

SECTION III
Rules for Construction of
Nuclear Facility Components

2015 ASME Boiler and
Pressure Vessel Code
An International Code

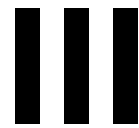
Division 1 — Subsection NC
Class 2 Components

AN INTERNATIONAL CODE

2015 ASME Boiler & Pressure Vessel Code

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RULES FOR CONSTRUCTION OF NUCLEAR FACILITY COMPONENTS

Division 1 - Subsection NC

Class 2 Components

ASME Boiler and Pressure Vessel Committee
on Nuclear Power



The American Society of
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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 Number Order	xlii
Cross-Referencing and Stylistic Changes in the Boiler and Pressure Vessel Code	xliii
Article NC-1000 Introduction	1
NC-1100 Scope	1
NC-1120 Temperature Limits	1
NC-1130 Boundaries of Jurisdiction Applicable to This Subsection	1
Article NC-2000 Material	6
NC-2100 General Requirements for Material	6
NC-2110 Scope of Principal Terms Employed	6
NC-2120 Pressure-Retaining Material	6
NC-2130 Certification of Material	8
NC-2140 Welding Materials	8
NC-2150 Material Identification	8
NC-2160 Deterioration of Material in Service	8
NC-2170 Heat Treatment to Enhance Impact Properties	8
NC-2180 Procedures for Heat Treatment of Material	8
NC-2190 Nonpressure-Retaining Material	8
NC-2200 Material Test Coupons and Specimens for Ferritic Steel Material	9
NC-2210 Heat Treatment Requirements	9
NC-2220 Procedure for Obtaining Test Coupons and Specimens for Quenched and Tempered Material	9
NC-2300 Fracture Toughness Requirements for Material	11
NC-2310 Material to Be Impact Tested	11
NC-2320 Impact Test Procedures	12
NC-2330 Test Requirements and Acceptance Standards	13
NC-2340 Number of Impact Tests Required	13
NC-2350 Retests	15
NC-2360 Calibration of Instruments and Equipment	15
NC-2400 Welding Material	15
NC-2410 General Requirements	15
NC-2420 Required Tests	15
NC-2430 Weld Metal Tests	17
NC-2440 Storage and Handling of Welding Material	19
NC-2500 Examination and Repair of Pressure-Retaining Material	19
NC-2510 Pressure-Retaining Material	19
NC-2530 Examination and Repair of Plate	19
NC-2540 Examination and Repair of Forgings and Bars	21
NC-2550 Examination and Repair of Seamless and Welded (Without Filler Metal) Tubular Products and Fittings	22
NC-2560 Examination and Repair of Tubular Products and Fittings Welded With Filler Metal ...	24

NC-2570	Examination and Repair of Statically and Centrifugally Cast Products	24
NC-2580	Examination of Bolts, Studs, and Nuts	30
NC-2600	Material Organizations' Quality System Programs	30
NC-2610	Documentation and Maintenance of Quality System Programs	30
NC-2700	Dimensional Standards	30
Article NC-3000	Design	31
NC-3100	General Design	31
NC-3110	Loading Criteria	31
NC-3120	Special Considerations	32
NC-3130	General Design Rules	32
NC-3200	Alternative Design Rules for Vessels	36
NC-3210	General Requirements	36
NC-3220	Design Considerations	44
NC-3230	Openings and Their Reinforcement	53
NC-3240	Vessels Under External Pressure	62
NC-3250	Welded Joints	63
NC-3260	Special Vessel Requirements	66
NC-3300	Vessel Design	67
NC-3310	General Requirements	67
NC-3320	Design Considerations	68
NC-3330	Openings and Reinforcement	82
NC-3350	Design of Welded Construction	89
NC-3360	Special Vessel Requirements	95
NC-3400	Pump Design	98
NC-3410	General Requirements for Centrifugal Pumps	98
NC-3420	Definitions	99
NC-3430	Design Requirements for Centrifugal Pumps	99
NC-3440	Design of Specific Pump Types	101
NC-3450	Design of Class 2 Reciprocating Pumps	114
NC-3500	Valve Design	114
NC-3510	General Requirements	114
NC-3520	Level B, C, and D Service Limits	118
NC-3530	General Rules	120
NC-3590	Pressure Relief Valve Design	121
NC-3600	Piping Design	125
NC-3610	General Requirements	125
NC-3620	Design Considerations	128
NC-3640	Pressure Design of Piping Products	128
NC-3650	Analysis of Piping Designs	145
NC-3660	Design of Welds	149
NC-3670	Special Piping Requirements	150
NC-3690	Dimensional Requirements for Piping Products	161
NC-3700	Electrical and Mechanical Penetration Assemblies	161
NC-3720	Design Rules	161
NC-3800	Design of Atmospheric Storage Tanks	161
NC-3810	General Requirements	161
NC-3820	Design Considerations	162
NC-3830	Bottom Design	162
NC-3840	Shell Design	162
NC-3850	Roof Design	163
NC-3860	Tank Connections and Appurtenances	167

