-3133.4-1	Values of Spherical Radius Factor, K_1	57
WB-3217-1	Classification of Stress Intensity in Containments for Some Typical Cases	63
WB-4232-1	Maximum Allowable Offset in Final Welded Joints	84
WB-4622.1-1	Mandatory Requirements for Postweld Heat Treatment of Welds	100
WB-4622.4(c)-1	Alternative Holding Temperatures and Times	100
WB-4622.7(b)-1	Exemptions to Mandatory PWHT	101
WB-5111-1	Thickness, IQI Designations, Essential Holes, and Wire Diameters	111
WC-2311(a)-1	Exemptions From Impact Testing Under WC-2311(a)(7)	128
WC-2332.1-1	Required C_v Lateral Expansion Values for Containment Material Other Than Bolting ...	129
WC-2332.1-2	Required C_v Energy Values for Containment Material Other Than Bolting	130
WC-2332.3-1	Required C_v Values for Bolting Material Tested in Accordance With WC-2332.3	130
WC-2432.1-1	Sampling of Welding Materials for Chemical Analysis	134
WC-2432.2-1	Welding Material Chemical Analysis	135
WC-3133.4-1	Values of Spherical Radius Factor K_1	146
WC-3217-1	Stress Intensity k Factors for Design and Operating Load Combinations	149
WC-3262-1	Stress Reduction Factors and Examinations for Closure Welds	162
WC-4232(a)-1	Maximum Allowable Offset in Final Welded Joints	168
WC-4524-1	Maximum Design Temperatures for Brazing Filler Metal, °F (°C)	184
WC-4622.1-1	Mandatory Requirements for Postweld Heat Treatment of Welds	185
WC-4622.4(c)-1	Alternative Holding Temperatures and Times	186
WC-4622.7(b)-1	Exemptions to Mandatory PWHT	187
WC-5111-1	Thickness, IQI Designations, Essential Holes, and Wire Diameters	197

FORMS

N-7	22
N-8	24
N-9	25

ENDNOTES	209
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(15)

LIST OF SECTIONS

SECTIONS

- I Rules for Construction of Power Boilers
- II Materials
 - Part A — Ferrous Material Specifications
 - Part B — Nonferrous Material Specifications
 - Part C — Specifications for Welding Rods, Electrodes, and Filler Metals
 - Part D — Properties (Customary)
 - Part D — Properties (Metric)
- III Rules for Construction of Nuclear Facility Components
 - Subsection NCA — General Requirements for Division 1 and Division 2
 - Appendices
 - Division 1
 - Subsection NB — Class 1 Components
 - Subsection NC — Class 2 Components
 - Subsection ND — Class 3 Components
 - Subsection NE — Class MC Components
 - Subsection NF — Supports
 - Subsection NG — Core Support Structures
 - Subsection NH — Class 1 Components in Elevated Temperature Service*
 - Division 2 — Code for Concrete Containments
 - Division 3 — Containments for Transportation and Storage of Spent Nuclear Fuel and High Level Radioactive Material and Waste
 - Division 5 — High Temperature Reactors
- IV Rules for Construction of Heating Boilers
- V Nondestructive Examination
- VI Recommended Rules for the Care and Operation of Heating Boilers
- VII Recommended Guidelines for the Care of Power Boilers
- VIII Rules for Construction of Pressure Vessels
 - Division 1
 - Division 2 — Alternative Rules
 - Division 3 — Alternative Rules for Construction of High Pressure Vessels
- IX Welding, Brazing, and Fusing Qualifications
- X Fiber-Reinforced Plastic Pressure Vessels
- XI Rules for Inservice Inspection of Nuclear Power Plant Components
- XII Rules for Construction and Continued Service of Transport Tanks

* 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.

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.

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

1 INTRODUCTION

(a) The following information provides guidance to Code users for submitting technical inquiries to the 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.

PERSONNEL

ASME Boiler and Pressure Vessel Standards Committees, Subgroups, and Working Groups

January 1, 2015

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ORGANIZATION OF SECTION III

1 GENERAL

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

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

2 SUBSECTIONS

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

* The 2015 Edition of Section III 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.

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 NB-3000 includes all material in Article NB-3000; reference to NB-3200 includes all material in subarticle NB-3200; reference to NB-3230 includes all paragraphs, NB-3231 through NB-3236.

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

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

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

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

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

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

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

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

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

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

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

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

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

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.

