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SECTION III

Rules for Construction of
Nuclear Facility Components

2015

ASME Boiler and
Pressure Vessel Code
An International Code

Division 5

High Temperature Reactors

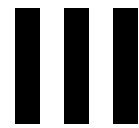
 **ASME**
SETTING THE STANDARD

AN INTERNATIONAL CODE

2015 ASME Boiler & Pressure Vessel Code

2015 Edition

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RULES FOR CONSTRUCTION OF NUCLEAR FACILITY COMPONENTS

Division 5

High Temperature Reactors

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



The American Society of
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TABLE OF CONTENTS

List of Sections	xviii
Foreword	xx
Statement of Policy on the Use of the Certification Mark and Code Authorization in Advertising	xxii
Statement of Policy on the Use of ASME Marking to Identify Manufactured Items	xxii
Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees	xxiii
Personnel	xxv
Organization of Section III	xlii
Summary of Changes	xlvi
List of Changes in Record Number Order	xliv
Cross-Referencing and Stylistic Changes in the Boiler and Pressure Vessel Code	1
Subsection HA	
General Requirements	1
Subpart A	
Metallic Materials	1
Article HAA-1000	
HAA-1100	1
HAA-1110	1
HAA-1120	1
HAA-1130	1
Article HAA-2000	
HAA-2100	3
HAA-2120	3
HAA-2130	3
Article HAA-7000	
HAA-7100	4
Article HAA-8000	
HAA-8100	5
HAA-8110	5
Article HAA-9000	
HAA-9100	6
HAA-9200	6
Subpart B	
Graphite Materials	7
Article HAB-1000	
HAB-1100	7
HAB-1110	7
HAB-1120	7
HAB-1130	7
HAB-1140	7
HAB-1150	7
HAB-1200	8
HAB-1210	8
HAB-1220	8
HAB-1280	8
Article HAB-2000	
Classification of Graphite Core Components	9

HAB-2100	General Requirements	9
HAB-2110	Scope	9
HAB-2130	Design Classes of Graphite Core Components	9
HAB-2140	Design Basis	9
Article HAB-3000	Responsibilities and Duties	11
HAB-3100	General	11
HAB-3110	Responsibilities Versus Legal Liabilities	11
HAB-3120	Certification	11
HAB-3200	Owner's Responsibilities	11
HAB-3220	Categories of the Owner's Responsibilities	11
HAB-3230	Owner's Certificate	12
HAB-3240	Provision of Adequate Supporting Structures	12
HAB-3250	Provision of Design Specifications	12
HAB-3260	Review of Design Report	13
HAB-3280	Owner's Data Report and Filing	13
HAB-3290	Owner's Responsibility for Records	13
HAB-3300	Responsibilities of a Designer	13
HAB-3320	Categories of the Designer's Responsibility	13
HAB-3340	Design Drawings and Construction Specification	14
HAB-3350	Requirements for Design Output Documents	14
HAB-3360	Certification of the Construction Specification, Design Drawings, and Design Report	14
HAB-3370	Revision of Design Drawings and Construction Specification ...	15
HAB-3380	Certification of Construction Report	15
HAB-3400	Responsibilities of a G Certificate Holder	15
HAB-3420	Categories of the G Certificate Holder's Responsibilities	15
HAB-3430	Obtaining a Certificate	15
HAB-3440	Compliance With This Subpart and Subsection HH, Subpart A ..	15
HAB-3450	Construction Documents	15
HAB-3460	Responsibility for Quality Assurance	16
HAB-3800	Graphite Material Organization's Quality System Program	16
HAB-3820	Certification or Qualification of Graphite Material Organizations	16
HAB-3830	Responsibilities of Graphite Material Organizations	17
HAB-3840	Evaluation of the Program	17
HAB-3850	Quality System Program Requirements	18
HAB-3860	Certification Requirements	22
Article HAB-4000	Quality Assurance	25
HAB-4100	Requirements	25
HAB-4110	Scope and Applicability	25
HAB-4120	Definitions	25
HAB-4130	Establishment and Implementation	25
Article HAB-5000	Authorized Inspection	29
HAB-5100	Introduction	29
HAB-5110	Applicability	29
HAB-5120	Performance of Inspection	29
HAB-5130	Access for Inspection Agency Personnel	29
HAB-5200	Duties of Graphite Inspector	30
HAB-5210	General Inspection Duties	30
HAB-5220	Categories of Graphite Inspector's Duties	30
HAB-5230	Scope of Work, Design Specifications, and Design Reports	30
HAB-5240	Quality Assurance Programs	30
HAB-5250	Qualification Records	31
HAB-5260	Materials and Graphite Core Components	31
HAB-5270	Examinations and Tests	31

