

SECTION VIII

Rules for Construction of Pressure Vessels

2021

ASME Boiler and
Pressure Vessel Code
An International Code

Division 1

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AN INTERNATIONAL CODE

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VIII RULES FOR CONSTRUCTION OF PRESSURE VESSELS

Division 1

ASME Boiler and Pressure Vessel Committee
on Pressure Vessels



The American Society of
Mechanical Engineers

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TABLE OF CONTENTS

List of Sections		xxxi
Foreword		xv
Statement of Policy on the Use of the ASME Single Certification Mark and Code Authorization in Advertising		xvi
Statement of Policy on the Use of ASME Marking to Identify Manufactured Items		xxxvii
Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees		xxxviii
Personnel		xli
Summary of Changes		lxii
List of Changes in Record Number Order		lxix
Cross-Referencing and Stylistic Changes in the Boiler and Pressure Vessel Code		lxx
Introduction		1
U-1	Scope	1
U-2	General	3
U-3	Standards Referenced by This Division	4
U-4	Units of Measurement	4
U-5	Tolerances	5
Subsection A	General Requirements	8
Part UG	General Requirements for All Methods of Construction and All Materials	8
UG-1	Scope	8
	Materials	8
UG-4	General	8
UG-5	Plate	9
UG-6	Forgings	9
UG-7	Castings	9
UG-8	Pipes and Tubes	9
UG-9	Welding Materials	10
UG-10	Material Identified With or Produced to a Specification Not Permitted by This Division, and Material Not Fully Identified	10
UG-11	Prefabricated or Preformed Pressure Parts Furnished Without a Certification Mark	11
UG-12	Bolts and Studs	13
UG-13	Nuts and Washers	14
UG-14	Rods and Bars	14
UG-15	Product Specification	14
	Design	15
UG-16	General	15
UG-17	Methods of Fabrication in Combination	15
UG-18	Materials in Combination	16
UG-19	Special Constructions	16
UG-20	Design Temperature	16
UG-21	Design Pressure	17
UG-22	Loadings	17
UG-23	Maximum Allowable Stress Values	17
UG-24	Castings	19
UG-25	Corrosion	20
UG-26	Linings	20
UG-27	Thickness of Shells Under Internal Pressure	20
UG-28	Thickness of Shells and Tubes Under External Pressure	21

UG-29	Stiffening Rings for Cylindrical Shells Under External Pressure ..	25
UG-30	Attachment of Stiffening Rings	26
UG-31	Tubes, and Pipe When Used as Tubes or Shells	30
UG-32	Formed Heads, and Sections, Pressure on Concave Side	30
UG-33	Formed Heads, Pressure on Convex Side	31
UG-34	Unstayed Flat Heads and Covers	34
UG-35	Other Types of Closures	38
	Openings and Reinforcements	39
UG-36	Openings in Pressure Vessels	39
UG-37	Reinforcement Required for Openings in Shells and Formed Heads	42
UG-38	Flued Openings in Shells and Formed Heads	46
UG-39	Reinforcement Required for Openings in Flat Heads and Covers ..	46
UG-40	Limits of Reinforcement	48
UG-41	Strength of Reinforcement	51
UG-42	Reinforcement of Multiple Openings	51
UG-43	Methods of Attachment of Pipe and Nozzle Necks to Vessel Walls	53
UG-44	Flanges and Pipe Fittings	55
UG-45	Nozzle Neck Thickness	56
UG-46	Inspection Openings	57
	Braced and Stayed Surfaces	58
UG-47	Braced and Stayed Surfaces	58
UG-48	Staybolts	59
UG-49	Location of Staybolts	59
UG-50	Dimensions of Staybolts	59
	Ligaments	60
UG-53	Ligaments	60
UG-54	Supports	62
UG-55	Lugs for Platforms, Ladders, and Other Attachments to Vessel Walls	62
	Fabrication	62
UG-75	General	62
UG-76	Cutting Planes and Other Stock	62
UG-77	Material Identification (see UG-85)	62
UG-78	Repair of Defects in Materials	65
UG-79	Forming Pressure Parts	65
UG-80	Permissible Out-of-Roundness of Cylindrical, Conical, and Spheri- cal Shells	65
UG-81	Tolerance for Formed Heads	67
UG-82	Lugs and Fitting Attachments	67
UG-83	Holes for Screw Stays	68
UG-84	Charpy Impact Tests	68
UG-85	Heat Treatment	74
	Inspection and Tests	75
UG-90	General	75
UG-91	The Inspector	76
UG-92	Access for Inspector	76
UG-93	Inspection of Materials	76
UG-94	Marking on Materials	77
UG-95	Examination of Surfaces During Fabrication	77
UG-96	Dimensional Check of Component Parts	78
UG-97	Inspection During Fabrication	78
UG-98	Maximum Allowable Working Pressure	78
UG-99	Standard Hydrostatic Test	78
UG-100	Pneumatic Test (see UW-50)	80
UG-101	Proof Tests to Establish Maximum Allowable Working Pressure ..	81

UG-102	Test Gages	86
UG-103	Nondestructive Testing	86
	Marking and Reports	86
UG-115	General	86
UG-116	Required Marking	87
UG-117	Certificates of Authorization and Certification Marks	88
UG-118	Methods of Marking	89
UG-119	Nameplates	90
UG-120	Data Reports	91
	Overpressure Protection	93
UG-150	General Requirements	93
UG-151	Responsibilities	93
UG-152	Determination of Pressure Relieving Requirements	93
UG-153	Overpressure Limits	94
UG-154	Permitted Pressure Relief Devices and Methods	94
UG-155	Pressure Settings and Performance Requirements	95
UG-156	Installation	96
Subsection B	Requirements Pertaining to Methods of Fabrication of Pressure Vessels	97
Part UW	Requirements for Pressure Vessels Fabricated by Welding ..	97
	General	97
UW-1	Scope	97
UW-2	Service Restrictions	97
UW-3	Welded Joint Category	98
	Materials	99
UW-5	General	99
UW-6	Nonmandatory Guidelines for Welding Material Selections	100
	Design	100
UW-8	General	100
UW-9	Design of Welded Joints	100
UW-10	Postweld Heat Treatment	102
UW-11	Radiographic and Ultrasonic Examination	102
UW-12	Joint Efficiencies	103
UW-13	Attachment Details	104
UW-14	Openings in or Adjacent to Welds	113
UW-15	Welded Connections	114
UW-16	Minimum Requirements for Attachment Welds at Openings	115
UW-17	Plug Welds	124
UW-18	Fillet Welds	124
UW-19	Welded Stayed Construction	125
UW-20	Tube-to-Tubesheet Welds	126
UW-21	ASME B16.5 Socket and Slip-on Flange Welds	129
	Fabrication	129
UW-26	General	129
UW-27	Welding Processes	130
UW-28	Qualification of Welding Procedure	130
UW-29	Tests of Welders and Welding Operators	131
UW-30	Lowest Permissible Temperatures for Welding	131
UW-31	Cutting, Fitting, and Alignment	131
UW-32	Cleaning of Surfaces to Be Welded	132
UW-33	Alignment Tolerance	132
UW-34	Spin-Holes	132
UW-35	Finished Longitudinal and Circumferential Joints	132
UW-36	Fillet Welds	133
UW-37	Miscellaneous Welding Requirements	133

UW-38	Repair of Weld Defects	134
UW-39	Peening	134
UW-40	Procedures for Postweld Heat Treatment	134
UW-41	Sectioning of Welded Joints	136
UW-42	Surface Weld Metal Buildup	136
	Inspection and Tests	136
UW-46	General	136
UW-47	Check of Welding Procedure	136
UW-48	Check of Welder and Welding Operator Qualifications	136
UW-49	Check of Postweld Heat Treatment Practice	136
UW-50	Nondestructive Examination of Welds on Pneumatically Tested Vessels	136
UW-51	Radiographic Examination of Welded Joints	137
UW-52	Spot Examination of Welded Joints	137
UW-53	Ultrasonic Examination of Welded Joints	138
UW-54	Qualification of Nondestructive Examination Personnel	139
	Marking and Reports	139
UW-60	General	139
Part UF	Requirements for Pressure Vessels Fabricated by Forging ..	140
	General	140
UF-1	Scope	140
	Materials	140
UF-5	General	140
UF-6	Forgings	140
UF-7	Forged Steel Rolls Used for Corrugating Paper Machinery	140
	Design	140
UF-12	General	140
UF-13	Head Design	140
UF-25	Corrosion Allowance	141
	Fabrication	141
UF-26	General	141
UF-27	Tolerances on Forgings	141
UF-28	Methods of Forming Forged Heads	141
UF-29	Tolerances on Forged Heads	141
UF-30	Localized Thin Areas	141
UF-31	Heat Treatment	141
UF-32	Welding for Fabrication	142
UF-37	Repair of Defects in Material	143
UF-38	Repair of Weld Defects	143
UF-43	Attachment of Threaded Nozzles to Integrally Forged Necks and Thickened Heads on Vessels	144
	Inspection and Tests	144
UF-45	General	144
UF-46	Acceptance by Inspector	144
UF-47	Parts Forging	144
UF-52	Check of Heat Treatment and Postweld Heat Treatment	144
UF-53	Test Specimens	144
UF-54	Tests and Retests	144
UF-55	Ultrasonic Examination	144
	Marking and Reports	145
UF-115	General	145
Part UB	Requirements for Pressure Vessels Fabricated by Brazing ..	146
	General	146
UB-1	Scope	146
UB-2	Elevated Temperature	146

