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SECTION III

Rules for Construction of Nuclear Facility Components

2023 ASME Boiler and Pressure Vessel Code

An International Code

Division 1 — Subsection NCD

Class 2 and Class 3 Components

ASME

SETTING THE STANDARD

AN INTERNATIONAL CODE

2023 ASME Boiler & Pressure Vessel Code

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III

RULES FOR CONSTRUCTION OF NUCLEAR FACILITY COMPONENTS

Division 1 - Subsection NCD

Class 2 and Class 3 Components

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

The American Society of Mechanical Engineers

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TABLE OF CONTENTS

List of Sections xi

Foreword xii

Statement of Policy on the Use of the ASME Single Certification Mark and Code Authorization in Advertising xiv

Statement of Policy on the Use of ASME Marking to Identify Manufactured Items xiv

Personnel xv

Correspondence With the Committee xxxvii

Organization of Section III xxxix

Summary of Changes xliii

Cross-Referencing in the ASME BPVC xlv

Article NCD-1000	**Introduction**	1
NCD-1100	Scope	1
Article NCD-2000	**Material**	6
NCD-2100	General Requirements for Material	6
NCD-2200	Material Test Coupons and Specimens for Ferritic Steel Material	9
NCD-2300	Fracture Toughness Requirements for Material	13
NCD-2400	Welding Material	20
NCD-2500	Examination and Repair of Pressure-Retaining Material	23
NCD-2600	Material Organizations' Quality System Programs	37
NCD-2700	Dimensional Standards	37
Article NCD-3000	**Design**	38
NCD-3100	General Design	38
NCD-3200	Alternative Design Rules for Class 2 Vessels	46
NCD-3300	Vessel Design	78
NCD-3400	Pump Design	117
NCD-3500	Valve Design	143
NCD-3600	Piping Design	152
NCD-3700	Electrical and Mechanical Penetration Assemblies	187
NCD-3800	Design of Atmospheric Storage Tanks	188
NCD-3900	Design of 0 psi to 15 psi (0 kPa to 100 kPa) Storage Tanks	206
Article NCD-4000	**Fabrication and Installation**	241
NCD-4100	General Requirements	241
NCD-4200	Forming, Cutting, and Aligning	242
NCD-4300	Welding Qualifications	281
NCD-4400	Rules Governing Making, Examining, and Repairing Welds	287
NCD-4500	Brazing	293
NCD-4600	Heat Treatment	296
NCD-4700	Mechanical Joints	302

NCD-4800	Expansion Joints	303
Article NCD-5000	**Examination**	304
NCD-5100	General Requirements for Examination	304
NCD-5200	Examination of Welds	306
NCD-5300	Acceptance Standards	311
NCD-5400	For Class 3 Only — Spot Examination of Welded Joints	313
NCD-5500	Qualifications and Certification of Nondestructive Examination Personnel	314
NCD-5600	For Class 2 Only — Final Examination of Components	315
NCD-5700	Examination Requirements for Expansion Joints	315
Article NCD-6000	**Testing**	317
NCD-6100	General Requirements	317
NCD-6200	Hydrostatic Tests	319
NCD-6300	Pneumatic Tests	320
NCD-6400	Pressure Test Gages	320
NCD-6500	Atmospheric and 0 psig to 15 psig (0 kPa gage to 100 kPa gage) Storage Tanks	321
NCD-6600	Special Test Pressure Situations	323
NCD-6900	Proof Tests to Establish Design Pressure	323
Article NCD-7000	**Overpressure Protection**	328
NCD-7100	General Requirements	328
NCD-7200	Overpressure Protection Report	330
NCD-7300	Relieving Capacity Requirements	331
NCD-7400	Set Pressures of Pressure Relief Devices	332
NCD-7500	Operating and Design Requirements for Pressure and Vacuum Relief Valves	332
NCD-7600	Nonreclosing Pressure Relief Devices	337
NCD-7700	Certification	339
NCD-7800	Marking, Stamping With Certification Mark, and Data Reports	341
Article NCD-8000	**Nameplates, Stamping With Certification Mark, and Reports**	343
NCD-8100	General Requirements	343

Figures

NCD-1132.2-1	Attachments in the Component Support Load Path That Do Not Perform a Pressure-Retaining Function	3
NCD-1132.2-2	Attachments That Do Not Perform a Pressure-Retaining Function and Are Not in the Component Support Load Path (Nonstructural Attachments)	4
NCD-1132.2-3	Attachments That Perform a Pressure-Retaining Function	5
NCD-2433.1-1	Weld Metal Delta Ferrite Content	24
NCD-2575.2-1	Typical Pressure-Retaining Parts of Pumps and Valves	35
NCD-3133.4-1	For Class 3 Only — Length L of Some Typical Conical Sections	43
NCD-3133.8-1	Chart for Determining Wall Thickness of Tubes Under External Pressure	47
NCD-3217-1	Example of Acceptable Local Primary Membrane Stress Due to Pressure	51
NCD-3224.6-1	Design Curves for Torispherical Heads and 2:1 Ellipsoidal Heads for Use With NCD-3224.8 and NCD-3224.6	56
NCD-3224.13(b)(6)(-a)-1	Inherent Reinforcement for Large End of Cone–Cylinder Junction	58
NCD-3224.13(b)(6)(-b)-1	Values for Q for Large End of Cone–Cylinder Junction	59