<i>Page</i>	<i>Location</i>	<i>Change (Record Number)</i>
xii	List of Sections	Revised
xiv	Foreword	(1) Revised (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
xxxvi	Organization of Section III	(1) New footnote added (2) 9(d)(3) added (13-1032)
6	WA-3320	Subparagraph (g)(2) deleted and subsequent subparagraphs redesignated (14-1494)
15	WA-5300	Subparagraph (i) revised (14-1494)
17	Table WA-7100-2	Third column, third entry revised (12-454)
39	WB-2420	In first paragraph, cross-reference to Section IX revised (14-1494)
54	WB-3111	Subparagraph (g) revised (13-2298)
54	WB-3112.4	In second line of subpara. (a)(2), “and” corrected by errata to “or” (13-1956)
55	WB-3133	Title revised (13-2298)
55	WB-3133.1	Revised (13-2298)
56	WB-3133.3	Subparagraph (a) Step 2 revised (13-2298)
57	WB-3133.4	(1) Subparagraph (a) Step 2 revised (13-2298) (2) Subparagraph (b) revised (13-2298)
58	WB-3133.5	Subparagraph (a) Step 1 revised (13-2298)
58	WB-3133.6	Subparagraph (b) revised (13-2298)
59	WB-3135	Subparagraph (a) revised (13-2298)
59	WB-3213.2	Revised (13-2298)
61	WB-3213.18	Deleted (06-1236)
61	WB-3213.19	Deleted (06-1236)

<i>Page</i>	<i>Location</i>	<i>Change (Record Number)</i>
61	WB-3215	(1) Subparagraph (b)(4) deleted and subsequent subparagraphs redesignated (06-1236, 13-2298) (2) In endnote 18, “and” corrected by errata to “or” (14-599)
63	Table WB-3217-1	Entry in penultimate row and column revised (13-2298)
65	Figure WB-3221-1	Revised (06-1236)
62	WB-3221.1	Revised (13-2298)
62	WB-3221.4	Revised (06-1236)
66	Figure WB-3222-1	Revised (06-1236)
64	WB-3222.4	Revised (06-1236)
64	WB-3222.6	Revised (06-1236)
64	WB-3222.7	Deleted (06-1236)
67	WB-3222.9	Subparagraphs (a), (d), (d)(2), (d)(3), and Note revised (13-2298)
69	WB-3224.1	Subparagraph (c) revised (06-1236)
70	Figure WB-3224.1-1	Revised (06-1236)
72	WB-3231	Revised (12-1105)
72	WB-3232.1	Revised (12-1105)
72	WB-3232.2	Revised (12-1105)
72	WB-3232.3	Revised (12-1105)
73	WB-3232.4	(1) Revised (13-2298) (2) Subparagraph (b)(1) revised (12-1105) (3) Subparagraph (d) revised (13-2298)
73	WB-3236	Revised (13-2298)
73	WB-3240	Subparagraph (b) revised (06-1236)
74	WB-3252.2	Revised (13-2298)
76	WB-3252.4	Subparagraphs (c), (d), and (f)(2) revised (13-2298)
77	WB-3700	Subparagraphs (c), (d), and (f)(2) revised (13-1955)
92	WB-4324	Revised (14-1494)
97	WB-4453.4	In subparagraph (b)(2), “Article 5” corrected by errata to “Article 4” (13-1270)
113	WB-5245	Revised (14-1494)
115	WB-5521	Subparagraphs (a), (a)(3), and (a)(4) revised (12-454)
125	WC-2150	Revised (14-45)
132	WC-2420	Revised (14-1494)
134	WC-2432.1	Subparagraph (d) revised (14-1494)
143	WC-3112.4	In subparagraph (b), “and” corrected by errata to “or” (13-1956)
147	WC-3211.1	Subparagraph (c) revised (14-600)
147	WC-3211.3	Revised (14-600)
152	WC-3224.3	Subparagraph (c) revised (14-600)

<i>Page</i>	<i>Location</i>	<i>Change (Record Number)</i>
152	WC-3224.4	Subparagraph (c) revised (14-600)
157	Figure WC-3225-3	In sketch (e), <i>T</i> and <i>c</i> relocated by errata for clarity (14-599, 14-600)
154	WC-3231	Subparagraph (a) revised (14-1494)
156	WC-3233	Revised (14-600)
160	WC-3252.4	Subparagraphs (a), (b), and (d) revised (14-600)
161	WC-3259	Subparagraph (b) revised (14-600)
162	WC-3700	Revised (13-1955)
172	WC-4324	Revised (14-1494)
181	WC-4453.4	In subpara. (b)(2), “Article V” corrected by errata to “Article 4” (13-1270)
191	Figure WC-4622.10(f)-1	Editorially revised
201	WC-5521	Subparagraphs (a), (a)(3), and (a)(4) revised (12-454)

NOTE: Volume 63 of the Interpretations to Section III, Division 3 of the ASME Boiler and Pressure Vessel Code follows the last page of Section III, Division 3.