UB-3	Service Restrictions	146
	Materials	146
UB-5	General	146
UB-6	Brazing Filler Metals	147
UB-7	Fluxes and Atmospheres	147
	Design	147
UB-9	General	147
UB-10	Strength of Brazed Joints	147
UB-11	Qualification of Brazed Joints for Design Temperatures Up to the Maximum Shown in Column 1 of Table UB-2	147
UB-12	Qualification of Brazed Joints for Design Temperatures in the Range Shown in Column 2 of Table UB-2	147
UB-13	Corrosion	147
UB-14	Joint Efficiency Factors	147
UB-15	Application of Brazing Filler Metal	147
UB-16	Permissible Types of Joints	148
UB-17	Joint Clearance	149
UB-18	Joint Brazing Procedure	149
UB-19	Openings	149
UB-20	Nozzles	150
UB-21	Brazed Connections	150
UB-22	Low Temperature Operation	150
	Fabrication	150
UB-30	General	150
UB-31	Qualification of Brazing Procedure	150
UB-32	Qualification of Brazer and Brazing Operators	151
UB-33	Buttstraps	151
UB-34	Cleaning of Surfaces to Be Brazed	151
UB-35	Clearance Between Surfaces to Be Brazed	151
UB-36	Postbrazing Operations	151
UB-37	Repair of Defective Brazing	151
	Inspection and Tests	151
UB-40	General	151
UB-41	Inspection During Fabrication	151
UB-42	Procedure	151
UB-43	Brazer and Brazing Operator	152
UB-44	Visual Examination	152
UB-50	Exemptions	152
	Marking and Reports	152
UB-55	General	152
Subsection C	Requirements Pertaining to Classes of Materials	153
Part UCS	Requirements for Pressure Vessels Constructed of Carbon and Low Alloy Steels	153
	General	153
UCS-1	Scope	153
	Materials	153
UCS-2	General	153
UCS-6	Steel Plates	153
UCS-7	Steel Forgings	154
UCS-8	Steel Castings	154
UCS-9	Steel Pipe and Tubes	154
UCS-10	Bolt Materials	154
UCS-11	Nuts and Washers	154
UCS-12	Bars and Shapes	154
	Design	154

UCS-16	General	154
UCS-19	Welded Joints	155
UCS-23	Maximum Allowable Stress Values	155
UCS-27	Shells Made From Pipe	155
UCS-28	Thickness of Shells Under External Pressure	155
UCS-29	Stiffening Rings for Shells Under External Pressure	155
UCS-30	Attachment of Stiffening Rings to Shell	155
UCS-33	Formed Heads, Pressure on Convex Side	155
UCS-56	Requirements for Postweld Heat Treatment	155
UCS-57	Radiographic Examination	167
	Low Temperature Operation	167
UCS-65	Scope	167
UCS-66	Materials	167
UCS-67	Impact Tests of Welding Procedures	183
UCS-68	Design	184
	Fabrication	184
UCS-75	General	184
UCS-79	Forming Pressure Parts	184
UCS-85	Heat Treatment of Test Specimens	185
	Inspection and Tests	186
UCS-90	General	186
	Marking and Reports	186
UCS-115	General	186
Nonmandatory Appendix UCS-A		187
UCS-A-1	General	187
UCS-A-2	Creep-Rupture Properties of Carbon Steels	187
UCS-A-3	Vessels Operating at Temperatures Colder Than the MDMT Stamped on the Nameplate	187
Part UNF	Requirements for Pressure Vessels Constructed of Nonferrous Materials	188
	General	188
UNF-1	Scope	188
UNF-3	Uses	188
UNF-4	Conditions of Service	188
	Materials	188
UNF-5	General	188
UNF-6	Nonferrous Plate	188
UNF-7	Forgings	188
UNF-8	Castings	188
UNF-12	Bolt Materials	188
UNF-13	Nuts and Washers	189
UNF-14	Rods, Bars, and Shapes	189
UNF-15	Other Materials	189
	Design	189
UNF-16	General	189
UNF-19	Welded Joints	189
UNF-23	Maximum Allowable Stress Values	189
UNF-28	Thickness of Shells Under External Pressure	192
UNF-30	Stiffening Rings	192
UNF-33	Formed Heads, Pressure on Convex Side	192
UNF-56	Postweld Heat Treatment	192
UNF-57	Radiographic Examination	193
UNF-58	Liquid Penetrant Examination	193
UNF-65	Low Temperature Operation	193
	Fabrication	193

UNF-75	General	193
UNF-77	Forming Shell Sections and Heads	194
UNF-78	Welding	194
UNF-79	Requirements for Postfabrication Heat Treatment Due to Straining	194
	Inspection and Tests	194
UNF-90	General	194
UNF-91	Requirements for the Image Quality Indicator	194
UNF-95	Welding Test Plates	194
	Marking and Reports	194
UNF-115	General	194
Nonmandatory Appendix UNF-A	Characteristics of the Nonferrous Materials	196
UNF-A-1	Purpose	196
UNF-A-2	General	196
UNF-A-3	Properties	196
UNF-A-4	Magnetic Properties	196
UNF-A-5	Elevated Temperature Effects	196
UNF-A-6	Low Temperature Behavior	196
UNF-A-7	Thermal Cutting	196
UNF-A-8	Machining	196
UNF-A-9	Gas Welding	196
UNF-A-10	Metal Arc Welding	197
UNF-A-11	Inert Gas Metal Arc Welding	197
UNF-A-12	Resistance Welding	197
UNF-A-13	Corrosion	197
UNF-A-14	Special Comments	197
Part UHA	Requirements for Pressure Vessels Constructed of High Alloy Steel	198
	General	198
UHA-1	Scope	198
UHA-5	Uses	198
UHA-6	Conditions of Service	198
UHA-8	Material	198
	Materials	198
UHA-11	General	198
UHA-12	Bolt Materials	198
UHA-13	Nuts and Washers	198
	Design	199
UHA-20	General	199
UHA-21	Welded Joints	199
UHA-23	Maximum Allowable Stress Values	199
UHA-28	Thickness of Shells Under External Pressure	199
UHA-29	Stiffening Rings for Shells Under External Pressure	199
UHA-30	Attachment of Stiffening Rings to Shell	199
UHA-31	Formed Heads, Pressure on Convex Side	199
UHA-32	Requirements for Postweld Heat Treatment	199
UHA-33	Radiographic Examination	206
UHA-34	Liquid Penetrant Examination	206
	Fabrication	206
UHA-40	General	206
UHA-42	Weld Metal Composition	206
UHA-44	Requirements for Postfabrication Heat Treatment Due to Straining	206
	Inspection and Tests	208
UHA-50	General	208

UHA-51	Impact Tests	208
UHA-52	Welded Test Plates	211
	Marking and Reports	211
UHA-60	General	211
Nonmandatory Appendix UHA-A	Suggestions on the Selection and Treatment of Austenitic Chromium-Nickel and Ferritic and Martensitic High Chromium Steels	212
UHA-A-1	General	212
UHA-A-2	Dissimilar Weld Metal	212
UHA-A-3	Fabrication	212
UHA-A-4	Relaxation Cracking	212
Part UCI	Requirements for Pressure Vessels Constructed of Cast Iron	214
	General	214
UCI-1	Scope	214
UCI-2	Service Restrictions	214
UCI-3	Pressure-Temperature Limitations	214
	Materials	214
UCI-5	General	214
UCI-12	Bolt Materials	214
	Design	214
UCI-16	General	214
UCI-23	Maximum Allowable Stress Values	214
UCI-28	Thickness of Shells Under External Pressure	215
UCI-29	Dual Metal Cylinders	215
UCI-32	Heads With Pressure on Concave Side	215
UCI-33	Heads With Pressure on Convex Side	215
UCI-35	Spherically Shaped Covers (Heads)	215
UCI-36	Openings and Reinforcements	215
UCI-37	Corners and Fillets	216
	Fabrication	216
UCI-75	General	216
UCI-78	Repairs in Cast Iron Materials	216
	Inspection and Tests	217
UCI-90	General	217
UCI-99	Standard Hydrostatic Test	217
UCI-101	Hydrostatic Test to Destruction	217
	Marking and Reports	217
UCI-115	General	217
Part UCL	Requirements for Welded Pressure Vessels Constructed of Material With Corrosion Resistant Integral Cladding, Weld Metal Overlay Cladding, or Applied Linings	218
	General	218
UCL-1	Scope	218
UCL-2	Methods of Fabrication	218
UCL-3	Conditions of Service	218
	Materials	218
UCL-10	General	218
UCL-11	Integral and Weld Metal Overlay Clad Material	218
UCL-12	Lining	219
	Design	219
UCL-20	General	219
UCL-23	Maximum Allowable Stress Values	219
UCL-24	Maximum Allowable Working Temperature	220
UCL-25	Corrosion of Cladding or Lining Material	220
UCL-26	Thickness of Shells and Heads Under External Pressure	220

UCL-27	Low Temperature Operations	220
	Fabrication	220
UCL-30	General	220
UCL-31	Joints in Integral or Weld Metal Overlay Cladding and Applied Linings	220
UCL-32	Weld Metal Composition	220
UCL-33	Inserted Strips in Clad Material	220
UCL-34	Postweld Heat Treatment	221
UCL-35	Radiographic Examination	221
UCL-36	Examination of Chromium Stainless Steel Cladding or Lining	221
UCL-40	Welding Procedures	221
UCL-42	Alloy Welds in Base Metal	221
UCL-46	Fillet Welds	221
	Inspection and Tests	222
UCL-50	General	222
UCL-51	Tightness of Applied Lining	222
UCL-52	Hydrostatic Test	222
	Marking and Reports	222
UCL-55	General	222
Part UCD	Requirements for Pressure Vessels Constructed of Cast Ductile Iron	223
	General	223
UCD-1	Scope	223
UCD-2	Service Restrictions	223
UCD-3	Pressure-Temperature Limitations	223
	Materials	223
UCD-5	General	223
UCD-12	Bolt Materials	223
	Design	223
UCD-16	General	223
UCD-23	Maximum Allowable Stress Values	223
UCD-28	Thickness of Shells Under External Pressure	223
UCD-32	Heads With Pressure on Concave Side	224
UCD-33	Heads With Pressure on Convex Side	224
UCD-35	Spherically Shaped Covers (Heads)	224
UCD-36	Openings and Reinforcements	224
UCD-37	Corners and Fillets	224
	Fabrication	224
UCD-75	General	224
UCD-78	Repairs in Cast Ductile Iron Material	224
	Inspection and Tests	225
UCD-90	General	225
UCD-99	Standard Hydrostatic Test	225
UCD-101	Hydrostatic Test to Destruction	226
	Marking and Reports	226
UCD-115	General	226
Part UHT	Requirements for Pressure Vessels Constructed of Ferritic Steels With Tensile Properties Enhanced by Heat Treatment	227
	General	227
UHT-1	Scope	227
	Materials	227
UHT-5	General	227
UHT-6	Test Requirements	227
	Design	228