NCD-3224.13(c)(6)(-a)-1 Inherent Reinforcement for Small End of Cone–Cylinder Junction 60
NCD-3224.13(c)(6)(-b)-1 Values for Q for Small End of Cone–Cylinder Junction 61
NCD-3224.13(d)-1 Cone–Cylinder Junction at Small End Treated as Opening 62
NCD-3225-1 Typical Flat Heads and Supported and Unsupported Tubesheets With Hubs 64
NCD-3225-2 Some Acceptable Types of Unstayed Flat Heads and Covers 65
NCD-3225-3 Attachment of Pressure Parts to Plates to Form a Corner Joint 66
NCD-3234.2(a)-1 Nozzle Nomenclature and Dimensions 69
NCD-3239.1(b)-1 Examples of Acceptable Transition Details 70
NCD-3239.4-1 Limits of Reinforcing Zone 72
NCD-3324.2-1 Principal Dimensions of Typical Heads 82
NCD-3324.11(a)(6)-1 Large Head Openings, Reverse Curve, and Conical Shell Reducer Sections 87
NCD-3325-1 Some Acceptable Types of Unstayed Flat Heads and Covers 89
NCD-3326.1-1 Spherically Dished Covers With Bolting Flanges 93
NCD-3329.1(b)-1 Example of Tube Spacing With Pitch of Holes Equal in Every Row . . . 95
NCD-3329.1(b)-2 Example of Tube Spacing With Pitch of Holes Unequal in Every Second Row 95
NCD-3329.1(b)-3 Example of Tube Spacing With Pitch of Holes Varying in Every Second and Third Row 95
NCD-3329.1(d)-1 Example of Tube Spacing With Tube Holes on Diagonal Lines 97
NCD-3329.1(d)-2 Diagram for Determining the Efficiency of Longitudinal and Diagonal Ligaments Between Openings in Cylindrical Shells 98
NCD-3329.1(g)-1 Diagram for Determining Equivalent Longitudinal Efficiency of Diagonal Ligaments 99
NCD-3329.2.1-1 Acceptable Proportions for Ends or Through Stays 100
NCD-3332.2-1 Chart for Determining Value of F 101
NCD-3335.1(b)-1 Some Representative Configurations Describing the t_e Reinforcement Dimension 104
NCD-3335.2-1 Arrangement of Multiple Openings 105
NCD-3335.3(b)-1 Minimum Depth for Flange of Flued Openings 105
NCD-3351-1 Welded Joint Locations Typical of Categories A, B, C, and D 107
NCD-3352-1 Typical Butt Joints 107
NCD-3358.1(a)-1 Heads Attached to Shells 112
NCD-3361.1-1 Butt Welding of Plates of Unequal Thicknesses 115
NCD-3423-1 Typical Single Volute Casing 118
NCD-3423-2 Typical Double Volute Casing 119
NCD-3433.4-1 Minimum Tangential Inlet and Outlet Wall Thickness 120
NCD-3441.1-1 Type A Pump 122
NCD-3441.1-2 Type A Pump 122
NCD-3441.1(a)-1 Type A Pump 123
NCD-3441.2-1 Type B Pump 123
NCD-3441.3-1 Type C Pump 124
NCD-3441.3-2 Type C Pump 125
NCD-3441.4(a)-1 Type D Pump 126
NCD-3441.5-1 Type E Pump 126
NCD-3441.6(a)-1 Type F Pump 126
NCD-3441.7(a)-1 Axially Split Casing, Volute Pump, Type G 126
NCD-3441.7(a)-2 Axially Split Casing, Volute Pump, Type G 127