LIST OF CHANGES IN RECORD ORDER NUMBER

Record Number	Change
06-1236	Revised Article WB-3000 to delete expansion stress (P_e) requirements, associated references, and assure correct wording for definitions of stress limits in the text and associated Hopper diagrams.
12-454	Incorporated acceptance of the ASNT SNT-TC-1A 2011 standard into WB-5500, WC-5500, and WA-7100-2. Clarified the requirement for the near-vision acuity examination.
12-1105	Revised WB-3230 to utilize S_y for service stresses to account for the revised criteria for S_m values for bolting.
13-860	In the Foreword, the subtitle has been deleted and replaced with an ANSI disclaimer as a footnote.
13-1032	Added a paragraph to the introduction of Section III, Division 1, Organization of Section III, Article 9(d) References to Appendices to add guidance on the use of nonmandatory appendices for Section III.
13-1270	Revised the Section V Article callout to identify the proper Article for appropriate procedures to perform ultrasonic examination of repair welds.
13-1955	Eliminated weight limitations in WB-3700 and revised both WB-3700 and WC-3700 to show that a strain-based acceptance criterion applies to components subject to energy-limited events.
13-1956	Revised WB/WC-3112.4 to read "SA-874 or SA/JIS G5504" in lieu of "SA-874 and SA/JIS G5504."
13-2298	Made editorial changes to Article WB-3000. These changes included replacing missing/incorrect words, making the language consistent, and correcting references.
14-45	In WC-2150 corrected reference from NCA-3865 to NCA-3856.
14-599	Corrected the errata identified in Articles WB-3000 and WC-3000.
14-600	Corrected the various portions of Article WC-3000 with the editorial actions identified in the proposal.
14-1494	Updated and corrected nine cross references that either did not exist or were incorrect.

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

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

Subparagraph Breakdowns/Nested Lists Hierarchy

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

Footnotes

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

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

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

Cross-References

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

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

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SUBSECTION WA

GENERAL REQUIREMENTS

ARTICLE WA-1000

SCOPE OF DIVISION 3

WA-1100 SCOPE

WA-1110 NATURE OF THESE RULES AND CONTAINMENTS TO WHICH THEY ARE APPLICABLE

The rules of this Division constitute requirements for the construction of:

(a) Containments used for the transportation and storage, including disposal¹ of spent nuclear fuel and high level radioactive material and waste, and

(b) Structures internal to the containment² necessary to support and maintain geometric configuration of the spent nuclear fuels and high level radioactive materials and waste.

WA-1120 DEFINITIONS

Definitions of key terms used in this Division are included in [Article WA-9000](#).

WA-1130 LIMITS OF THESE RULES

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

(b) The rules are intended to be applicable to any item that serves a containment or internal support² function.

WA-1140 USE OF CODE EDITIONS, ADDENDA, AND CASES

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

(b) The Certificate Holder shall construct the containment under the provisions of a Quality Assurance Program which has been accepted by the Society. The

Quality Assurance Program shall be updated to meet the requirements of the latest Division 3 Edition and Addenda within 6 months of issuance.

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

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

(1) The material ([WA-1220](#)) meets the applicable requirements of a material specification permitted by [WB-2121](#), [WC-2121](#) of the Edition and Addenda specified for construction.

(2) The material meets all the requirements of [WB-2000](#), [WC-2000](#) of the Edition and Addenda specified for construction.

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

WA-1150 UNITS OF MEASURE

Either U.S. Customary or SI units may be used for compliance with all requirements of this edition, but one system shall be used consistently throughout for all phases of construction.

Either the U.S. Customary units or SI units that are listed in Section III Appendices, Mandatory Appendix XXIV shall be used consistently for all phases of construction (e.g., materials, design, fabrication, and reports).