UHT-16	General	228
UHT-17	Welded Joints	228
UHT-18	Nozzles	229
UHT-19	Conical Sections	229
UHT-20	Joint Alignment	229
UHT-23	Maximum Allowable Stress Values	229
UHT-25	Corrosion Allowance	232
UHT-27	Thickness of Shells Under External Pressure	232
UHT-28	Structural Attachments and Stiffening Rings	232
UHT-29	Stiffening Rings for Shells Under External Pressure	232
UHT-30	Attachment of Stiffening Rings to Shells	232
UHT-32	Formed Heads, Pressure on Concave Side	232
UHT-33	Formed Heads, Pressure on Convex Side	233
UHT-34	Hemispherical Heads	233
UHT-40	Materials Having Different Coefficients of Expansion	233
UHT-56	Postweld Heat Treatment	233
UHT-57	Examination	233
	Fabrication	234
UHT-75	General	234
UHT-79	Forming Pressure Parts	234
UHT-80	Heat Treatment	235
UHT-81	Heat Treatment Verification Tests	235
UHT-82	Welding	235
UHT-83	Methods of Metal Removal	237
UHT-84	Weld Finish	237
UHT-85	Structural and Temporary Welds	237
UHT-86	Marking on Plates and Other Materials	237
	Inspection and Tests	237
UHT-90	General	237
	Marking and Reports	237
UHT-115	General	237
Part ULW	Requirements for Pressure Vessels Fabricated by Layered Construction	238
	Introduction	238
ULW-1	Scope	238
ULW-2	Nomenclature	238
	Material	238
ULW-5	General	238
	Design	238
ULW-16	General	238
ULW-17	Design of Welded Joints	241
ULW-18	Nozzle Attachments and Opening Reinforcement	249
ULW-20	Welded Joint Efficiency	249
ULW-22	Attachments	249
ULW-26	Postweld Heat Treatment	249
	Welding	253
ULW-31	Welded Joints	253
ULW-32	Welding Procedure Qualification	253
ULW-33	Performance Qualification	253
	Nondestructive Examination of Welded Joints	253
ULW-50	General	253
ULW-51	Inner Shells and Inner Heads	253
ULW-52	Layers — Welded Joints	253
ULW-53	Layers — Step Welded Girth Joints	255
ULW-54	Butt Joints	255
ULW-55	Flat Head and Tubesheet Weld Joints	256

ULW-56	Nozzle and Communicating Chambers Weld Joints	256
ULW-57	Random Spot Examination and Repairs of Weld	257
	Fabrication	259
ULW-75	General	259
ULW-76	Vent Holes	259
ULW-77	Contact Between Layers	259
ULW-78	Alternative to Measuring Contact Between Layers During Construction	259
	Inspection and Testing	260
ULW-90	General	260
	Marking and Reports	260
ULW-115	General	260
Part ULT	Alternative Rules for Pressure Vessels Constructed of Mate- rials Having Higher Allowable Stresses at Low Temperature	261
	General	261
ULT-1	Scope	261
ULT-2	Conditions of Service	261
ULT-5	General	261
	Design	262
ULT-16	General	262
ULT-17	Welded Joints	262
ULT-18	Nozzles and Other Connections	262
ULT-23	Maximum Allowable Stress Values	262
ULT-27	Thickness of Shells	262
ULT-28	Thickness of Shells Under External Pressure	262
ULT-29	Stiffening Rings for Shells Under External Pressure	262
ULT-30	Structural Attachments	262
ULT-56	Postweld Heat Treatment	266
ULT-57	Examination	266
	Fabrication	266
ULT-75	General	266
ULT-79	Forming Shell Sections and Heads	266
ULT-82	Welding	266
ULT-86	Marking on Plate and Other Materials	267
	Inspection and Tests	269
ULT-90	General	269
ULT-99	Hydrostatic Test	269
ULT-100	Pneumatic Test	269
	Marking and Reports	269
ULT-115	General	269
	Overpressure Protection	269
ULT-125	General	269
Part UHX	Rules for Shell-and-Tube Heat Exchangers	270
UHX-1	Scope	270
UHX-2	Materials and Methods of Fabrication	270
UHX-3	Terminology	270
UHX-4	Design	270
UHX-5	Tube-sheet Design Definitions	273
UHX-8	Tube-sheet Effective Bolt Load, W^*	276
UHX-9	Tube-sheet Extension	276
UHX-10	General Conditions of Applicability for Tube-sheets	277
UHX-11	Tube-sheet Characteristics	278
UHX-12	Rules for the Design of U-Tube Tube-sheets	280
UHX-13	Rules for the Design of Fixed Tube-sheets	290

UHX-14	Rules for the Design of Floating Tubesheets	304
UHX-16	Bellows Expansion Joints	314
UHX-17	Flexible Shell Element Expansion Joints	315
UHX-18	Pressure Test Requirements	316
UHX-19	Heat Exchanger Marking and Reports	316
UHX-20	Examples	317
Part UIG	Requirements for Pressure Vessels Constructed of Impreg-	
	nated Graphite	318
	Nonmandatory Introduction	318
	General	318
UIG-1	Scope	318
UIG-2	Equipment and Service Limitations	318
UIG-3	Terminology	319
	Materials	319
UIG-5	Raw Material Control	319
UIG-6	Certified Material Control	319
UIG-7	Additional Properties	320
UIG-8	Tolerances for Impregnated Graphite Tubes	320
	Design	320
UIG-22	Loadings	320
UIG-23	Maximum Allowable Stress Values for Certified Material	320
UIG-27	Thickness of Cylindrical Shells Made of Certified Materials Under	
	Internal Pressure	320
UIG-28	External Pressure	321
UIG-29	Euler Buckling of Extruded Graphite Tubes	321
UIG-34	Calculating Flat Heads, Covers, and Tubesheets	321
UIG-36	Openings and Reinforcements	328
UIG-45	Nozzle Neck Thickness	328
UIG-60	Lethal Service	328
	Fabrication	337
UIG-75	General Requirements	337
UIG-76	Procedure and Personnel Qualification	338
UIG-77	Certified Material Specification	338
UIG-78	Certified Cement Specification	338
UIG-79	Certified Cementing Procedure Specification	345
UIG-80	Cementing Technician Qualification	345
UIG-81	Repair of Materials	345
UIG-84	Required Tests	345
	Inspection and Tests	347
UIG-90	General	347
UIG-95	Visual Examination	347
UIG-96	Qualification of Visual Examination Personnel	347
UIG-97	Acceptance Standards and Documentation	347
UIG-99	Pressure Tests	347
UIG-112	Quality Control Requirements	347
UIG-115	Markings and Reports	347
UIG-116	Required Markings	347
UIG-120	Data Reports	348
UIG-121	Records	348
Nonmandatory Appendix UIG-A	Guide to Part UIG Certification Requirements	361
UIG-A-1	General	361
UIG-A-2	Material Qualification	361
UIG-A-3	Cementing Procedure and Cementing Technician Qualification ..	361
UIG-A-4	Lot Testing	361
UIG-A-5	Documentation	362

Mandatory Appendix 1	Supplementary Design Formulas	363
1-1	Thickness of Cylindrical and Spherical Shells	363
1-2	Cylindrical Shells	363
1-3	Spherical Shells	363
1-4	Formulas for the Design of Formed Heads Under Internal Pressure	364
1-5	Rules for Conical Reducer Sections and Conical Heads Under Internal Pressure	367
1-6	Dished Covers (Bolted Heads)	369
1-7	Large Openings in Cylindrical and Conical Shells	372
1-8	Rules for Reinforcement of Cones and Conical Reducers Under External Pressure	373
Mandatory Appendix 2	Rules for Bolted Flange Connections With Ring Type Gaskets	378
2-1	Scope	378
2-2	Materials	378
2-3	Notation	379
2-4	Circular Flange Types	381
2-5	Bolt Loads	385
2-6	Flange Moments	390
2-7	Calculation of Flange Stresses	391
2-8	Allowable Flange Design Stresses	391
2-9	Split Loose Flanges	398
2-10	Noncircular Shaped Flanges With Circular Bore	398
2-11	Flanges Subject to External Pressures	398
2-12	Flanges With Nut-Stops	398
2-13	Reverse Flanges	399
2-14	Flange Rigidity	401
2-15	Qualification of Assembly Procedures and Assemblers	401
Mandatory Appendix 3	Definitions	402
3-1	Introduction	402
3-2	Definitions of Terms	402
Mandatory Appendix 4	Rounded Indications Charts Acceptance Standard for Radiographically Determined Rounded Indications in Welds	405
4-1	Applicability of These Standards	405
4-2	Terminology	405
4-3	Acceptance Criteria	405
Mandatory Appendix 5	Flexible Shell Element Expansion Joints	413
5-1	General	413
5-2	Materials	413
5-3	Design	413
5-4	Fabrication	414
5-5	Inspection and Tests	416
5-6	Marking and Reports	416
Mandatory Appendix 6	Methods for Magnetic Particle Examination (MT)	417
6-1	Scope	417
6-2	Certification of Competency for Nondestructive Examination Personnel	417
6-3	Evaluation of Indications	417
6-4	Acceptance Standards	417
6-5	Repair Requirements	417
Mandatory Appendix 7	Examination of Steel Castings	419
7-1	Scope	419
7-2	Examination Techniques	419

7-3	Examination Requirements	419
7-4	Repairs	420
7-5	Identification and Marking	421
Mandatory Appendix 8	Methods for Liquid Penetrant Examination (PT)	422
8-1	Scope	422
8-2	Certification of Competency of Nondestructive Examination Personnel	422
8-3	Evaluation of Indications	422
8-4	Acceptance Standards	422
8-5	Repair Requirements	422
Mandatory Appendix 9	Jacketed Vessels	424
9-1	Scope	424
9-2	Types of Jacketed Vessels	424
9-3	Materials	424
9-4	Design of Jacket Shells and Jacket Heads	424
9-5	Design of Closure Member of Jacket to Vessel	424
9-6	Design of Penetrations Through Jackets	431
9-7	Design of Partial Jackets	431
9-8	Fabrication	431
9-10	Inspection	433
Mandatory Appendix 10	Quality Control System	434
10-1	General	434
10-2	Outline of Features to Be Included in the Written Description of the Quality Control System	434
10-3	Authority and Responsibility	434
10-4	Organization	434
10-5	Drawings, Design Calculations, and Specification Control	434
10-6	Material Control	435
10-7	Examination and Inspection Program	435
10-8	Correction of Nonconformities	435
10-9	Welding	435
10-10	Nondestructive Examination	435
10-11	Heat Treatment	435
10-12	Calibration of Measurement and Test Equipment	435
10-13	Records Retention	435
10-14	Sample Forms	436
10-15	Inspection of Vessels and Vessel Parts	436
10-16	Inspection of Pressure Relief Valves	436
10-17	Certifications	436
Mandatory Appendix 11	Capacity Conversions for Safety Valves	437
Mandatory Appendix 12	Ultrasonic Examination of Welds (UT)	438
12-1	Scope	438
12-2	Certification of Competence of Nondestructive Examiner	438
12-3	Acceptance–Rejection Standards	438
12-4	Report of Examination	438
Mandatory Appendix 13	Vessels of Noncircular Cross Section	439
13-1	Scope	439
13-2	Types of Vessels	439
13-3	Materials	445
13-4	Design of Vessels of Noncircular Cross Section	445
13-5	Nomenclature	447
13-6	Ligament Efficiency of Multidiameter Holes in Plates	449
13-7	Unreinforced Vessels of Rectangular Cross Section	450