NCD-3441.7(c)-1	Axially Split Casing, Volute Pump, Type G	127
NCD-3441.7(c)(2)-1	Typical Section of Type G Pumps	128
NCD-3441.7(c)(2)-2	Typical Section of Type G Pumps	128
NCD-3441.7(c)(2)-3	Typical Loads on Type G Pumps	129
NCD-3441.8-1	Longitudinal Section Through Type H Pump	131
NCD-3441.8-2	Transverse Section Through Type H Pump	131
NCD-3441.9-1	Type K Pump	132
NCD-3441.9-2	Type K Pump	133
NCD-3441.10-1	Type L Pump	137
NCD-3441.10-2	Type L Pump Bowl	139
NCD-3441.11-1	Type N Pump	141
NCD-3451(a)-1	Horizontal Single-Acting Power Pump Liquid Ends	142
NCD-3521-1	Typical Sections of Valve Bodies	146
NCD-3591.2-1	Typical Pressure Relief Devices	149
NCD-3591.2-2	Typical Pressure Relief Devices	150
NCD-3595.3-1	Valve Nozzle	151
NCD-3622-1	Examples of Reversing and Nonreversing Dynamic Loads	156
NCD-3643.2(b)-1	Typical Welded Branch Connections	159
NCD-3643.2(b)-2	Typical Right Angle Branch Connections Made Using a Fillet Weld or a Partial Penetration Weld	160
NCD-3643.3(c)(1)-1	Reinforcement of Branch Connections	162
NCD-3643.3(c)(1)-2	Some Representative Configurations Describing the t_e Reinforcement Dimension	163
NCD-3643.4(a)-1	Reinforced Extruded Outlets	164
NCD-3647.2-1	Types of Permanent Blanks	167
NCD-3653.3-1	Reducing or Full Outlet Branch Connections, or Tees	173
NCD-3673.2(b)-2	Branch Connection Nomenclature	186
NCD-3861-1	Roof Manholes	201
NCD-3862(a)-1	Flanged Roof Nozzles	202
NCD-3862(a)-2	Screwed or Socket Weld Roof Nozzles	203
NCD-3863-1	Welded Bottom Outlet Elbow	204
NCD-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	209
NCD-3922.1-2	Reduction of Design Stresses Required to Allow for Biaxial Stresses of Opposite Sign	210
NCD-3932.1-1	Some Typical Free Body Diagrams for Certain Shapes of Tanks	216
NCD-3933.4(a)-1	Compression Ring Region	221
NCD-3933.5(d)-1	Permissible Details of Compression Ring Construction	222
NCD-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 ≤ 300°F	228
NCD-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 ≤ 150°C	229
NCD-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 ≤ 300°F	230

NCD-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 ≤ 150°C	231
NCD-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 ≤ 300°F	232
NCD-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 ≤ 150°C	233
NCD-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 ≤ 300°F	234
NCD-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 ≤ 150°C	235
NCD-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 ≤ 300°F	236
NCD-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 ≤ 150°C	237
NCD-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 ≤ 300°F	238
NCD-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 ≤ 150°C	239
NCD-3947-1	Meridional Straightness Tolerance	240
NCD-4221.1-1	Maximum Difference in Cross-Sectional Diameters	244
NCD-4221.2(a)-1	Maximum Permissible Deviation *e* From a True Circular Form	245
NCD-4221.2(a)-2	Maximum Arc Length for Determining Plus or Minus Deviation	246
NCD-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	248
NCD-4243.1-1	For Class 2 Only — Acceptable Full Penetration Weld Details for Category C Joints	250
NCD-4243.1-2	For Class 2 Only — Attachment of Pressure Parts to Plates to Form a Corner Joint	251
NCD-4243.2-1	For Class 3 Only — Attachment of Pressure Parts to Plates to Form a Corner Joint	252
NCD-4243.3-1	Typical Flat Heads and Supported and Unsupported Tubesheet With Hubs	254
NCD-4244.1-1	Nozzles, Branch, and Piping Connections Joined by Full Penetration Butt Welds	255
NCD-4244.1-2	Nozzles, Branch, and Piping Connections Joined by Full Penetration Corner Welds	256
NCD-4244.1-3	Deposited Weld Metal Used as Reinforcement of Openings for Nozzles, Branch, and Piping Connections	257
NCD-4244.1-4	Some Acceptable Types of Welded Nozzles, Branch, and Piping Connections	258
NCD-4244.1-5	Some Acceptable Types of Welded Nozzles	260
NCD-4244.1-6	Some Acceptable Types of Small Fitting	261

NCD-4244.2-1 Tube Connections 262
NCD-4244.2-2 Some Acceptable Types of Welded Nozzles, and Branch and Piping Connections 263
NCD-4245.2-1 Attachment Welds 265
NCD-4246.1(a)-1 Typical Bottom and Bottom-to-Shell Joints 267
NCD-4246.3-1 Typical Roof and Roof-to-Shell Joints 268
NCD-4246.5-1 Roof Manholes 270
NCD-4246.5-2 Flanged Roof Nozzles 271
NCD-4246.5-3 Screwed or Socket Weld Roof Nozzles 271
NCD-4246.5-4 Welded Bottom Outlet Elbow 272
NCD-4250-1 Welding End Transitions Maximum Envelope 273
NCD-4265-1 Acceptable Full Penetration Details to Form a Corner Joint 275
NCD-4265-2 Acceptable Full Penetration Weld Details for Category C Joints 276
NCD-4266(a)-1 Nozzles Attached by Full Penetration Butt Welds 276
NCD-4266(b)-1 Full Penetration Corner Welded Attachments 277
NCD-4266(c)-1 Pad and Screwed Fitting Types of Welded Nozzles and Other Connections to Shells, Drums, and Headers 278
NCD-4266(d)-1 Partial Penetration Weld Connections 279
NCD-4267-1 Attachments 280
NCD-4427-1 Fillet and Socket Weld Details and Dimensions 290
NCD-4433-1 Types of Attachment Welds 291
NCD-4437.2(b)-1 Some Acceptable Methods of Attaching Stiffening Rings to Shells of Cylindrical Vessels Subjected to External Pressure 292
NCD-4470-1 For Class 3 Only — Welded Stayed Construction 294
NCD-4511-1 Brazed Connections for Appurtenances and Piping 295
NCD-4730-1 Penetration Assembly 303
NCD-4810(c)-1 Permissible Attachment Welds for Bellows 303