NC-3900	Zero psi to 15 psi (0 kPa to 100 kPa) Storage Tank Design	167
NC-3910	General Requirements	167
NC-3920	Design Considerations	173
NC-3930	Design Procedure	178
NC-3940	Alternate Rules for Axial Compressive Membrane Stresses in the Cylindrical Walls of 0 psi to 15 psi (0 kPa to 100 kPa) Storage Tanks	189
Article NC-4000	Fabrication and Installation	206
NC-4100	General Requirements	206
NC-4110	Introduction	206
NC-4120	Certification of Materials and Fabrication by Component Certificate Holder	206
NC-4130	Repair of Material	207
NC-4200	Forming, Cutting, and Aligning	207
NC-4210	Cutting, Forming, and Bending	207
NC-4220	Forming Tolerances	208
NC-4230	Fitting and Aligning	211
NC-4240	Requirements for Weld Joints in Components	212
NC-4250	Welding End Transitions — Maximum Envelope	228
NC-4260	Special Requirements for Weld Joints in Vessels Designed to NC-3200	228
NC-4300	Welding Qualifications	232
NC-4310	General Requirements	232
NC-4320	Welding Qualifications, Records, and Identifying Stamps	235
NC-4330	General Requirements for Welding Procedure Qualification Tests	237
NC-4350	Special Qualification Requirements for Tube-to-Tubesheet Welds	240
NC-4360	Qualification Requirements for Welding Specially Designed Welded Seals	240
NC-4400	Rules Governing Making, Examining, and Repairing Welds	241
NC-4410	Precautions to Be Taken Before Welding	241
NC-4420	Rules for Making Welded Joints	241
NC-4430	Welding of Attachments	243
NC-4450	Repair of Weld Metal Defects	246
NC-4500	Brazing	247
NC-4510	Rules for Brazing	247
NC-4520	Brazing Qualification Requirements	247
NC-4530	Fitting and Aligning of Parts to Be Brazed	248
NC-4540	Examination of Brazed Joints	248
NC-4600	Heat Treatment	249
NC-4610	Welding Preheat Requirements	249
NC-4620	Postweld Heat Treatment	249
NC-4630	Heat Treatment of Welds Other Than the Final Postweld Heat Treatment	254
NC-4650	Heat Treatment After Bending or Forming for Pipe, Pumps, and Valves	254
NC-4660	Heat Treatment of Electroslag Welds	255
NC-4700	Mechanical Joints	255
NC-4710	Bolting and Threading	255
NC-4720	Bolting Flanged Joints	255
NC-4730	Electrical and Mechanical Penetration Assemblies	255
NC-4800	Expansion Joints	255
NC-4810	Fabrication and Installation Rules for Bellows Expansion Joints	255
Article NC-5000	Examination	257
NC-5100	General Requirements for Examination	257
NC-5110	Procedure, Qualification, and Evaluation	257
NC-5120	Time of Examination of Welds and Weld Metal Cladding	257
NC-5130	Examination of Weld Edge Preparation Surfaces	258
NC-5140	Examination of Openings Cut in Vessels Designed to NC-3200	258

NC-5200	Examination of Welds	259
NC-5210	Category A Vessel Welded Joints and Longitudinal Welded Joints in Piping, Pumps, and Valves	259
NC-5220	Category B Vessel Welded Joints and Circumferential Welded Joints in Piping, Pumps, and Valves	259
NC-5230	Category C Vessel Welded Joints and Similar Welded Joints in Other Components	259
NC-5240	Category D Vessel Welded Joints and Similar Welded Joints in Other Components	259
NC-5250	Examination of Welds for Vessels Designed to NC-3200	259
NC-5260	Fillet, Partial Penetration, Socket, and Attachment Welds	260
NC-5270	Special Welds	260
NC-5280	Weld Joints in Storage Tanks	260
NC-5300	Acceptance Standards	261
NC-5320	Radiographic Acceptance Standards	261
NC-5330	Ultrasonic Acceptance Standards	261
NC-5340	Magnetic Particle Acceptance Standards	262
NC-5350	Liquid Penetrant Acceptance Standards	262
NC-5360	Visual Acceptance Standards for Brazed Joints	262
NC-5380	Gas and Bubble Formation Testing	262
NC-5400	Final Examination of Components	263
NC-5410	Examination After Pressure Testing	263
NC-5500	Qualifications and Certification of Nondestructive Examination Personnel	263
NC-5510	General Requirements	263
NC-5520	Personnel Qualification, Certification, and Verification	263
NC-5530	Records	264
NC-5700	Examination Requirements for Expansion Joints	264
NC-5720	Bellows Expansion Joints	264
Article NC-6000	Testing	265
NC-6100	General Requirements	265
NC-6110	Pressure Testing of Components, Appurtenances, and Systems	265
NC-6120	Preparation for Testing	266
NC-6200	Hydrostatic Tests	266
NC-6210	Hydrostatic Test Procedure	266
NC-6220	Hydrostatic Test Pressure Requirements	267
NC-6230	Bellows Expansion Joints	267
NC-6240	Provision for Embedded or Inaccessible Welded Joints in Piping	267
NC-6300	Pneumatic Tests	268
NC-6310	Pneumatic Testing Procedures	268
NC-6320	Pneumatic Test Pressure Requirements	268
NC-6330	Bellows Expansion Joints	268
NC-6400	Pressure Test Gages	268
NC-6410	Requirements for Pressure Test Gages	268
NC-6500	Atmospheric and 0 psi to 15 psi (0 kPa to 100 kPa) Storage Tanks	269
NC-6510	Testing of Atmospheric Storage Tanks	269
NC-6520	Testing of 0 psi to 15 psi (0 kPa to 100 kPa) Storage Tanks	269
NC-6530	Test Gages	270
NC-6600	Special Test Pressure Situations	270
NC-6610	Components Designed for External Pressure	270
NC-6620	Pressure Testing of Combination Units	271
NC-6900	Proof Tests to Establish Design Pressure	271
NC-6910	General Requirements	271
NC-6920	Procedures	272
NC-6930	Procedure for Components Having Chambers of Special Shape Subject to Collapse	275