13-8	Reinforced Vessels of Rectangular Cross Section	451
13-9	Stayed Vessels of Rectangular Cross Section [Figure 13-2(a), Sketches (7) and (8)]	456
13-10	Unreinforced Vessels Having an Obround Cross Section [Figure 13-2(b), Sketch (1)]	459
13-11	Reinforced Vessels of Obround Cross Section [Figure 13-2(b), Sketch (2)]	460
13-12	Stayed Vessels of Obround Cross Section [Figure 13-2(b), Sketch (3)]	460
13-13	Vessels of Circular Cross Section Having a Single Diametral Staying Member [Figure 13-2(c)]	462
13-14	Vessels of Noncircular Cross Section Subject to External Pressure	463
13-15	Fabrication	465
13-16	Inspection	465
13-17	Examples	465
13-18	Special Calculations	465
Mandatory Appendix 14	Integral Flat Heads With a Large, Single, Circular, Centrally Located Opening	469
14-1	Scope	469
14-2	Nomenclature	469
14-3	Design Procedure	469
14-4	Data Reports	471
Mandatory Appendix 17	Dimpled or Embossed Assemblies	472
17-1	Scope	472
17-2	Service Restrictions	472
17-3	Materials	472
17-4	Thickness Limitations	473
17-5	Maximum Allowable Working Pressure (MAWP)	473
17-6	Design Limitations	473
17-7	Welding Control	473
17-8	Quality Control	475
17-9	Records	476
17-10	Data Reports	476
Mandatory Appendix 18	Adhesive Attachment of Nameplates	484
18-1	Scope	484
18-2	Nameplate Application Procedure Qualification	484
Mandatory Appendix 19	Electrically Heated or Gas-Fired Jacketed Steam Kettles	485
19-1	Scope	485
19-2	Service Restrictions	485
19-3	Materials	485
19-4	Design	485
19-5	Inspection and Stamping	485
19-6	Pressure Relief	485
19-7	Appurtenances and Controls	485
19-8	Data Reports	485
Mandatory Appendix 20	Hubs Machined From Plate	486
20-1	Scope	486
20-2	Material	486
20-3	Examination Requirements	486
20-4	Data Reports	486
Mandatory Appendix 21	Jacketed Vessels Constructed of Work-Hardened Nickel	487
21-1	Scope	487
21-2	Design Requirements	487

21-3	Fabrication	487
21-4	Data Reports	487
Mandatory Appendix 22	Integrally Forged Vessels	488
22-1	Scope	488
22-2	Material	488
22-3	Design	488
22-4	Heat Treatment	489
22-5	Marking	489
22-6	Data Reports	489
Mandatory Appendix 23	External Pressure Design of Copper, Copper Alloy, and Titanium Alloy Condenser and Heat Exchanger Tubes With Integral Fins	490
23-1	Scope	490
23-2	Materials	490
23-3	Test Procedure	490
23-4	Criteria	490
23-5	Data Reports	491
Mandatory Appendix 24	Design Rules for Clamp Connections	492
24-1	Scope	492
24-2	Materials	492
24-3	Notation	492
24-4	Bolt Loads	496
24-5	Hub Moments	497
24-6	Calculation of Hub Stresses	497
24-7	Calculation of Clamp Stresses	497
24-8	Allowable Design Stresses for Clamp Connections	497
Mandatory Appendix 26	Bellows Expansion Joints	498
26-1	Scope	498
26-2	Conditions of Applicability	498
26-3	Nomenclature	498
26-4	Design Considerations	502
26-5	Materials	505
26-6	Design of U-Shaped Unreinforced Bellows	505
26-7	Design of U-Shaped Reinforced Bellows	510
26-8	Design of Toroidal Bellows	513
26-9	Bellows Subjected to Axial, Lateral, or Angular Displacements ...	515
26-10	Fabrication	518
26-11	Examination	519
26-12	Pressure Test Requirements	520
26-13	Marking and Reports	520
26-14	Examples	520
26-15	Polynomial Approximation for Coefficients C_p , C_f , C_d	520
Mandatory Appendix 27	Alternative Requirements for Glass-Lined Vessels	529
27-1	Scope	529
27-2	Permissible Out-of-Roundness of Cylindrical Shells Under Internal Pressure	529
27-3	Permissible Tolerance for Hemispherical or 2:1 Ellipsoidal Heads	529
27-4	Hydrostatic Test	529
27-5	Heat Treatment of Test Specimens	530
27-6	Low Temperature Operation	530
27-7	Postweld Heat Treatment	530
27-8	Data Reports	530

Mandatory Appendix 30	Rules for Drilled Holes Not Penetrating Through Vessel Wall	531
30-1	Scope	531
30-2	Supplementary Requirements	531
30-3	Nomenclature	532
Mandatory Appendix 31	Rules for Cr-Mo Steels With Additional Requirements for Welding and Heat Treatment	533
31-1	Scope	533
31-2	Postweld Heat Treatment	533
31-3	Test Specimen Heat Treatment	534
31-4	Welding Procedure Qualification and Welding Consumables Testing	535
31-5	Toughness Requirements	535
Mandatory Appendix 32	Local Thin Areas in Cylindrical Shells and in Spherical Seg- ments of Shells	536
32-1	Scope	536
32-2	General Requirements	536
32-3	Nomenclature	536
32-4	Allowable Locations for Local Thin Areas	537
32-5	Blend Grinding Requirements for Local Thin Areas	538
32-6	Single Local Thin Areas in Cylindrical Shells	538
32-7	Multiple Local Thin Areas in Cylindrical Shells	539
32-8	Single Local Thin Areas in Spherical Segments of Shells	539
32-9	Multiple Local Thin Areas in Spherical Segments of Shells	539
32-10	Data Reports	539
Mandatory Appendix 34	Requirements for Use of High Silicon Stainless Steels for Pressure Vessels	540
34-1	Scope	540
34-2	Heat Treatment	540
34-3	Weld Procedure Qualification	540
34-4	Toughness Requirements	541
34-5	Additional Requirements	541
Mandatory Appendix 35	Rules for Mass Production of Pressure Vessels	542
35-1	Introduction	542
35-2	Scope	542
35-3	General	542
35-4	Quality Control Procedures	542
35-5	Data Reports	543
35-6	Pneumatic Testing	543
35-7	Hydrostatic Testing	544
Mandatory Appendix 36	Standard Test Method for Determining the Flexural Strength of Certified Materials Using Three-Point Loading	545
36-1	Scope	545
36-2	Terminology	545
36-3	Apparatus	545
36-4	Test Specimen	545
36-5	Procedure	545
36-6	Test Data Record	545
36-7	Calculation	545
36-8	Report	545
Mandatory Appendix 37	Standard Test Method for Determining the Tensile Strength of Certified Impregnated Graphite Materials	547
37-1	Scope	547
37-2	Terminology	547

37-3	Apparatus	547
37-4	Test Specimens	547
37-5	Procedure	547
37-6	Test Data Record	547
37-7	Calculations	547
37-8	Reports	548
Mandatory Appendix 38	Standard Test Method for Compressive Strength of Impreg- nated Graphite	549
38-1	Scope	549
38-2	Referenced Documents	549
38-3	Terminology	549
38-4	Significance and Use	549
38-5	Apparatus	549
38-6	Sampling	549
38-7	Test Specimen	549
38-8	Procedure	549
38-9	Calculation	550
38-10	Report	550
38-11	Precision and Bias	550
Mandatory Appendix 39	Testing the Coefficient of Permeability of Impregnated Gra- phite	551
39-1	Scope and Field of Application	551
39-2	Concept	551
39-3	Principle	551
39-4	Apparatus	551
39-5	Specimens	552
39-6	Procedure	552
39-7	Test Report	552
39-8	Precision	552
Mandatory Appendix 40	Thermal Expansion Test Method for Graphite and Impreg- nated Graphite	553
40-1	Scope	553
40-2	Test Method	553
40-3	Equipment	553
40-4	Test Specimen	553
40-5	Testing Process	554
40-6	Thermal Expansion Factor	554
Mandatory Appendix 41	Electric Immersion Heater Element Support Plates	556
41-1	Scope	556
41-2	Materials and Methods of Fabrication	556
41-3	Terminology	556
41-4	Conditions of Applicability for EIH Support Plates	556
41-5	Nomenclature	556
41-6	Design Considerations	558
41-7	Calculation Procedure	558
41-8	Pressure Test Requirement	559
41-9	Data Reports	559
41-10	Example	559
Mandatory Appendix 42	Diffusion Welding of Microchannel Heat Exchangers	561
42-1	General	561
42-2	Design	561
42-3	Production Diffusion Weld Examination	561