Tables

NCD-2311-1 For Class 2 Only — Exemptions From Impact Testing Under NCD-2311(a)(8) 14
NCD-2311-2 For Class 3 Only — Exemptions From Impact Testing Under NCD-2311(a)(9) 15
NCD-2332.1-1 For Class 2 Only — Required C_v Lateral Expansion Values for Pressure-Retaining Material Other Than Bolting Material 16
NCD-2332.1-2 For Class 2 Only — Required C_v Energy Values for Pressure-Retaining Material Other Than Bolting Material 17
NCD-2332.3-1 For Class 2 Only — Required C_v Values for Bolting Material Tested in Accordance With NCD-2332.3 17
NCD-2333.1-1 For Class 3 Only — Required C_v Lateral Expansion Values for Pressure-Retaining Material Other Than Bolting Material 18
NCD-2333.1-2 For Class 3 Only — Required C_v Energy Values for Pressure-Retaining Material Other Than Bolting Material 19
NCD-2333.2-1 For Class 3 Only — Required C_v Values for Bolting Material 19
NCD-2432.1-1 Sampling of Welding Materials for Chemical Analysis 22
NCD-2432.2-1 Welding Material Chemical Analysis 23
NCD-2571.1-1 Required Examinations for Class 2 Castings 30

NCD-2571.2-1 Required Examinations for Class 3 Castings 31
NCD-3215.1(a)-1 Pressure and Temperature Relationships 49
NCD-3217-1 Stress Intensity k Factors for Design and Service Load Combinations . 50
NCD-3239.3(a)-1 Required Minimum Reinforcing Area, A_r 71
NCD-3239.7-1 Stress Indices for Internal Pressure Loading 72
NCD-3266-1 Minimum Number of Pipe Threads for Connections 78
NCD-3321-1 Stress Limits for Design and Service Loadings 79
NCD-3321-2 Classification of Stress in Vessels for Some Typical Cases 80
NCD-3324.2-1 Values of Factor K 83
NCD-3324.8(b)-1 Values of Factor M 85
NCD-3324.11(b)(2)-1 Values of Δ for Junctions at the Large Cylinder for $\alpha \leq 30$ deg 87
NCD-3324.11(b)(3)-1 Values of Δ for Junctions at the Small Cylinder for $\alpha \leq 30$ deg 87
NCD-3332.2-1 Values of Spherical Radius Factor K_1 102
NCD-3361.2.2-1 Minimum Number of Pipe Threads for Connections 115
NCD-3416-1 Stress and Pressure Limits for Design and Service Loadings 118
NCD-3521-1 Service Loading Limits 147
NCD-3592.2(b)-1 Pressure Relief Devices Service Loading Limits 151
NCD-3611.2(e)-1 Stress Range Reduction Factors 152
NCD-3613.4-1 For Class 3 Only — Weld Joint Efficiency Factor 154
NCD-3641.1(a)-1 Values of A 157
NCD-3673.2(b)-1 Stress Indices, Flexibility, and Stress Intensification Factors 181
NCD-3821.5-1 Design and Service Limits 189
NCD-3852.7-1 For Class 3 Aluminum Storage Tanks Only — Allowable Tensile Stresses for Roof Supports 192
NCD-3852.7-2 For Class 3 Aluminum Storage Tanks Only — Allowable Axial Compression Stresses for Roof Supports 193
NCD-3852.7-3 For Class 3 Aluminum Storage Tanks Only — Allowable Bending Stresses for Roof Supports 195
NCD-3852.7-4 For Class 3 Aluminum Storage Tanks Only — Allowable Shear Stresses for Roof Supports 197
NCD-3852.7-5 For Class 3 Aluminum Storage Tanks Only — Allowable Shear and Tension Stresses for Bolts for Roof Supports 198
NCD-3852.7-6 For Class 3 Aluminum Storage Tanks Only — Allowable Bearing Stresses for Bolts for Roof Supports 198
NCD-3861-1 Roof Manholes 202
NCD-3862(a)-1 Flanged Roof Nozzles 202
NCD-3862(a)-2 Screwed or Socket Weld Roof Nozzles 203
NCD-3863-1 Welded Bottom Outlet Elbow 204
NCD-3865-1 Platforms and Walkways 205
NCD-3865-2 Stairways 205
NCD-3865-3 Stairway Rise, Run, and Angle Relationships 206
NCD-3921.8-1 Design and Service Limits for Steel Tanks 207
NCD-3923.1-1 Maximum Allowable Stress Values for Structural Members 212
NCD-3932.2(d)-1 Factors for Determining Values of R_1 and R_2 for 2:1 Ellipsoidal Roofs and Bottoms 217
NCD-3933.5(h)-1 Some Values for k Based on n, θ 224
NCD-4232(a)-1 Maximum Allowable Offset in Final Welded Joints 247