Article NC-7000	Overpressure Protection	276
NC-7100	General Requirements	276
NC-7110	Scope	276
NC-7120	Integrated Overpressure Protection	276
NC-7130	Verification of the Operation of Reclosing Pressure Relief Devices	276
NC-7140	Installation	276
NC-7150	Acceptable Pressure Relief Devices	277
NC-7160	Unacceptable Pressure Relief Devices	277
NC-7170	Permitted Use of Pressure Relief Devices	277
NC-7200	Overpressure Protection Report	278
NC-7210	Responsibility for Report	278
NC-7220	Content of Report	278
NC-7230	Certification of Report	278
NC-7240	Review of Report After Installation	278
NC-7250	Filing of Report	279
NC-7300	Relieving Capacity Requirements	279
NC-7310	Expected System Pressure Transient Conditions	279
NC-7320	Unexpected System Excess Pressure Transient Conditions	279
NC-7330	System Faulted Conditions	280
NC-7400	Set Pressures of Pressure Relief Devices	280
NC-7410	Set Pressure Limitations for Expected System Pressure Transient Conditions	280
NC-7420	Set Pressure Limitation for Unexpected System Excess Pressure Transient Conditions ..	280
NC-7500	Operating and Design Requirements for Pressure and Vacuum Relief Valves	280
NC-7510	Safety, Safety Relief, and Relief Valves	280
NC-7520	Pilot-Operated Pressure Relief Valves	282
NC-7530	Power-Actuated Pressure Relief Valves	282
NC-7540	Safety Valves With Auxiliary Actuating Devices	283
NC-7550	Vacuum Relief Valves	284
NC-7560	Alternative Test Media	284
NC-7600	Nonreclosing Pressure Relief Devices	285
NC-7610	Rupture Disk Devices	285
NC-7620	Installation Requirements	285
NC-7700	Certification	286
NC-7710	Responsibility for Certification of Pressure and Vacuum Relief Valves	286
NC-7720	Responsibility for Certification of Nonreclosing Pressure Relief Devices	286
NC-7730	Capacity Certification of Pressure Relief Valves — Compressible Fluids	286
NC-7740	Capacity Certification of Pressure Relief Valves — Incompressible Fluids	291
NC-7750	Capacity Certification of Vacuum Relief Valves	293
NC-7760	Capacity Determination of Rupture Disk Devices	294
NC-7800	Marking, Stamping With Certification Mark, and Data Reports	296
NC-7810	Pressure and Vacuum Relief Valves	296
NC-7820	Rupture Disk Devices	297
NC-7830	Pressure Relief Valve in Combination With Rupture Disk Devices	297
NC-7840	Certificate of Authorization to Use Certification Mark	297
Article NC-8000	Nameplates, Stamping With Certification Mark, and Reports	298
NC-8100	General Requirements	298
 FIGURES		
NC-1132.2-1	Attachments in the Component Support Load Path That Do Not Perform a Pressure-Retaining Function	3
NC-1132.2-2	Attachments That Do Not Perform a Pressure-Retaining Function and Are Not in the Component Support Load Path (Nonstructural Attachments)	4
NC-1132.2-3	Attachments That Perform a Pressure-Retaining Function	5
NC-2433.1-1	Weld Metal Delta Ferrite Content	20
NC-2575.2-1	Typical Pressure-Retaining Parts of Pumps and Valves	28