Mandatory Appendix 43	Establishing Governing Code Editions and Cases for Pressure Vessels and Parts	562
43-1	General	562
43-2	Construction	562
43-3	Materials	562
Mandatory Appendix 44	Cold Stretching of Austenitic Stainless Steel Pressure Vessels	563
44-1	Scope	563
44-2	General Requirements	563
44-3	Nomenclature	563
44-4	Materials and Allowable Design Stress	563
44-5	Design	563
44-6	Fabrication Process	564
44-7	Stamping and Certification	565
Mandatory Appendix 45	Plate Heat Exchangers	566
45-1	Scope	566
45-2	Materials of Construction	566
45-3	Terminology	566
45-4	Conditions of Applicability	567
45-5	Design Considerations	567
45-6	Calculation Procedure	568
45-7	Pressure Test Requirements	568
45-8	Manufacturer's Data Reports	568
Mandatory Appendix 46	Rules for Use of Section VIII, Division 2	569
46-1	Scope	569
46-2	Allowable Design Stress and Other Material Rules	569
46-3	Design by Rule	569
46-4	Design by Analysis	569
Mandatory Appendix 47	Requirements for Pressure Vessel Designers	571
47-1	Introduction	571
47-2	Qualification Requirements for Responsible Charge	571
47-3	Alternative Qualifications for Responsible Charge	571
47-4	Qualifications for Design Activity	572
47-5	Additional Qualification Requirements	572
47-6	Manufacturer's Responsibilities	572
Mandatory Appendix 48	Vessels With Acrylic Cylindrical Shells	573
48-1	Scope and Service Restriction	573
48-2	Materials	573
48-3	Design	573
48-4	Fabrication	573
48-5	Inspection	574
48-6	Testing	574
48-7	Marking	574
48-8	Acrylic Window Manufacturer Certification	574
48-9	Acrylic Vessels Maintenance and Operation	574
Nonmandatory Appendix A	Basis for Establishing Allowable Loads for Tube-to-Tubesheet Joints	575
A-1	General	575
A-2	Maximum Axial Loadings	576
A-3	Shear Load Test	577
A-4	Acceptance Standards for f_r Determined by Test	581
A-5	Acceptance Standards for Proposed Operating Temperatures Determined by Test	581

Nonmandatory Appendix C	Suggested Methods for Obtaining the Operating Temperature of Vessel Walls in Service	582
C-1	Thermocouple Installation	582
C-2	Alternative Thermocouple Installation	582
Nonmandatory Appendix D	Suggested Good Practice Regarding Internal Structures	583
D-1	Introduction	583
D-2	Internal Structures Support	583
D-3	Internal Structures Support Guidelines	583
Nonmandatory Appendix E	Suggested Good Practice Regarding Corrosion Allowance ...	584
E-1	General	584
E-2	Predictable Corrosion Rate	584
E-3	Indeterminate Corrosion Rate	584
E-4	Negligible Corrosion Rate	584
E-5	Corrosive Service	584
E-6	External Attachment Corrosion Rate	584
Nonmandatory Appendix F	Suggested Good Practice Regarding Linings	585
F-1	General	585
F-2	Metal Linings	585
F-3	Paint	585
F-4	Hydrotest Considerations for Metal Linings	585
Nonmandatory Appendix G	Suggested Good Practice Regarding Piping Reactions and Design of Supports and Attachments	586
G-1	General	586
G-2	Supports Considerations	586
G-3	Vertical Vessels, Post Supported	586
G-4	Vertical Vessels Supported at Shell	586
G-5	Vertical Vessels, Skirt Supported	586
G-6	Horizontal Vessel Supports	587
G-7	Horizontal Gas Storage Tank Supports	587
G-8	Attachments Subject to Cyclic Loading	587
G-9	Additional References	587
Nonmandatory Appendix H	Guidance to Accommodate Loadings Produced by Deflagration	588
H-1	Scope	588
H-2	General	588
H-3	Design Limitations	588
H-4	Design Criteria	588
H-5	References	589
Nonmandatory Appendix K	Sectioning of Welded Joints	590
K-1	Etch Tests	590
K-2	Closure of Openings Resulting From Sectioning	590
K-3	Preheating	591
Nonmandatory Appendix L	Application of Rules for Joint Efficiency in Shells and Heads of Vessels With Welded Joints	592
L-1	Vessels Under Internal Pressure	592
Nonmandatory Appendix M	Installation and Operation	597
M-1	Introduction	597
M-2	Corrosion	597
M-3	Marking on the Vessel	597
M-4	Pressure-Relieving Devices	597
M-5	Stop Valves Located in the Relief Path	597

M-6	Inlet Pressure Drop for High Lift, Top-Guided Safety, Safety Relief, and Pilot-Operated Pressure Relief Valves in Compressible Fluid Service	598
M-7	Discharge Lines From Pressure Relief Devices	598
M-8	Pressure Drop, Nonreclosing Pressure Relief Devices	599
M-9	General Advisory Information on the Characteristics of Pressure Relief Devices Discharging Into a Common Header	599
M-10	Pressure Differentials for Pressure Relief Valves	599
M-11	Installation of Pressure Relief Valves	600
M-12	Reaction Forces and Externally Applied Loads	600
M-13	Sizing of Pressure Relief Devices for Fire Conditions	600
M-14	Pressure-Indicating Device	601
Nonmandatory Appendix P	Basis for Establishing Allowable Stress Values for UCI, UCD, and ULT Materials	602
P-1	.....	602
Nonmandatory Appendix R	Preheating	603
	Introduction	603
R-1	P-No. 1 Group Nos. 1, 2, and 3	603
R-2	P-No. 3 Group Nos. 1, 2, and 3	603
R-3	P-No. 4 Group Nos. 1 and 2	603
R-4	P-Nos. 5A and 5B Group No. 1	603
R-5	P-No. 6 Group Nos. 1, 2, and 3	603
R-6	P-No. 7 Group Nos. 1 and 2	603
R-7	P-No. 8 Group Nos. 1 and 2	603
R-8	P-No. 9 Groups	603
R-9	P-No. 10 Groups	603
R-10	P-No. 11 Groups	603
R-11	P-No. 15E Group No. 1	604
Nonmandatory Appendix S	Design Considerations for Bolted Flange Connections	605
S-1	Bolting	605
Nonmandatory Appendix T	Temperature Protection	607
Nonmandatory Appendix W	Guide for Preparing Manufacturer's Data Reports	608
W-1	Guide for Preparing Manufacturer's Data Reports	608
W-2	Guide for Preparing Supplemental Data Reports for Parts Constructed of Graphite	608
Nonmandatory Appendix Y	Flat Face Flanges With Metal-to-Metal Contact Outside the Bolt Circle	638
Y-1	General	638
Y-2	Materials	639
Y-3	Notation	639
Y-4	Bolt Loads	643
Y-5	Classification of Assemblies and Categorization of Individual Flanges	643
Y-6	Flange Analysis	645
Y-7	Allowable Flange Design Stresses	649
Y-8	Prestressing the Bolts	649
Y-9	Estimating Flange Thicknesses and Bolting	649
Y-10	.....	651
Nonmandatory Appendix EE	Half-Pipe Jackets	652
EE-1	General	652
EE-2	Half-Pipe Jackets	652
EE-3	Jackets With Other Geometries	652

Nonmandatory Appendix FF	Guide for the Design and Operation of Quick-Actuating and Quick-Opening Closures	657
FF-1	Introduction	657
FF-2	Responsibilities	657
FF-3	Design	657
FF-4	Installation	658
FF-5	Maintenance	658
FF-6	Inspection	658
FF-7	Training	658
FF-8	Administrative Controls	659
Nonmandatory Appendix GG	Guidance for the Use of U.S. Customary and SI Units in the ASME Boiler and Pressure Vessel Code	660
GG-1	Use of Units in Equations	660
GG-2	Guidelines Used to Develop SI Equivalents	660
GG-3	Soft Conversion Factors	663
Nonmandatory Appendix HH	Tube Expanding Procedures and Qualification	664
HH-1	General	664
HH-2	Scope	664
HH-3	Terms and Definitions	664
HH-4	Tube Expanding Procedure Specification (TEPS)	665
HH-5	Tube Expanding Procedure Qualification	665
HH-6	Tube Expanding Performance Qualification (TEPQ)	665
HH-7	Tube Expanding Variables	665
Nonmandatory Appendix JJ	Flowcharts Illustrating Toughness Testing Requirements and Exemptions From Toughness Testing by the Rules of UHA-51	672
JJ-1	UHA-51 Toughness Test Requirements for High Alloy Vessels ...	672
Nonmandatory Appendix KK	Guide for Preparing User's Design Requirements	678
KK-1	Introduction	678
Nonmandatory Appendix LL	Graphical Representations of $F_{t,min}$ and $F_{t,max}$	684
LL-1	Scope	684
LL-2	Conditions of Applicability	684
Nonmandatory Appendix MM	Alternative Marking and Stamping of Graphite Pressure Vessels	693
MM-1	General Requirements	693
MM-2	Application of the Certification Mark	693
MM-3	Application of Characters Directly to Graphite	693
MM-4	Acceptance Criterion	693
Nonmandatory Appendix NN	Guidance to the Responsibilities of the User and Designated Agent	694
NN-1	Introduction	694
NN-2	Information Regarding the "User" Designation	694
NN-3	Information Regarding the User's "Designated Agent"	694
NN-4	Common Scenarios Involving the "User" or "Designated Agent" Responsibilities	695
NN-5	Examples Illustrating the NN-4 Common Scenarios Involving the "User or His Designated Agent"	695
NN-6	Specific Code-Assigned Responsibilities	695
Nonmandatory Appendix PP	Guide to the Relocation of Overpressure Protection Requirements	702
PP-1	General	702