NCD-4245.2-1 264
NCD-4247.6(d)-1 Minimum Size for Fillet Welds 272
NCD-4524-1 Maximum Design Temperatures for Brazing Filler Metal, °F (°C) 296
NCD-4622.1-1 Mandatory Requirements for Postweld Heat Treatment of Welds 298
NCD-4622.4(c)-1 Alternative Holding Temperatures and Times 299
NCD-4622.7(b)-1 Exemptions to Mandatory PWHT 300
NCD-5111.1-1 Thickness, IQI Designations, Essential Holes, and Wire Diameters 304
NCD-5211.2-1 For Class 3 Only — Thickness Above Which Full Radiographic Examination of Butt-Welded Joint Is Mandatory 307

Endnotes 344

LIST OF SECTIONS (23)

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 NCD — Class 2 and Class 3 Components
  - Subsection NE — Class MC Components
  - Subsection NF — Supports
  - Subsection NG — Core Support Structures
- Division 2 — Code for Concrete Containments
- Division 3 — Containment Systems for Transportation and Storage of Spent Nuclear Fuel and High-Level Radioactive Material
- Division 4 — Fusion Energy Devices
- 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 Reactor Facility Components
- Division 1 — Rules for Inspection and Testing of Components of Light-Water-Cooled Plants
- Division 2 — Requirements for Reliability and Integrity Management (RIM) Programs for Nuclear Reactor Facilities

XII Rules for Construction and Continued Service of Transport Tanks

XIII Rules for Overpressure Protection

FOREWORD*

In 1911, The American Society of Mechanical Engineers established the Boiler and Pressure Vessel Committee to formulate standard rules for the construction of steam boilers and other pressure vessels. In 2009, the Boiler and Pressure Vessel Committee was superseded by the following committees:

(a) Committee on Power Boilers (I)
(b) Committee on Materials (II)
(c) Committee on Construction of Nuclear Facility Components (III)
(d) Committee on Heating Boilers (IV)
(e) Committee on Nondestructive Examination (V)
(f) Committee on Pressure Vessels (VIII)
(g) Committee on Welding, Brazing, and Fusing (IX)
(h) Committee on Fiber-Reinforced Plastic Pressure Vessels (X)
(i) Committee on Nuclear Inservice Inspection (XI)
(j) Committee on Transport Tanks (XII)
(k) Committee on Overpressure Protection (XIII)
(l) Technical Oversight Management Committee (TOMC)

Where reference is made to "the Committee" in this Foreword, each of these committees is included individually and collectively.

The Committee's function is to establish rules of safety relating to pressure integrity, which govern the construction** of boilers, pressure vessels, transport tanks, and nuclear components, and the inservice inspection of nuclear components and transport tanks. For nuclear items other than pressure-retaining components, the Committee also establishes rules of safety related to structural integrity. The Committee also interprets these rules when questions arise regarding their intent. The technical consistency of the Sections of the Code and coordination of standards development activities of the Committees is supported and guided by the Technical Oversight Management Committee. This Code does not address other safety issues relating to the construction of boilers, pressure vessels, transport tanks, or nuclear components, or the inservice inspection of nuclear components or transport tanks. Users of the Code should refer to the pertinent codes, standards, laws, regulations, or other relevant documents for safety issues other than those relating to pressure integrity and, for nuclear items other than pressure-retaining components, structural integrity. Except for Sections XI and XII, and with a few other exceptions, the rules do not, of practical necessity, reflect the likelihood and consequences of deterioration in service related to specific service fluids or external operating environments. In formulating the rules, the Committee considers the needs of users, manufacturers, and inspectors of components addressed by the Code. The objective of the rules is to afford reasonably certain protection of life and property, and to provide a margin for deterioration in service to give a reasonably long, safe period of usefulness. Advancements in design and materials and evidence of experience have been recognized.

This Code contains mandatory requirements, specific prohibitions, and nonmandatory guidance for construction activities and inservice inspection and testing activities. The Code does not address all aspects of these activities and those aspects that are not specifically addressed should not be considered prohibited. The Code is not a handbook and cannot replace education, experience, and the use of engineering judgment. The phrase *engineering judgment* refers to technical judgments made by knowledgeable engineers experienced in the application of the Code. Engineering judgments must be consistent with Code philosophy, and such judgments must never be used to overrule mandatory requirements or specific prohibitions of the Code.

The Committee recognizes that tools and techniques used for design and analysis change as technology progresses and expects engineers to use good judgment in the application of these tools. The designer is responsible for complying with Code rules and demonstrating compliance with Code equations when such equations are mandatory. The Code neither requires nor prohibits the use of computers for the design or analysis of components constructed to the requirements of the Code. However, designers and engineers using computer programs for design or analysis are cautioned that they are

* The information contained in this Foreword is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. Therefore, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Code.

** *Construction*, as used in this Foreword, is an all-inclusive term comprising materials, design, fabrication, examination, inspection, testing, certification, and overpressure protection.

responsible for all technical assumptions inherent in the programs they use and the application of these programs to their design.

The rules established by the Committee are not to be interpreted as approving, recommending, or endorsing any proprietary or specific design, or as limiting in any way the manufacturer's freedom to choose any method of design or any form of construction that conforms to the Code rules.