NC-3133.8-1	Chart for Determining Wall Thickness of Tubes Under External Pressure	37
NC-3224.6-1	Design Curves for Torispherical Heads and 2:1 Ellipsoidal Heads for Use With NC-3224.8 and NC-3224.6	46
NC-3224.13(b)(6)(-a)-1	Inherent Reinforcement for Large End of Cone–Cylinder Junction	48
NC-3224.13(b)(6)(-b)-1	Values for Q for Large End of Cone–Cylinder Junction	49
NC-3224.13(c)(6)(-a)-1	Inherent Reinforcement for Small End of Cone–Cylinder Junction	50
NC-3224.13(c)(6)(-b)-1	Values for Q for Small End of Cone–Cylinder Junction	51
NC-3224.13(d)-1	Cone–Cylinder Junction at Small End Treated as Opening	52
NC-3225-1	Typical Flat Heads and Supported and Unsupported Tubesheets With Hubs	54
NC-3225-2	Some Acceptable Types of Unstayed Flat Heads and Covers	55
NC-3225-3	Attachment of Pressure Parts to Plates to Form a Corner Joint	56
NC-3234.2(a)-1	Nozzle Nomenclature and Dimensions	58
NC-3239.1(b)-1	Examples of Acceptable Transition Details	60
NC-3239.4-1	Limits of Reinforcing Zone	61
NC-3324.2-1	Principal Dimensions of Typical Heads	71
NC-3324.11(a)(6)-1	Large Head Openings, Reverse Curve, and Conical Shell Reducer Sections	76
NC-3325-1	Some Acceptable Types of Unstayed Flat Heads and Covers	78
NC-3326.1-1	Spherically Dished Covers With Bolting Flanges	79
NC-3329(b)-1	Example of Tube Spacing With Pitch of Holes Equal in Every Row	81
NC-3329(b)-2	Example of Tube Spacing With Pitch of Holes Unequal in Every Second Row	81
NC-3329(b)-3	Example of Tube Spacing With Pitch Holes Varying in Every Second and Third Row	82
NC-3329(d)-1	Example of Tube Spacing With Tube Holes on Diagonal Lines	82
NC-3329(d)-2	Diagram for Determining the Efficiency of Longitudinal and Diagonal Ligaments Between Openings in Cylindrical Shells	83
NC-3329(g)-1	Diagram for Determining Equivalent Longitudinal Efficiency of Diagonal Liga- ments	84
NC-3332.2-1	Chart for Determining the Value of F	85
NC-3335(b)-1	Some Representative Configurations Describing the t_e Reinforcement Dimension	88
NC-3335.2-1	Arrangement of Multiple Openings	89
NC-3335.3(b)-1	Minimum Depth for Flange of Flued Openings	89
NC-3351-1	Welded Joint Locations Typical of Categories A, B, C, and D	90
NC-3352-1	Typical Butt Joints	91
NC-3358.1(a)-1	Heads Attached to Shells	94
NC-3361-1	Butt Welding of Sections of Unequal Thicknesses	96
NC-3423-1	Typical Single Volute Casing	99
NC-3423-2	Typical Double Volute Casing	99
NC-3433.4-1	Minimum Tangential Inlet and Outlet Wall Thickness	101
NC-3441.1-1	Type A Pump	101
NC-3441.1-2	Type A Pump	102
NC-3441.1(a)-1	Type A Pump	102
NC-3441.2-1	Type B Pump	103
NC-3441.3-1	Type C Pump	103
NC-3441.3-2	Type C Pump	104
NC-3441.4(a)-1	Type D Pump	105
NC-3441.5-1	Type E Pump	105
NC-3441.6(a)-1	Type F Pump	105
NC-3441.7(a)-1	Axially Split Casing, Volute Pump, Type G	105
NC-3441.7(a)-2	Axially Split Casing, Volute Pump, Type G	106
NC-3441.7(c)-1	Axially Split Casing, Volute Pump, Type G	106
NC-3441.7(c)(2)-1	Typical Section of Type G Pumps	107
NC-3441.7(c)(2)-2	Typical Section of Type G Pumps	107
NC-3441.7(c)(2)-3	Typical Loads on Type G Pumps	108
NC-3441.8-1	Longitudinal Section Through Type H Pump	110
NC-3441.8-2	Transverse Section Through Type H Pump	110
NC-3441.9-1	Type K Pump	111

NC-3441.9-2	Type K Pump	112
NC-3441.10-1	Type N Pump	115
NC-3451(a)-1	Horizontal Single-Acting Power Pump Liquid Ends	116
NC-3521-1	Typical Sections of Valve Bodies	119
NC-3591.1-1	Typical Pressure Relief Devices	122
NC-3591.1-2	Typical Pressure Relief Devices	123
NC-3595.3-1	Valve Nozzle	125
NC-3622-1	Examples of Reversing and Nonreversing Dynamic Loads	129
NC-3643.2(b)-1	Typical Welded Branch Connections	133
NC-3643.2(b)-2	Typical Right Angle Branch Connections Made Using a Fillet Weld or a Partial Penetration Weld	134
NC-3643.3(c)(1)-1	Reinforcement of Branch Connections	135
NC-3643.3(c)(1)-2	Some Representative Configurations Describing the t_e Reinforcement Dimensions	136
NC-3643.4(a)-1	Reinforced Extruded Outlets	138
NC-3647.2-1	Types of Permanent Blanks	141
NC-3653.3-1	Reducing or Full Outlet Branch Connections or Tees	146
NC-3673.2(b)-2	Branch Connection Nomenclature	159
NC-3861-1	Roof Manholes	168
NC-3862(a)-1	Flanged Roof Nozzles	169
NC-3862(a)-2	Screwed or Socket Weld Roof Nozzles	170
NC-3863-1	Typical Welded Bottom Outlet Elbow	171
NC-3922.1-1	Biaxial Stress Chart for Combined Tension and Compression, 30,000 psi to 38,000 psi (205 MPa to 260 MPa) Yield Strength Steels	175
NC-3922.1-2	Reduction of Design Stresses Required to Allow for Biaxial Stresses of Opposite Sign	176
NC-3932.1-1	Some Typical Free Body Diagrams for Certain Shapes of Tanks	182
NC-3933.4(a)-1	Compression Ring Region	186
NC-3933.5(d)-1	Permissible Details of Compression Ring	188
NC-3944-1	Design Factor Times Allowable Axial Membrane Compressive Stress Versus Radius Over Thickness for Ferrous Materials With Yield Strengths of 25 ksi at Temperatures $\leq 300^\circ\text{F}$	192
NC-3944-1M	Design Factor Times Allowable Axial Membrane Compressive Stress Versus Radius Over Thickness for Ferrous Materials With Yield Strengths of 175 MPa at Temperatures $\leq 150^\circ\text{C}$	193
NC-3944-2	Design Factor Times Allowable Axial Membrane Compressive Stress Versus Radius Over Thickness for Ferrous Materials With Yield Strengths of 30 ksi at Temperatures $\leq 300^\circ\text{F}$	194
NC-3944-2M	Design Factor Times Allowable Axial Membrane Compressive Stress Versus Radius Over Thickness for Ferrous Materials With Yield Strengths of 210 MPa at Temperatures $\leq 150^\circ\text{C}$	195
NC-3944-3	Design Factor Times Allowable Axial Membrane Compressive Stress Versus Radius Over Thickness for Ferrous Materials With Yield Strengths of 35 ksi at Temperatures $\leq 300^\circ\text{F}$	196
NC-3944-3M	Design Factor Times Allowable Axial Membrane Compressive Stress Versus Radius Over Thickness for Ferrous Materials With Yield Strengths of 245 MPa at Temperatures $\leq 150^\circ\text{C}$	197
NC-3944-4	Design Factor Times Allowable Axial Membrane Compressive Stress Versus Radius Over Thickness for Ferrous Materials With Yield Strengths of 40 ksi at Temperatures $\leq 300^\circ\text{F}$	198
NC-3944-4M	Design Factor Times Allowable Axial Membrane Compressive Stress Versus Radius Over Thickness for Ferrous Materials With Yield Strengths of 280 MPa at Temperatures $\leq 150^\circ\text{C}$	199
NC-3944-5	Design Factor Times Allowable Axial Membrane Compressive Stress Versus Radius Over Thickness for Ferrous Materials With Yield Strengths of 45 ksi at Temperatures $\leq 300^\circ\text{F}$	200