FIGURES

UG-28	Diagrammatic Representation of Variables for Design of Cylindrical Vessels Subjected to External Pressure	22
UG-28.1	Diagrammatic Representation of Lines of Support for Design of Cylindrical Vessels Subjected to External Pressure	23
UG-29.1	Various Arrangements of Stiffening Rings for Cylindrical Vessels Subjected to External Pressure	27
UG-29.2	Maximum Arc of Shell Left Unsupported Because of Gap in Stiffening Ring of Cylindrical Shell Under External Pressure	28
UG-30	Some Acceptable Methods of Attaching Stiffening Rings	29
UG-33.1	Length L_c of Some Typical Conical Sections for External Pressure	33
UG-34	Some Acceptable Types of Unstayed Flat Heads and Covers	35
UG-36	Large Head Openings — Reverse-Curve and Conical Shell-Reducer Sections	41
UG-37	Chart for Determining Value of F , as Required in UG-37	43
UG-37.1	Nomenclature and Formulas for Reinforced Openings	44
UG-38	Minimum Depth for Flange of Flued-In Openings	46
UG-39	Openings in Flat Heads and Covers	47
UG-40	Some Representative Configurations Describing the Reinforcement Dimension t_e and the Opening Dimension d	49
UG-41.1	Nozzle Attachment Weld Loads and Weld Strength Paths to Be Considered	52
UG-42	Examples of Multiple Openings	54
UG-47	Acceptable Proportions for Ends of Stays	59
UG-53.1	Example of Tube Spacing With Pitch of Holes Equal in Every Row	60
UG-53.2	Example of Tube Spacing With Pitch of Holes Unequal in Every Second Row	61
UG-53.3	Example of Tube Spacing With Pitch of Holes Varying in Every Second and Third Row	61
UG-53.4	Example of Tube Spacing With Tube Holes on Diagonal Lines	62
UG-53.5	Diagram for Determining the Efficiency of Longitudinal and Diagonal Ligaments Between Openings in Cylindrical Shells	63
UG-53.6	Diagram for Determining Equivalent Longitudinal Efficiency of Diagonal Ligaments Between Openings in Cylindrical Shells	64
UG-80.1	Maximum Permissible Deviation From a Circular Form e for Vessels Under External Pressure	66
UG-80.2	Example of Differences Between Maximum and Minimum Inside Diameters in Cylindrical, Conical, and Spherical Shells	66
UG-84	Simple Beam Impact Test Specimens (Charpy Type Test)	68
UG-84.1	Charpy V-Notch Impact Test Requirements for Full-Size Specimens for Carbon and Low Alloy Steels, Having a Specified Minimum Tensile Strength of Less Than 95 ksi, Listed in Table UCS-23	69
UG-84.1M	Charpy V-Notch Impact Test Requirements for Full-Size Specimens for Carbon and Low Alloy Steels, Having a Specified Minimum Tensile Strength of Less Than 655 MPa, Listed in Table UCS-23	70
UG-84.5	HAZ Impact Specimen Removal	72
UG-116	Official Certification Mark to Denote the American Society of Mechanical Engineers' Standard	87
UG-118	Form of Stamping	90
UW-3	Illustration of Welded Joint Locations Typical of Categories A, B, C, and D	99
UW-9-1	Butt Welding of Plates of Unequal Thickness	101
UW-9-2	Butt Welding of Components to Thickened Neck Nozzles	101
UW-9-3	Butt Welding With One Plate Edge Offset	103
UW-13.1	Heads Attached to Shells	106
UW-13.2	Attachment of Pressure Parts to Flat Plates to Form a Corner Joint	109
UW-13.3	Typical Pressure Parts With Butt-Welded Hubs	113
UW-13.4	Nozzle Necks Attached to Piping of Lesser Wall Thickness	114
UW-13.5	Fabricated Lap Joint Stub Ends for Lethal Service	114
UW-16.1	Some Acceptable Types of Welded Nozzles and Other Connections to Shells, Heads, etc.	116

UW-16.2	Some Acceptable Types of Small Standard Fittings	122
UW-16.3	Some Acceptable Types of Small Bolting Pads	124
UW-19.1	Typical Forms of Welded Staybolts	125
UW-19.2	Use of Plug and Slot Welds for Staying Plates	126
UW-20.1	Tube-to-Tubesheet Joints Acceptable to Determine Joint Strength by Calculation	128
UW-21	Welds of Socket Weld Flanges to Nozzle Necks	130
UB-14	Examples of Filler Metal Application	148
UB-16	Some Acceptable Types of Brazed Joints	149
UCS-66	Impact Test Exemption Curves	168
UCS-66M	Impact Test Exemption Curves	171
UCS-66.1	Reduction in Minimum Design Metal Temperature Without Impact Testing	176
UCS-66.1M	Reduction in Minimum Design Metal Temperature Without Impact Testing	177
UCS-66.2	Diagram of UCS-66 Rules for Determining Lowest Minimum Design Metal Temperature (MDMT) Without Impact Testing	178
UCS-66.3	Some Typical Vessel Details Showing the Governing Thicknesses as Defined in UCS-66	180
UHA-51-1	Weld Metal Delta Ferrite Content	209
UHT-6.1	Charpy V-Notch Impact Test Requirements	228
UHT-6.1M	Charpy V-Notch Impact Test Requirements	228
UHT-18.1	Acceptable Welded Nozzle Attachment Readily Radiographed to Code Standards	230
UHT-18.2	Acceptable Full Penetration Welded Nozzle Attachments Radiographable With Difficulty and Generally Requiring Special Techniques Including Multiple Exposures to Take Care of Thickness Variations	231
ULW-2.1	Some Acceptable Layered Shell Types	239
ULW-2.2	Some Acceptable Layered Head Types	240
ULW-17.1	Transitions of Layered Shell Sections	242
ULW-17.2	Some Acceptable Solid Head Attachments to Layered Shell Sections	243
ULW-17.3	Some Acceptable Flat Heads and Tubesheets With Hubs Joining Layered Shell Sections ...	245
ULW-17.4	Some Acceptable Flanges for Layered Shells	246
ULW-17.5	Some Acceptable Layered Head Attachments to Layered Shells	247
ULW-17.6	Some Acceptable Welded Joints of Layered-to-Layered and Layered-to-Solid Sections	248
ULW-18.1	Some Acceptable Nozzle Attachments in Layered Shell Sections	250
ULW-22	Some Acceptable Supports for Layered Vessels	252
ULW-32.1	Solid-to-Layered and Layered-to-Layered Test Plates	254
ULW-32.2	.....	255
ULW-32.3	.....	255
ULW-32.4	.....	256
ULW-54.1	.....	257
ULW-54.2	.....	258
ULW-77	.....	260
UHX-3	Terminology of Heat Exchanger Components	271
UHX-4-1	Nozzles Adjacent to Tubesheets	272
UHX-9	Some Representative Configurations Describing the Minimum Required Thickness of the Tubesheet Flanged Extension, h_r	278
UHX-10	Integral Channels	279
UHX-11.5.1-1	Tubesheet Geometry	281
UHX-11.5.1-2	Typical Untubed Lane Configurations	282
UHX-11.5.1-3	Location of Tubesheet Metal Temperature, T' , at Rim	283
UHX-11.5.2-1	Curves for the Determination of E^*/E and ν^* (Equilateral Triangular Pattern)	284
UHX-11.5.2-2	Curves for the Determination of E^*/E and ν^* (Square Pattern)	285
UHX-12.1	U-Tube Tubesheet Configurations	286
UHX-12.2	Tube Layout Perimeter	287
UHX-13.1	Fixed Tubesheet Configurations	291
UHX-13.2	$Z_d, Z_v, Z_w,$ and Z_m Versus X_a	293
UHX-13.4	Different Shell Thicknesses and/or Material Adjacent to the Tubesheets	295
UHX-13.5.7-1	F_m Versus X_a ($0.0 \leq Q_3 \leq 0.8$)	297
UHX-13.5.7-2	F_m Versus X_a ($-0.8 \leq Q_3 \leq 0.0$)	298

UHX-14.1	Floating Tubesheet Heat Exchangers	305
UHX-14.2	Stationary Tubesheet Configurations	306
UHX-14.3	Floating Tubesheet Configurations	307
UIG-34-1	Typical Graphite Shell and Tube Heat Exchanger	322
UIG-34-2	Fixed Tubesheet Configurations	322
UIG-34-3	Floating Tubesheet Configurations	323
UIG-34-4	Tubesheet Geometry	330
UIG-36-1	Unacceptable Nozzle Attachment Details	333
UIG-36-2	Some Acceptable Nozzle Attachment Details in Impregnated Graphite Pressure Vessels ...	334
UIG-76-1	Tension Test Specimen	339
UIG-76-2	Cement Material Tension Test Specimen	340
UIG-76-3	Tube-to-Tubesheet Tension Test Specimen	341
UIG-76-4	Tube Cement Joint Tension Test Specimen	342
UIG-76-5	Tube Tension Test Specimen	343
UIG-76-6	Tension Test Specimen	344
1-4	Principal Dimensions of Typical Heads	365
1-6	Dished Covers With Bolting Flanges	370
1-7-1	.....	373
1-7-2	.....	374
2-4	Types of Flanges	382
2-7.1	Values of T , U , Y , and Z (Terms Involving K)	392
2-7.2	Values of F (Integral Flange Factors)	393
2-7.3	Values of V (Integral Flange Factors)	394
2-7.4	Values of F_L (Loose Hub Flange Factors)	395
2-7.5	Values of V_L (Loose Hub Flange Factors)	395
2-7.6	Values of f (Hub Stress Correction Factor)	396
2-13.1	Reverse Flange	399
2-13.2	Loose Ring Type Reverse Flange	400
4-1	Aligned Rounded Indications	406
4-2	Groups of Aligned Rounded Indications	407
4-3	Charts for t Equal to $\frac{1}{8}$ in. to $\frac{1}{4}$ in. (3 mm to 6 mm), Inclusive	408
4-4	Charts for t Over $\frac{1}{4}$ in. to $\frac{3}{8}$ in. (6 mm to 10 mm), Inclusive	409
4-5	Charts for t Over $\frac{3}{8}$ in. to $\frac{3}{4}$ in. (10 mm to 19 mm), Inclusive	409
4-6	Charts for t Over $\frac{3}{4}$ in. to 2 in. (19 mm to 50 mm), Inclusive	410
4-7	Charts for t Over 2 in. to 4 in. (50 mm to 100 mm), Inclusive	411
4-8	Charts for t Over 4 in. (100 mm)	412
5-1	Typical Flexible Shell Element Expansion Joints	414
5-2	Typical Nozzle Attachment Details Showing Minimum Length of Straight Flange or Outer Shell Element	415
9-2	Some Acceptable Types of Jacketed Vessels	425
9-5	Some Acceptable Types of Jacket Closures	427
9-6	Some Acceptable Types of Penetration Details	432
9-7	.....	433
13-2(a)	Vessels of Rectangular Cross Section	440
13-2(b)	Vessels of Obround Cross Section	444
13-2(c)	Vessel of Circular Cross Section With Central Dividing Plate	445
13-6	Plate With Multidiameter Hole Pattern	449
13-14(a)	.....	463
13-14(b)	Orientation of Panel Dimensions and Stresses	463
14-1	Integral Flat Head With Large Central Opening	470
17-1	Two Embossed Plates	476
17-2	Two Dimpled Plates	476
17-3	Embossed Plate to Plain Plate	476
17-4	Arc-Spot-Welded Two-Layer Assembly	477
17-5	Dimpled Plate Welded to Plain Plate	477
17-6	Three-Ply Assemblies	477