The Committee meets regularly to consider revisions of the rules, new rules as dictated by technological development, Code Cases, and requests for interpretations. Only the Committee has the authority to provide official interpretations of this Code. Requests for revisions, new rules, Code Cases, or interpretations shall be addressed to the Secretary in writing and shall give full particulars in order to receive consideration and action (see Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees). Proposed revisions to the Code resulting from inquiries will be presented to the Committee for appropriate action. The action of the Committee becomes effective only after confirmation by ballot of the Committee and approval by ASME. Proposed revisions to the Code approved by the Committee are submitted to the American National Standards Institute (ANSI) and published at http://go.asme.org/BPVCPublicReview to invite comments from all interested persons. After public review and final approval by ASME, revisions are published at regular intervals in Editions of the Code.

The Committee does not rule on whether a component shall or shall not be constructed to the provisions of the Code. The scope of each Section has been established to identify the components and parameters considered by the Committee in formulating the Code rules.

Questions or issues regarding compliance of a specific component with the Code rules are to be directed to the ASME Certificate Holder (Manufacturer). Inquiries concerning the interpretation of the Code are to be directed to the Committee. ASME is to be notified should questions arise concerning improper use of the ASME Single Certification Mark.

When required by context in this Section, the singular shall be interpreted as the plural, and vice versa, and the feminine, masculine, or neuter gender shall be treated as such other gender as appropriate.

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

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

STATEMENT OF POLICY ON THE USE OF THE ASME SINGLE CERTIFICATION MARK AND CODE AUTHORIZATION IN ADVERTISING

ASME has established procedures to authorize qualified organizations to perform various activities in accordance with the requirements of the ASME Boiler and Pressure Vessel Code. It is the aim of the Society to provide recognition of organizations so authorized. An organization holding authorization to perform various activities in accordance with the requirements of the Code may state this capability in its advertising literature.

Organizations that are authorized to use the ASME Single Certification Mark for marking items or constructions that have been constructed and inspected in compliance with the ASME Boiler and Pressure Vessel Code are issued Certificates of Authorization. It is the aim of the Society to maintain the standing of the ASME Single Certification Mark for the benefit of the users, the enforcement jurisdictions, and the holders of the ASME Single Certification Mark who comply with all requirements.

Based on these objectives, the following policy has been established on the usage in advertising of facsimiles of the ASME Single Certification Mark, Certificates of Authorization, and reference to Code construction. The American Society of Mechanical Engineers does not "approve," "certify," "rate," or "endorse" any item, construction, or activity and there shall be no statements or implications that might so indicate. An organization holding the ASME Single Certification Mark and/or a Certificate of Authorization may state in advertising literature that items, constructions, or activities "are built (produced or performed) or activities conducted in accordance with the requirements of the ASME Boiler and Pressure Vessel Code," or "meet the requirements of the ASME Boiler and Pressure Vessel Code." An ASME corporate logo shall not be used by any organization other than ASME.

The ASME Single Certification Mark shall be used only for stamping and nameplates as specifically provided in the Code. However, facsimiles may be used for the purpose of fostering the use of such construction. Such usage may be by an association or a society, or by a holder of the ASME Single Certification Mark who may also use the facsimile in advertising to show that clearly specified items will carry the ASME Single Certification Mark.

STATEMENT OF POLICY ON THE USE OF ASME MARKING TO IDENTIFY MANUFACTURED ITEMS

The ASME Boiler and Pressure Vessel Code provides rules for the construction of boilers, pressure vessels, and nuclear components. This includes requirements for materials, design, fabrication, examination, inspection, and stamping. Items constructed in accordance with all of the applicable rules of the Code are identified with the ASME Single Certification Mark described in the governing Section of the Code.

Markings such as "ASME," "ASME Standard," or any other marking including "ASME" or the ASME Single Certification Mark shall not be used on any item that is not constructed in accordance with all of the applicable requirements of the Code.

Items shall not be described on ASME Data Report Forms nor on similar forms referring to ASME that tend to imply that all Code requirements have been met when, in fact, they have not been. Data Report Forms covering items not fully complying with ASME requirements should not refer to ASME or they should clearly identify all exceptions to the ASME requirements.

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CORRESPONDENCE WITH THE COMMITTEE (23)

General

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

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

Revisions and Errata

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

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

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

Cases

(a) The most common applications for cases are

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

(2) to provide alternative requirements

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

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

(b) Users are cautioned that not all jurisdictions or owners automatically accept cases. Cases are not to be considered as approving, recommending, certifying, or endorsing any proprietary or specific design, or as limiting in any way the freedom of manufacturers, constructors, or owners to choose any method of design or any form of construction that conforms to the Code.

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

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

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

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

(1) a statement of need and background information

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

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

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

(e) A case is effective for use when the public review process has been completed and it is approved by the cognizant supervisory board. Cases that have been approved will appear in the next edition or supplement of the Code Cases books, "Boilers and Pressure Vessels" or "Nuclear Components." Each Code Cases book is updated with seven Supplements.