NC-3944-5M	Design Factor Times Allowable Axial Membrane Compressive Stress Versus Radius Over Thickness for Ferrous Materials With Yield Strengths of 315 MPa at Temperatures $\leq 150^{\circ}\text{C}$	201
NC-3944-6	Design Factor Times Allowable Axial Membrane Compressive Stress Versus Radius Over Thickness for Ferrous Materials With Yield Strengths of 50 ksi at Temperatures $\leq 300^{\circ}\text{F}$	202
NC-3944-6M	Design Factor Times Allowable Axial Membrane Compressive Stress Versus Radius Over Thickness for Ferrous Materials With Yield Strengths of 350 MPa at Temperatures $\leq 150^{\circ}\text{C}$	203
NC-3947-1	Meridional Straightness Tolerance	205
NC-4221.1-1	Maximum Difference in Cross-Sectional Diameters	209
NC-4221.2(a)-1	Maximum Permissible Deviation e From a True Circular Form	210
NC-4221.2(a)-2	Maximum Arc Length for Determining Plus or Minus Deviation	211
NC-4233-1	Butt Weld Alignment and Mismatch Tolerances for Unequal I.D. and O.D. When Components Are Welded From One Side and Fairing Is Not Performed	212
NC-4243-1	Acceptable Full Penetration Weld Details for Category C Joints	214
NC-4243-2	Attachment of Pressure Parts to Plates to Form a Corner Joint	215
NC-4243.1-1	Typical Flat Heads and Supported and Unsupported Tubesheet With Hubs	216
NC-4244(a)-1	Nozzles, Branch, and Piping Connections Joined by Full Penetration Butt Welds ..	217
NC-4244(b)-1	Nozzles, Branch, and Piping Connections Joined by Full Penetration Corner Welds	218
NC-4244(c)-1	Deposited Weld Metal Used as Reinforcement of Openings for Nozzles, Branch, and Piping Connections	219
NC-4244(d)-1	Some Acceptable Types of Welded Nozzles, Branch, and Piping Connections	220
NC-4244(e)-1	Some Acceptable Types of Welded Nozzles	221
NC-4244(e)-2	Some Acceptable Types of Small Fittings	222
NC-4246.1(a)-1	Typical Bottom and Bottom-to-Shell Joints	223
NC-4246.3-1	Typical Roof and Roof-to-Shell Joints	224
NC-4246.5-1	Roof Manholes	225
NC-4246.5-2	Flanged Roof Nozzles	226
NC-4246.5-3	Screwed or Socket Weld Roof Nozzles	226
NC-4246.5-4	Welded Bottom Outlet Elbow	227
NC-4250-1	Welding End Transitions Maximum Envelope	229
NC-4265-1	Acceptable Full Penetration Details to Form a Corner Joint	230
NC-4265-2	Acceptable Full Penetration Weld Details for Category C Joints	231
NC-4266(a)-1	Nozzles Attached by Full Penetration Butt Welds	231
NC-4266(b)-1	Full Penetration Corner Welded Attachments	233
NC-4266(c)-1	Pad and Screwed Fitting Types of Welded Nozzles and Other Connections to Shells, Drums, and Headers	234
NC-4266(d)-1	Partial Penetration Weld Connections	235
NC-4267-1	Attachments	236
NC-4427-1	Fillet and Socket Weld Details and Dimensions	244
NC-4433-1	Types of Attachment Welds	245
NC-4437.2(b)-1	Some Acceptable Methods of Attaching Stiffening Rings to Shells of Cylindrical Vessels Subjected to External Pressure	246
NC-4511-1	Brazed Connections for Appurtenances and Piping	248
NC-4730-1	Penetration Assembly	256
NC-4810(c)-1	Permissible Attachment Welds for Bellows	256
NC-7734.2(a)-1	Values of F for Nonchoking Flow	290
NC-7754.2(a)-1	Values of F for Nonchoking Flow	295