17-7	Single-Spot-Weld Tension Specimen, Two-Ply Joint	477
17-8	Seam-Weld Specimen for Tension and Macrosection, Two-Ply Joint	478
17-9	Single Spot-Weld Tension Specimen for Three-Ply Joint	478
17-10	Seam-Weld Specimen for Tension and Macrosection for Three-Ply Joint	478
17-11	Gas Metal Arc-Spot-Weld Block for Macrosections and Strength Tests	479
17-12	Gas Metal Arc-Spot-Weld Block for Bend Tests	480
17-13	Gas Tungsten-Arc Seam Weld, Plasma-Arc Seam Weld, Submerged-Arc Seam Weld, and Laser Beam Seam Weld Test Specimen for Bend Tests	481
17-14	.....	482
17-15	.....	482
17-16	Peel Test	482
17-17	Complete Penetration Welding Per 17-1(c)	483
22-1	Typical Sections of Special Seamless Vessels	488
24-1	Typical Hub and Clamp	493
24-2	Typical Clamp Lug Configurations	494
26-1-1	Typical Bellows Expansion Joints	499
26-1-2	Starting Points for the Measurement of the Length of Shell on Each Side of the Bellows ...	500
26-2	Dimensions to Determine I_{xx}	502
26-3	Possible Convolution Profile in the Neutral Position	505
26-4	Coefficient C_p	506
26-5	Coefficient C_f	507
26-6	Coefficient C_d	511
26-7	Bellows Subjected to an Axial Displacement x	514
26-8	Bellows Subjected to a Lateral Deflection y	517
26-9	Bellows Subjected to an Angular Rotation θ	517
26-10	Cyclic Displacements	519
26-11	Cyclic Displacements	520
26-12	Cyclic Displacements	520
26-13	Some Typical Expansion Bellows to Weld End Details	521
26-14	Toroidal Bellows Manufacturing Tolerances	522
30-1	Thickness Ratio Versus Diameter Ratio	531
31-1	.....	534
32-3	Nomenclature	536
32-4-1	Limits for Torispherical Head	537
32-4-2	Limits for Ellipsoidal Head	538
32-4-3	Limits for Hemispherical Head	538
32-5-1	LTA Blend Grinding	539
36-4-1	Test Specimen Arrangement	546
39-4-1	Schematic Diagram of Vacuum Apparatus	552
40-3-1	Typical Equipment (Dilometer) for Thermal Expansion Test	553
40-6-1	Typical Recording Curve in Thermal Expansion Test, $\Delta L_t = f(\theta)$	554
41-1-1	EIH Support Plate Gasketed With Mating Flange	556
41-4-1	Typical EIH Support Plate and Element Geometry	557
41-5-1	Some Representative Configurations Describing the Minimum Required Thickness of the EIH Support Plate Flanged Extension, h_r	558
45-3.1-1	Typical Plate Heat Exchanger	567
A-2	Some Acceptable Types of Tube-to-Tubesheet Welds	579
A-3	Typical Test Fixtures for Expanded or Welded Tube-to-Tubesheet Joints	580
K-2	Some Acceptable Types of Filler Plugs	591
L-1.4-1	Joint Efficiency and Weld Joint Type — Cylinders and Cones	593
L-1.4-2	Joint Efficiency and Weld Joint Type — Heads	594
L-1.4-3	Joint Efficiencies for Category A and D Welded Joints in Shells, Heads, or Cones	595
L-1.4-4	Joint Efficiencies for Category B and C Welded Joints in Shells or Cones	596
W-3.1	Example of the Use of Form U-4	635
Y-3.1	.....	641
Y-3.2	Flange Dimensions and Forces	642

Y-5.1.1	Class 1 Flange Assembly (Identical Flange Pairs)	644
Y-5.1.2	Class 2 Flange Assembly	644
Y-5.1.3	Class 3 Flange Assembly	645
EE-1	NPS 2 Pipe Jacket	653
EE-2	NPS 3 Pipe Jacket	654
EE-3	NPS 4 Pipe Jacket	655
EE-4	.....	656
EE-5	.....	656
JJ-1.2-1	Austenitic Stainless Steel Base Metal and HAZ Toughness Testing Requirements	673
JJ-1.2-2	Welding Procedure Qualification With Toughness Testing Requirements for Austenitic Stainless Steel	674
JJ-1.2-3	Welding Consumable Pre-Use Testing Requirements for Austenitic Stainless Steel	675
JJ-1.2-4	Production Toughness Testing Requirements for Austenitic Stainless Steel	676
JJ-1.2-5	Austenitic-Ferritic Duplex, Ferritic Chromium, and Martensitic Stainless Steel Toughness Testing Requirements	677
LL-1-1	Z_v , Z_d , Z_w , and Z_m Versus X_a	685
LL-1-2	F_m Versus X_a and Q_3 ($-0.8 \leq Q_3 \leq 0$)	687
LL-1-3	Graphical Representation of $F_{t,min}$	689
LL-1-4	Graphical Representation of $F_{t,max}$	691

TABLES

U-3	Year of Acceptable Edition of Referenced Standards in This Division	5
U-4-1	Standard Units for Use in Equations	7
UG-33.1	Values of Spherical Radius Factor K_o for Ellipsoidal Head With Pressure on Convex Side ..	32
UG-37	Values of Spherical Radius Factor K_1	45
UG-43	Minimum Number of Pipe Threads for Connections	54
UG-44-1	Moment Factor, F_M	56
UG-45	Nozzle Minimum Thickness Requirements	57
UG-79-1	Equations for Calculating Forming Strains	65
UG-84.2	Charpy Impact Test Temperature Reduction Below Minimum Design Metal Temperature .	71
UG-84.3	Specifications for Impact Tested Materials in Various Product Forms	71
UG-84.4	Impact Test Temperature Differential	71
UG-84.6	Required HAZ Impact Test Specimen Set Removal	72
UW-12	Maximum Allowable Joint Efficiencies for Welded Joints	105
UW-16.1	Minimum Thickness Requirements for Fittings	121
UW-33	.....	132
UB-2	Maximum Design Temperatures for Brazing Filler Metal	146
UB-17	Recommended Joint Clearances at Brazing Temperature	149
UCS-23	Carbon and Low Alloy Steel	156
UCS-56-1	Postweld Heat Treatment Requirements for Carbon and Low Alloy Steels — P-No. 1	158
UCS-56-2	Postweld Heat Treatment Requirements for Carbon and Low Alloy Steels — P-No. 3	159
UCS-56-3	Postweld Heat Treatment Requirements for Carbon and Low Alloy Steels — P-No. 4	160
UCS-56-4	Postweld Heat Treatment Requirements for Carbon and Low Alloy Steels — P-Nos. 5A, 5B, and 5C	161
UCS-56-5	Postweld Heat Treatment Requirements for Carbon and Low Alloy Steels — P-No. 9A	162
UCS-56-6	Postweld Heat Treatment Requirements for Carbon and Low Alloy Steels — P-No. 9B	163
UCS-56-7	Postweld Heat Treatment Requirements for Carbon and Low Alloy Steels — P-No. 10A	164
UCS-56-8	Postweld Heat Treatment Requirements for Carbon and Low Alloy Steels — P-No. 10B	164
UCS-56-9	Postweld Heat Treatment Requirements for Carbon and Low Alloy Steels — P-No. 10C	165
UCS-56-11	Postweld Heat Treatment Requirements for Carbon and Low Alloy Steels — P-No. 15E	166
UCS-56.1	Alternative Postweld Heat Treatment Requirements for Carbon and Low Alloy Steels	167
UCS-57	Thickness Above Which Full Radiographic Examination of Butt-Welded Joints Is Mandatory	167
UCS-66	Tabular Values for Figure UCS-66 and Figure UCS-66M	174
UCS-79-1	Post-Cold-Forming Strain Limits and Heat Treatment Requirements for P-No. 15E Materials	186
UNF-23.1	Nonferrous Metals — Aluminum and Aluminum Alloy Products	190
UNF-23.2	Nonferrous Metals — Copper and Copper Alloys	190

UNF-23.3	Nonferrous Metals — Nickel, Cobalt, and High Nickel Alloys	191
UNF-23.4	Nonferrous Metals — Titanium and Titanium Alloys	192
UNF-23.5	Nonferrous Metals — Zirconium	192
UNF-79	Postfabrication Strain Limits and Required Heat Treatment	195
UHA-23	High Alloy Steel	200
UHA-32-1	Postweld Heat Treatment Requirements for High Alloy Steels — P-No. 6	203
UHA-32-2	Postweld Heat Treatment Requirements for High Alloy Steels — P-No. 7	203
UHA-32-3	Postweld Heat Treatment Requirements for High Alloy Steels — P-No. 8	204
UHA-32-4	Postweld Heat Treatment Requirements for High Alloy Steels — P-No. 10H	204
UHA-32-5	Postweld Heat Treatment Requirements for High Alloy Steels — P-No. 10I	205
UHA-32-6	Postweld Heat Treatment Requirements for High Alloy Steels — P-No. 10K	205
UHA-32-7	Postweld Heat Treatment Requirements for High Alloy Steels — P-No. 45	206
UHA-44	Postfabrication Strain Limits and Required Heat Treatment	207
UCI-23	Maximum Allowable Stress Values in Tension for Cast Iron	215
UCI-78.1		216
UCI-78.2		216
UCD-23	Maximum Allowable Stress Values in Tension for Cast Ductile Iron, ksi (MPa)	224
UCD-78.1		225
UCD-78.2		225
UHT-23	Ferritic Steels With Properties Enhanced by Heat Treatment	232
UHT-56	Postweld Heat Treatment Requirements for Materials in Table UHT-23	234
ULT-23	V001 Maximum Allowable Stress Values in Tension for 5%, 7%, 8%, and 9% Nickel Steels; Types 304 and 316 Stainless Steels; and 5083-0 Aluminum Alloy at Cryogenic Temperatures for Welded and Nonwelded Construction	263
ULT-82	Minimum Tensile Strength Requirements for Welding Procedure Qualification Tests on Tension Specimens Conforming to Section IX, Figures QW-462.1(a) Through QW-462.1(e)	267
ULT-82M	Minimum Tensile Strength Requirements for Welding Procedure Qualification Tests on Tension Specimens Conforming to Section IX, Figures QW-462.1(a) Through QW-462.1(e)	268
UHX-8.1	Tube-sheet Effective Bolt Load, W^*	277
UHX-12.4-1		288
UHX-13.1	Formulas for Determination of Z_d , Z_v , Z_m , Z_w , and F_m	292
UHX-13.2	Formulas for Determination of $F_{t,min}$ and $F_{t,max}$	293
UHX-13.4-1		294
UHX-13.4-2		294
UHX-13.8.4-1		301
UHX-14.4-1		308
UHX-14.6.4-1		313
UHX-17	Flexible Shell Element Expansion Joint Load Cases and Stress Limits	315
UIG-6-1	Properties of Certified Material	320
UIG-34-1		326
UIG-34-2	Values for Determining E^*/E and ν^* Equilateral Triangular Pattern	329
UIG-34-3	Values for Determining E^*/E and ν^* Equilateral Square Pattern	329
UIG-34-4	Formulas for Determination of Z_d , Z_v , Z_m , Z_w , and F_m	331
UIG-34-5	Formulas for Determination of $F_{t,min}$ and $F_{t,max}$	332
UIG-84-1	Test Frequency for Certified Materials	346
1-4.1	Values of Factor K	365
1-4.2	Values of Factor M	366
1-4.3	Maximum Metal Temperature	366
1-4.4	Values of Knuckle Radius, r	367
1-5.1	Values of Δ for Junctions at the Large Cylinder for $\alpha \leq 30$ deg	367
1-5.2	Values of Δ for Junctions at the Small Cylinder for $\alpha \leq 30$ deg	368
1-8.1	Values of Δ for Junctions at the Large Cylinder for $\alpha \leq 60$ deg	375
2-4	Recommended Minimum Gasket Contact Widths for Sheet and Composite Gaskets	385
2-5.1	Gasket Materials and Contact Facings	386
2-5.2	Effective Gasket Width	388
2-6	Moment Arms for Flange Loads Under Operating Conditions	390