Supplements will be sent or made available automatically to the purchasers of the Code Cases books until the next edition of the Code. Annulments of Code Cases become effective six months after the first announcement of the annulment in a Code Case Supplement or Edition of the appropriate Code Case book. The status of any case is available at http://go.asme.org/BPVCCDatabase. An index of the complete list of Boiler and Pressure Vessel Code Cases and Nuclear Code Cases is available at http://go.asme.org/BPVCC.

Interpretations

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

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

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

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

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

Committee Meetings

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

ORGANIZATION OF SECTION III (23)

1 GENERAL

Section III consists of Division 1, Division 2, Division 3, Division 4, and Division 5. These Divisions are broken down into Subsections and are designated by capital letters preceded by the letter “N” for Division 1, by the letter “C” for Division 2, by the letter “W” for Division 3, by the letter "F" for Division 4, and by the letter “H” for Division 5. Each Subsection is published separately, with the exception of those listed for Divisions 2, 3, 4, and 5.

- Subsection NCA — General Requirements for Division 1 and Division 2
- Appendices
- Division 1
  - Subsection NB — Class 1 Components
  - Subsection NCD — Class 2 and Class 3 Components
  - Subsection NE — Class MC Components
  - Subsection NF — Supports
  - Subsection NG — Core Support Structures
- Division 2 — Code for Concrete Containments
  - Subsection CC — Concrete Containments
- Division 3 — Containment Systems for Transportation and Storage of Spent Nuclear Fuel and High-Level Radioactive Material
  - Subsection WA — General Requirements for Division 3
  - Subsection WB — Class TC Transportation Containments
  - Subsection WC — Class SC Storage Containments
  - Subsection WD — Class ISS Internal Support Structures
- Division 4 — Fusion Energy Devices
  - Subsection FA — Fusion Energy Device Facilities
  - Subsection FB — Pressure Boundary Components
- Division 5 — High Temperature Reactors
  - Subsection HA — General Requirements
    - Subpart A — Metallic Materials
    - Subpart B — Graphite Materials
    - Subpart C — Composite Materials
  - Subsection HB — Class A Metallic Pressure Boundary Components
    - Subpart A — Low Temperature Service
    - Subpart B — Elevated Temperature Service
  - Subsection HC — Class B Metallic Pressure Boundary Components
    - Subpart A — Low Temperature Service
    - Subpart B — Elevated Temperature Service
  - Subsection HF — Class A and B Metallic Supports
    - Subpart A — Low Temperature Service
  - Subsection HG — Class SM Metallic Core Support Structures
    - Subpart A — Low Temperature Service
    - Subpart B — Elevated Temperature Service
  - Subsection HH — Class SN Nonmetallic Core Components
    - Subpart A — Graphite Materials
    - Subpart B — Composite Materials

2 SUBSECTIONS

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

3 ARTICLES

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

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

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

4 SUBARTICLES

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

5 SUBSUBARTICLES

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

6 PARAGRAPHS

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

7 SUBPARAGRAPHS

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

8 SUBSUBPARAGRAPHS

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

9 REFERENCES

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

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

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

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

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

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

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

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

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

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

(3) Dimensional and other types of standards covering products such as valves, flanges, and fittings are also published by the Manufacturers Standardization Society of the Valve and Fittings Industry and are known as Standard Practices. When a product is required by these rules to conform to a Standard Practice, for example MSS SP-100, the Standard Practice referred to is published by the Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS), 127 Park Street, NE, Vienna, VA 22180. The applicable year of issue of such a Standard Practice is that suffixed to its numerical designation in Table NCA-7100-1, for example MSS SP-58-2009.

(4) Specifications for welding and brazing materials are published by the American Welding Society (AWS), 8669 NW 36 Street, No. 130, Miami, FL 33166. Specifications of this type are incorporated in Section II and are identified by the AWS designation with the prefix "SF," for example SFA-5.1.

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

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

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

* 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.

(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.