TABLES

NC-2311(a)-1	Exemptions From Impact Testing Under NC-2311(a)(8)	12
NC-2332.1-1	Required C_v Lateral Expansion Values for Pressure-Retaining Material Other Than Bolting	13
NC-2332.1-2	Required C_v Energy Values for Pressure-Retaining Material Other Than Bolting	14
NC-2332.3-1	Required C_v Values for Bolting Material Tested in Accordance With NC-2332.3	14

NC-2432.1-1	Sampling of Welding Materials for Chemical Analysis	18
NC-2432.2-1	Welding Material Chemical Analysis	18
NC-2571-1	Required Examinations	25
NC-3215.1(a)-1	Pressure and Temperature Relationships	39
NC-3217-1	Stress Intensity k Factors for Design and Service Load Combinations	40
NC-3239.3(a)-1	Required Minimum Reinforcing Area, A_r	60
NC-3239.7-1	Stress Indices for Internal Pressure Loading	62
NC-3266-1	Minimum Number of Pipe Threads for Connections	67
NC-3321-1	Stress Limits for Design and Service Loadings	68
NC-3321-2	Classification of Stress Intensity in Vessels for Some Typical Cases	69
NC-3324.2-1	Values of Factor K	71
NC-3324.8(b)-1	Values of Factor M	74
NC-3324.11(b)(2)-1	Values of Δ for Junctions at the Large Cylinder for $\alpha \leq 30$ deg	75
NC-3324.11(b)(3)-1	Values of Δ for Junctions at the Small Cylinder for $\alpha \leq 30$ deg	75
NC-3332.2-1	Values of Spherical Radius Factor K_1	86
NC-3416-1	Stress and Pressure Limits for Design and Service Loadings	99
NC-3521-1	Level A, B, C, and D Service Limits	120
NC-3592.2(b)-1	Class 2 Pressure Relief Devices: Level B, C, and D Service Loadings	124
NC-3611.2(e)-1	Stress Range Reduction Factors	126
NC-3641.1(a)-1	Values of A	130
NC-3673.2(b)-1	Stress Indices, Flexibility, and Stress Intensification Factors	153
NC-3821.5-1	Design and Service Limits	162
NC-3861-1	Roof Manholes	169
NC-3862(a)-1	Flanged Roof Nozzles	170
NC-3862(a)-2	Screwed or Socket Weld Roof Nozzles	171
NC-3863-1	Welded Bottom Outlet Elbow	172
NC-3865-1	Platforms and Walkways	172
NC-3865-2	Stairways	172
NC-3865-3	Stairway Rise, Run, and Angle Relationships	173
NC-3921.8-1	Design and Service Limits for Steel Tanks	174
NC-3923.1-1	Maximum Allowable Stress Values for Structural Members	179
NC-3932.2(d)-1	Factors for Determining Values of R_1 and R_2 for 2:1 Ellipsoidal Roofs and Bottoms	183
NC-4232(a)-1	Maximum Allowable Offset in Final Welded Joints	211
NC-4247.6(d)-1	Minimum Size for Fillet Welds	227
NC-4524-1	Maximum Design Temperatures for Brazing Filler Metal, °F (°C)	249
NC-4622.1-1	Mandatory Requirements for Postweld Heat Treatment of Welds	250
NC-4622.4(c)-1	Alternative Holding Temperatures and Times	251
NC-4622.7(b)-1	Exemptions to Mandatory PWHT	252
NC-5111-1	Thickness, IQI Designations, and Essential Holes, and Wire Diameters	258
ENDNOTES		299

(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

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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)
7	NC-2126.1	In subpara. (e), last two sentences added (14-1713)
15	NC-2420	In first paragraph, cross-reference to “Section IX, QW-492” corrected by errata to “Section IX, QG-109” (14-2229)
18	NC-2432.1	In subpara. (d), last sentence corrected by errata (14-2229)
25	Table NC-2571-1	In third column, ninth entry, cross-reference to “NC-2474” corrected by errata to “NC-2575” (14-2229)
41	NC-3218	In subpara. (a), cross-reference to “NC-6231” corrected by errata to “NC-6321” (15-225)
45	NC-3224.6	In last sentence, cross-reference to “Figure NC-3358-1” corrected by errata to “Figure NC-3358.1(a)-1” (15-225, 15-1011)
45	NC-3224.8	In second paragraph, last sentence, cross-reference to “Figure NC-3358-1” corrected by errata to “Figure NC-3358.1(a)-1” (15-225, 15-1011)
45	NC-3224.9	In last sentence, cross-reference to “Figure NC-3358-1” corrected by errata to “Figure NC-3358.1(a)-1” (15-225, 15-1011)
47	NC-3224.13	In subparas. (b)(3) and (c)(3), cross-reference to “NC-3252.2(b)” deleted by errata (15-225, 15-1011)
55	NC-3232.2	In subpara. (b), cross-reference to “NC-3234.1(c)” corrected by errata to “NC-3234.1(b)” (15-225, 15-1011)
57	NC-3235	In subpara. (d), cross-reference to “NC-4237” corrected by errata to “NC-3237” (15-225, 15-1011)