2-7.1	Flange Factors in Formula Form	397
2-14	Flange Rigidity Factors	401
4-1	.....	405
13-8(d)	.....	452
13-8(e)	.....	456
13-13(c)	.....	462
13-18.1	.....	467
13-18(b)	.....	468
24-8	Allowable Design Stress for Clamp Connections	497
26-2-1	Maximum Design Temperatures for Application of the Rules of Mandatory Appendix 26 ..	500
26-8	Tabular Values for Coefficients B_1, B_2, B_3	516
26-10-1	U-Shaped Unreinforced and Reinforced Bellows Manufacturing Tolerances	519
26-15.1a	Polynomial Coefficients α_i for the Determination of C_p When $C_1 \leq 0.3$	522
26-15.1b	Polynomial Coefficients α_i for the Determination of C_p When $C_1 > 0.3$	523
26-15.2	Polynomial Coefficients β_i for the Determination of C_f	523
26-15.3	Polynomial Coefficients γ_i for the Determination of C_d	524
31-1	Material Specifications	533
31-2	Composition Requirements for $2^{1/4}\text{Cr}-1\text{Mo}-^{1/4}\text{V}$ Weld Metal	534
34-1	Material Specifications	540
34-2	Additional Requirements	541
44-4-1	Allowable Materials and Design Stress	563
47-5-1	Design Activities Requiring Evidence of Additional Qualifications	572
A-2	Efficiencies f_r	578
P-1	Criteria for Establishing Allowable Stress Values	602
W-3	Instructions for the Preparation of Manufacturer's Data Reports	630
W-3.1	Supplementary Instructions for the Preparation of Manufacturer's Data Reports for Layered Vessels	636
W-3.2	Supplementary Instructions for the Preparation of Manufacturer's or Assembler's Certificate of Conformance Forms UV-1 and UD-1	637
Y-6.1	Summary of Applicable Equations for Different Classes of Assemblies and Different Categories of Flanges	645
Y-9.1	Trial Flange Thickness and Area of Bolting for Various Classes of Assemblies and Flange Categories	650
QEXP-1	Instructions for Filling Out TEPS Form	668
KK-1	Instructions for the Preparation of User's Design Requirements	683
LL-1-1	$Z_v, Z_d, Z_w,$ and Z_m Versus X_a	686
LL-1-2	F_m Versus X_a and Q_3 ($-0.8 \leq Q_3 \leq 0.8$)	688
LL-1-3	Tabular Representation of $F_{t,\min}$ ($v^* = 0.4$)	690
LL-1-4	Tabular Representation of $F_{t,\max}$ ($v^* = 0.4$)	692
NN-6-1	Responsibilities of the User	697
NN-6-2	Matters of Agreement Between the User and the Manufacturer	698
NN-6-3	The Manufacturer's Responsibility to the User	698
NN-6-4	Recommendations to the User	699
NN-6-5	Responsibilities of the User or His Designated Agent	699
NN-6-6	Matters of Agreement Between the User or His Designated Agent and the Manufacturer ..	700
NN-6-7	The Manufacturer's Responsibility to the User or His Designated Agent	700
NN-6-8	Recommendations to the User or His Designated Agent	700
NN-6-9	Cautionary Advice Provided to the User	701
NN-6-10	Guidance Code to Users and Their Designated Agents	701
NN-6-11	User-Manufacturer Rules	701
PP-1-1	Cross-Reference List	702

FORMS

CMQ	Certified Material Qualification Form	349
CCQ	Certified Cement Qualification Form	356
CPQ	Cementing Procedure Qualification Form	358
CTQ	Cementing Technician Qualification Form	360
26-1	Specification Sheet for ASME Section VIII, Division 1 Mandatory Appendix 26 Bellows Expansion Joints	525
26-1M	Specification Sheet for ASME Section VIII, Division 1 Mandatory Appendix 26 Bellows Expansion Joints	527
U-1	Manufacturer's Data Report for Pressure Vessels	609
U-1A	Manufacturer's Data Report for Pressure Vessels	612
U-1B	Manufacturer's Supplementary Data Report for Graphite Pressure Vessels	614
U-1P	Manufacturer's Data Report for Plate Heat Exchangers	615
U-2	Manufacturer's Partial Data Report	617
U-2A	Manufacturer's Partial Data Report (Alternative Form)	620
U-3	Manufacturer's Certificate of Compliance Covering Pressure Vessels to Be Stamped With the UM Designator [See U-1(j)]	622
U-3A	Manufacturer's Certificate of Compliance (Alternative Form) Covering Pressure Vessels to Be Stamped With the UM Designator [See U-1(j)]	624
U-3P	Manufacturer's Certificate of Compliance for Plate Heat Exchangers Covering Pressure Vessels to Be Stamped With the UM Designator [See U-1(j)]	626
U-4	Manufacturer's Data Report Supplementary Sheet	628
U-5	Manufacturer's Data Report Supplementary Sheet Shell-and-Tube Heat Exchangers	629
UV-1	Manufacturer's or Assembler's Certificate of Conformance for Pressure Relief Valves	636
UD-1	Manufacturer's Certificate of Conformance for Nonreclosing Pressure Relief Devices	637
QEXP-1	Tube Expanding Procedure Specification (TEPS)	667
QEXP-2	Suggested Format for Tube-to-Tubesheet Expanding Procedure Qualification Record for Test Qualification (TEPQR)	670
U-DR-1	User's Design Requirements for Single-Chamber Pressure Vessels	679
U-DR-2	User's Design Requirements for Multichamber Pressure Vessels	681
ENDNOTES	.....	707

LIST OF SECTIONS

(21)

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 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
 - 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 Power Plants
- XII Rules for Construction and Continued Service of Transport Tanks
- XIII Rules for Overpressure Protection

* In the 2021 Edition, Subsections NC and ND have been incorporated into one publication, Subsection NCD (BPVC.III.1.NCD), Class 2 and Class 3 Components.

INTERPRETATIONS

Interpretations are 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 2021 Code Cases book: "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 up to the publication of the 2023 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. Code Case users can check the current status of any Code Case at <http://go.asme.org/BPVCCDatabase>. Code Case users can also view an index of the complete list of Boiler and Pressure Vessel Code Cases and Nuclear Code Cases at <http://go.asme.org/BPVCC>.

FOREWORD*

(21)

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 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 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

* 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.

requirements of the Code. However, designers and engineers using computer programs for design or analysis are cautioned that they are responsible for all technical assumptions inherent in the programs they use and the application of these programs to their design.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(21) 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 applicable Boiler and Pressure Vessel (BPV) Standards Committee (hereinafter referred to as the Committee). See the guidelines on approval of new materials under the ASME Boiler and Pressure Vessel Code in Section II, Part D for requirements for requests that involve adding new materials to the Code. See the guidelines on approval of new welding and brazing materials in Section II, Part C for requirements for requests that involve adding new welding and brazing materials (“consumables”) to the Code.

Technical inquiries can include requests for revisions or additions to the Code requirements, requests for Code Cases, or requests for Code Interpretations, as described below:

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

(2) *Code Cases.* Code Cases represent alternatives or additions to existing Code requirements. 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 regulators, jurisdictions, or Owners automatically accept Code Cases. The most common applications for Code Cases are as follows:

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

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

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

(3) *Code Interpretations*

(-a) Code Interpretations provide clarification of the meaning of existing requirements in the Code and are presented in Inquiry and Reply format. Interpretations do not introduce new requirements.

(-b) Interpretations will be issued only if existing Code text is ambiguous or conveys conflicting requirements. If a revision of the requirements is required to support the Interpretation, an Intent Interpretation will be issued in parallel with a revision to the Code.

(b) Code requirements, Code Cases, and Code Interpretations established by the Committee 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 requirements.

(c) Inquiries that do not comply with the following guidance or that do not provide sufficient information for the Committee’s full understanding may result in the request being returned to the Inquirer with no action.

2 INQUIRY FORMAT

Submittals to the Committee should include the following information:

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

(1) request for revision of present Code requirements

(2) request for new or additional Code requirements

(3) request for Code Case

(4) request for Code Interpretation

(b) *Background.* The Inquirer should 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. This information should include a statement indicating why the included paragraphs, figures, or tables are ambiguous or convey conflicting requirements. Preferably, the Inquirer should provide a copy of, or relevant extracts from, the specific referenced portions of the Code.