SUMMARY OF CHANGES

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

Page	*Location*	*Change*
xi	List of Sections	(1) Under Section III, Division 4 added (2) Title of Section XI and subtitle of Section XI, Division 2 revised (3) Information on interpretations and Code cases moved to "Correspondence With the Committee"
xv	Personnel	Updated
xxxvii	Correspondence With the Committee	Added (replaces "Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees")
xxxix	Organization of Section III	In para. 1, Division 4 added
xlv	Cross-Referencing in the ASME BPVC	Updated
6	NCD-2121	Subparagraph (a) revised
8	NCD-2131	First and second sentences revised
8	NCD-2132	First and second sentences revised
9	NCD-2160	Last sentence added
14	NCD-2321.2	Revised
37	NCD-2610	(1) Subparagraphs (a) and (b) revised (2) Subparagraph (d) added
39	NCD-3125	Revised
51	Figure NCD-3217-1	In Legend, definitions of P_L and P_m revised
67	NCD-3232.1	Subparagraph (c) revised
70	Figure NCD-3239.1(b)-1	Revised
72	Figure NCD-3239.4-1	Revised
77	NCD-3262.1	Last sentence corrected by errata
80	Table NCD-3321-2	Second page of table reinstated (page was inadvertently omitted in 2021 edition)
88	NCD-3325.2	Subparagraph (a) corrected by errata
140	NCD-3450	Title corrected from "Design of Class 2 Reciprocating Pumps" to "Design of Reciprocating Pumps" by errata
148	NCD-3595.1	Reference to ASME B16.5 tables corrected by errata
242	NCD-4125	Cross-reference for brazing material requirements corrected by errata
283	NCD-4335	Revised
284	NCD-4335.1	Subparagraph (a) revised
284	NCD-4335.2	Subparagraph (a) revised
287	NCD-4413	Added
287	NCD-4423.1	Revised
287	NCD-4423.2	Revised
288	NCD-4423.3	Revised
290	Figure NCD-4427-1	Sketch (c-1) revised
292	NCD-4451	First sentence revised
298	Table NCD-4622.1-1	Spanning column heading revised
297	NCD-4622.3	Last sentence revised
300	Table NCD-4622.7(b)-1	Entries for P-No. 9A Gr. 1 and P-No. 9B Gr. 1 combined and revised
311	NCD-5321	Subparagraph (a)(4) revised
314	NCD-5510	Revised
315	NCD-5540	Added
317	NCD-6112.1	Subparagraph (c) added

Page	*Location*	*Change*
321	NCD-6412	Subparagraph (b) revised
321	NCD-6413	Revised

CROSS-REFERENCING IN THE ASME BPVC (23)

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

(a) Hierarchy of Subparagraph Breakdowns

(1) First-level breakdowns are designated as (a), (b), (c), etc.

(2) Second-level breakdowns are designated as (1), (2), (3), etc.

(3) Third-level breakdowns are designated as (-a), (-b), (-c), etc.

(4) Fourth-level breakdowns are designated as (-1), (-2), (-3), etc.

(5) Fifth-level breakdowns are designated as (+a), (+b), (+c), etc.

(6) Sixth-level breakdowns are designated as (+1), (+2), etc.

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

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

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

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

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

ARTICLE NCD-1000
INTRODUCTION

NCD-1100 SCOPE

NCD-1110 ASPECTS OF CONSTRUCTION COVERED BY THESE RULES

(a) Subsection NCD contains rules for the material, design, fabrication, examination, testing, overpressure relief, marking, stamping, and preparation of reports by the Certificate Holder for items that are intended to conform to the requirements for Class 2 or Class 3 construction.

(b) The rules of Subsection NCD cover the requirements for 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 that 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 NCD does not contain rules to cover all details of construction of Class 2 or Class 3 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 its designee and acceptance by the Inspector, shall provide details of construction that will be consistent with those provided by the rules of this Subsection.

(d) Class 2 vessels are to be designed using the standard design method in NCD-3300 or the alternative design rules of NCD-3200, which allow the use of analysis with the higher design stress intensity values of Section II, Part D, Subpart 1, Tables 2A, 2B, and 4.

NCD-1120 TEMPERATURE LIMITS

The rules of Subsection NCD shall not be used for items that are to be subjected to metal temperatures that exceed the temperature limit in the applicability column shown in Section II, Part D, Subpart 1, Tables 1A, 1B, and 3 for design stress values or in Section II, Part D, Subpart 1, Tables 2A, 2B, and 4 for design stress intensity values for Class 2 vessels designed to the alternative design rules of NCD-3200. For vessels operating beyond the temperature limits referenced above, the creep and stress rupture characteristics of materials permitted to be used become significant factors that are not presently covered by the rules of this Subsection. Fatigue design curves and specified methods for fatigue analysis are not applicable above 700°F (370°C) for materials covered by Section III Appendices, Mandatory Appendix I, Figures I-9.1 and I-9.4 and above 800°F (425°C) for materials covered by Section III Appendices, Mandatory Appendix I, Figures I-9.2 and I-9.3.

NCD-1130 BOUNDARIES OF JURISDICTION APPLICABLE TO THIS SUBSECTION

NCD-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.

NCD-1132 Boundary Between Components and Attachments

NCD-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 non-pressure-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 non-pressure-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.

NCD-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 NCD-1132.2-1 through NCD-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.

(c) Except as provided in (d) and (e) below, the boundary between a pressure-retaining component and an attachment not having a pressure-retaining function shall be at the surface of the component.

(d) The first connecting weld of a non-pressure-retaining structural attachment to a component shall be considered part of the component unless the weld is more than $2t$ from the pressure-retaining portion of the component, where t is the nominal thickness of the pressure-retaining material. Beyond $2t$ from the pressure-retaining portion of the component, the first weld shall be considered part of the attachment.

(e) The first connecting weld of a welded nonstructural attachment to a component shall be considered part of the attachment. At or within $2t$ from the pressure-retaining portion of the component the first connecting weld shall conform to NCD-4430.

(f) Mechanical fasteners used to connect a non-pressure-retaining attachment to the component shall be considered part of the attachment.

(g) The boundary may be located further from the pressure-retaining portion of the component than as defined in (a) through (f) above when specified in the Design Specification.