<i>Page</i>	<i>Location</i>	<i>Change (Record Number)</i>
59	NC-3237	In first sentence, cross-reference to “NC-3224.11(c)” corrected by errata to “NC-3224.13(d)” (15-225, 15-1011)
64	NC-3258.1	In subparas. (a) and (b), cross-references to “Figure NC-3358-1” corrected by errata to “Figure NC-3358.1(a)-1” (15-225, 15-1011)
66	NC-3261	In first paragraph and subpara. (b), cross-references to “Figure NC-3358-1” corrected by errata to “Figure NC-3358.1(a)-1” (15-225, 15-1011)
88	Figure NC-3335(b)-1	Revised editorially
90	NC-3351.2	Endnote reference corrected by errata (14-1554)
90	NC-3351.3	First endnote reference corrected by errata (14-1554)
90	NC-3351.4	Endnote reference corrected by errata (14-1554)
91	Figure NC-3352-1	Revised editorially
94	Figure NC-3358.1(a)-1	General Notes removed from the graphic by errata and redesignated as Notes (1) through (5) (14-1224)
100	NC-3432.1	In subpara. (c), cross-reference to “NC-1150” revised to “NC-1130” (14-2214)
110	NC-3441.9	In subpara. (a)(3), first sentence, the phrase “Except for flanged joints conforming to (5)” deleted by errata (14-1561)
117	NC-3512.2	Revised (12-503)
131	NC-3642.1	(1) Subparagraph (c) revised (13-621) (2) Former endnote 28 deleted; subsequent endnotes renumbered (13-621)
131	Table NC-3642.1(c)-1	Deleted (13-621)
140	NC-3647.2	(1) Nomenclature re-ordered by errata (14-1533) (2) In definition of S , “ksi” corrected by errata to “psi” (13-1034)
147	NC-3654.2	Subparagraph (a) revised (12-1975, 13-1280)
147	NC-3655	(1) Subparagraph (a)(2) revised (12-1975, 13-1280) (2) In subparas. (b)(2) and (b)(4), definition of S_h added (13-1280) (3) In subpara. (b)(3), definition of M_E revised (13-832)
153	Table NC-3673.2(b)-1	(1) “Run legs” equations for “Branch connection or unreinforced fabricated tee” revised (10-1819) (2) In General Note (a), definition of d_i added, and in Note (9), last sentence added (10-1819)
169	Figure NC-3862(a)-1	Revised editorially
171	Figure NC-3863-1	Revised editorially
167	NC-3911.1	In first sentence, endnote reference corrected by errata (14-1554)
175	Figure NC-3922.1-1	(1) Revised (12-887) (2) Callouts corrected by errata (14-1551) (3) In General Note (a), cross-reference to “Figure ND-3822.1-2” corrected by errata to “Figure NC-3922.1-2” (14-1551)
177	NC-3922.3	In subpara. (a), last two equations for S_{cs} revised, and in subpara. (b), second, fourth, and fifth equations for S_{ca} revised (12-887)
179	Table NC-3923.1-1	Revised (12-887)

<i>Page</i>	<i>Location</i>	<i>Change (Record Number)</i>
186	NC-3933.4	In subpara. (b), eq. (25) for SI units revised (12-887)
187	NC-3933.5(h)	Equation (26) for SI units revised (12-887)
209	NC-4223.1	Revised (13-621)
216	Figure NC-4243.1-1	Revised editorially
222	Figure NC-4244(e)-2	Revised editorially
228	NC-4266	In subpara. (c)(2)(-b), first sentence, cross-reference to “NC-3239.8” corrected by errata to “NC-3237” (14-2229)
231	Figure NC-4266(a)-1	Revised editorially
233	Figure NC-4266(b)-1	Revised editorially
236	Figure NC-4267-1	Revised editorially
237	NC-4324	Cross-references to Section IX, QW-201 and QW-300.20 deleted by errata (14-2229)
242	NC-4424	In first paragraph, cross-reference to “Table NB-3683.2-1” corrected by errata to “Table NC-3673.2(b)-1” (14-2229)
263	NC-5521	Subparagraphs (a), (a)(3), and (a)(4) revised (12-454)
273	NC-6922	In numerator of eq. (3), <i>D</i> corrected by errata to <i>B</i> (14-2353)
276	NC-7111	In subpara. (b), edition year for ASME PTC 25 deleted (14-873)
290	NC-7738	In first sentence, edition year for ASME PTC 25 deleted (14-873)
292	NC-7746	(1) In first sentence, edition year for ASME PTC 25 deleted (14-873) (2) In last sentence, endnote reference corrected by errata (14-1172)
294	NC-7755	(1) In first sentence, edition year for ASME PTC 25 deleted (14-873) (2) In last sentence, endnote reference corrected by errata (14-1172)
296	NC-7764	(1) In first sentence, edition year for ASME PTC 25 deleted (14-873) (2) In last sentence, endnote reference corrected by errata (14-1172)

NOTE: Volume 63 of the Interpretations to Section III, Divisions 1 and 2 of the ASME Boiler and Pressure Vessel Code follows the last page of Subsection NCA.

LIST OF CHANGES IN RECORD NUMBER ORDER

Record Number	Change
10-1819	In Table NC-3673.2(b)-1, revised stress indices and stress intensification factors for branch connections and unreinforced fabricated tees where $r/R \leq 0.5$.
12-454	Incorporated acceptance of the ASNT SNT-TC-1A 2011 standard into NC-5521 and clarified the requirement for the near-vision acuity examination.
12-503	Added standard design rules for socket-welded end and nonwelded end instrument, control, and sampling line valves, NPS 1 (DN 25) and smaller, to NC-3512.2.
12-887	Revised NC-3900.
12-1046	Editorial and stylistic revisions to correct changes made during the XML conversion.
12-1975	In NC-3654.2(a) and NC-3655(a)(2), changed “eqs. NC-3653.1(a)(9a) and NC-3653.1(b)(9b)” to “eq. NC-3653.1(a)(9a)” for appropriate application to Levels C and D Service Limits. Please see the proposal for further information.
13-621	Deleted Table NC-3642.1(c)-1 and replaced it with new Nonmandatory Appendix. Changed references to this Table in NC-3642 and NC-4223 to reference the new Appendix. Deleted NC-4223.1(b).
13-832	Made additions to the definition of M_E in NC-3655(b)(3) to definitively state that it includes weight and inertial loading, which is implied by the initial discussion in these sections but not clearly stated in the definition.
13-860	In the Foreword, the subtitle has been deleted and replaced with an ANSI disclaimer as a footnote.
13-1032	Added a subparagraph to the Organization of Section III, Article 9(d), <i>References to Appendices</i> to add guidance on the use of Nonmandatory Appendices for Section III.
13-1034	Errata correction. See Summary of Changes for details.
13-1280	Changed NC-3654.2(a), NC-3655(a)(2), NC-3655(b)(2), and NC-3655(b)(4) to state that S_h and S_y are taken at a temperature consistent with the load being considered.
13-1943	Errata changes to NC-3358.3 and NC-3358.4.
14-873	In NC-7111(b), NC-7738, NC-7746, NC-7755, and NC-7764, deleted ASME PTC-25 edition year.
14-1172	Errata correction. See Summary of Changes for details.
14-1224	Errata correction. See Summary of Changes for details.
14-1533	Errata correction. See Summary of Changes for details.
14-1551	Errata correction. See Summary of Changes for details.
14-1554	Errata correction. See Summary of Changes for details.
14-1561	Errata correction. See Summary of Changes for details.
14-1713	Revised NC-2126(e).
14-2214	Changed cross-reference to “NC-1150” to “NC-1130” in NC-3432.1(c).
14-2229	Errata correction. See Summary of Changes for details.
14-2353	Errata correction. See Summary of Changes for details.

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

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

Subparagraph Breakdowns/Nested Lists Hierarchy

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

Footnotes

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

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

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

Cross-References

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

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

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ARTICLE NC-1000

INTRODUCTION

NC-1100 SCOPE

(a) Subsection NC contains rules for the material, design, fabrication, examination, testing, overpressure relief, marking, stamping, and preparation of reports by the Certificate Holder for items which are intended to conform to the requirements for Class 2 construction.

(b) The rules of Subsection NC cover the strength and pressure integrity of items the failure of which would violate the pressure-retaining boundary. The rules cover load stresses but do not cover deterioration which may occur in service as a result of corrosion, radiation effects, or instability of materials. NCA-1130 further limits the rules of this Subsection.

(c) Subsection NC does not contain rules to cover all details of construction of Class 2 vessels and storage tanks. Where complete details are not provided in this Subsection, it is intended that the N Certificate Holder, subject to the approval of the Owner or his designee and acceptance by the Inspector, shall provide details of construction which will be consistent with those provided by the rules of this Subsection.

NC-1120 TEMPERATURE LIMITS

Vessels are to be designed using the standard design method in [NC-3300](#) or the alternative design rules of [NC-3200](#), which allows the use of analysis with the higher design stress intensity values of Section II, Part D, Subpart 1, Tables 2A, 2B, and 4.

NC-1130 BOUNDARIES OF JURISDICTION APPLICABLE TO THIS SUBSECTION

NC-1131 Boundary of Components

The Design Specification shall define the boundary of a component to which piping or another component is attached. The boundary shall not be closer to a vessel, tank, pump, or valve than:

(a) the first circumferential joint in welded connections (the connecting weld shall be considered part of the piping);

(b) the face of the first flange in bolted connections (the bolts shall be considered part of the piping);

(c) the first threaded joint in screwed connections.

NC-1132 Boundary Between Components and Attachments

NC-1132.1 Attachments.

(a) An *attachment* is an element in contact with or connected to the inside or outside of the pressure-retaining portion of a component.

(b) Attachments may have either a pressure-retaining function or a nonpressure-retaining function.

(1) Attachments with a pressure-retaining function include items such as:

(-a) pressure boundary stiffeners;

(-b) branch and vessel opening reinforcement.

(2) Attachments with a nonpressure-retaining function include items such as:

(-a) valve guides, thermal sleeves, and turning vanes;

(-b) vessel saddles, support and shear lugs, brackets, pipe clamps, trunnions, skirts, and other items within the component support load path.

(c) Attachments may also have either a structural or nonstructural function.

(1) Attachments with a structural function (structural attachments):

(-a) perform a pressure-retaining function;

(-b) are in the component support load path.

(2) Attachments with a nonstructural function (nonstructural attachments):

(-a) do not perform a pressure-retaining function;

(-b) are not in the component support load path;

(-c) may be permanent or temporary.

Nonstructural attachments include items such as nameplates, insulation supports, and locating and lifting lugs.

NC-1132.2 Jurisdictional Boundary. The jurisdictional boundary between a pressure-retaining component and an attachment defined in the Design Specification shall not be any closer to the pressure-retaining portion of the component than as defined in (a) through (g) below. [Figures NC-1132.2-1](#) through [NC-1132.2-3](#) are provided as an aid in defining the boundary and construction requirements of this Subsection.

(a) Attachments cast or forged with the component and weld buildup on the component surface shall be considered part of the component.

(b) Attachments, welds, and fasteners having a pressure-retaining function shall be considered part of the component.