HAB-5290	Data Reports and Construction Reports	31
HAB-5300	Responsibilities of the Authorized Inspection Agency	31
Article HAB-7000	Reference Standards	32
HAB-7100	General Requirements	32
Article HAB-8000	Certificates and Data Reports	33
HAB-8100	Authorization to Perform Code Activities	33
HAB-8110	General	33
HAB-8120	Scope of Certificates	33
HAB-8130	Inspection Agreement Required	33
HAB-8140	Quality Assurance Program Requirements	33
HAB-8150	Application for Certification	33
HAB-8160	Evaluation	33
HAB-8170	Issuance	33
HAB-8180	Renewal	34
HAB-8200	Nameplates	34
HAB-8400	Data Reports	34
HAB-8410	General Requirements	34
HAB-8420	Owner's Data Report	34
Article HAB-9000	Glossary	36
HAB-9100	Introduction	36
HAB-9200	Definitions	36
Mandatory Appendix HAB-I	Certificate Holder's Data Report Forms, Instructions, and Ap- plication Forms for Certificates of Authorization	38
Subpart C	Composite Materials	39
Article HAC-1000	Introduction	39
HAC-1100	General	39
HAC-1110	Scope	39
Subsection HB	Class A Metallic Pressure Boundary Components	40
Subpart A	Low Temperature Service	40
Article HBA-1000	Introduction	40
HBA-1100	General	40
HBA-1110	Scope	40
Article HBA-8000	Nameplates, Stamping With the Certification Mark, and Re- ports	41
HBA-8100	Requirements	41
Subpart B	Elevated Temperature Service	42
Article HBB-1000	Introduction	42
HBB-1100	General	42
HBB-1110	Scope	42
HBB-1120	Temperature and Service Life Limits	43
HBB-1130	Organization of Subsection HB, Subpart B	43
Article HBB-2000	Material	44
HBB-2100	.....	44
HBB-2120	Pressure-Retaining Materials	44
HBB-2160	Deterioration of Material in Service	44
HBB-2400	.....	45
HBB-2430	.....	45
HBB-2500	.....	45
HBB-2530	.....	45
HBB-2800	Fatigue Acceptance Test	46

Article HBB-3000	Design	47
HBB-3100	General Requirements for Design	47
HBB-3110	Scope, Acceptability, and Loadings	47
HBB-3120	Special Considerations	49
HBB-3130	General Design Rules	49
HBB-3200	Design by Analysis	51
HBB-3210	Design Criteria	51
HBB-3220	Design Rules and Limits for Load-Controlled Stresses in Structures Other Than Bolts	56
HBB-3230	Stress Limits for Load-Controlled Stresses on Bolts	68
HBB-3240	Special Requirements for Elevated Temperature Components	69
HBB-3250	Limits on Deformation-Controlled Quantities	69
HBB-3300	Vessel Designs	69
HBB-3310	General Requirements	69
HBB-3330	Openings and Reinforcement	70
HBB-3350	Design of Welded Construction	71
HBB-3360	Special Vessel Requirements	73
HBB-3400	Design of Class A Pumps	74
HBB-3410	General Requirements	74
HBB-3420	Design Considerations	75
HBB-3430	Pump Types	76
HBB-3500	Design of Class A Valves	76
HBB-3510	Design Requirements	76
HBB-3520		77
HBB-3540		77
HBB-3550	Cyclic Loading Requirements	77
HBB-3600	Piping Design	77
HBB-3610	General Requirements	77
HBB-3620	Design Considerations	78
HBB-3640	Pressure Design of Components	78
HBB-3650	Analysis of Piping Components	80
HBB-3660	Design of Welds	80
HBB-3670	Special Piping Requirements	80
Article HBB-4000	Fabrication and Installation	82
HBB-4100	General Requirements	82
HBB-4110	Introduction	82
HBB-4200		82
HBB-4210		82
HBB-4240	Special Joints and Fittings — Added Rules for Division 1, NB-4240	82
HBB-4400		83
HBB-4420		83
Article HBB-5000	Examination	84
HBB-5100	General Requirements for Examination	84
HBB-5110	General Requirements	84
HBB-5130	Examination of Weld Edge Preparation Surfaces	84
HBB-5200	Required Examination of Welds	84
HBB-5210	Category A Vessel Welded Joints and Longitudinal Welded Joints in Other Components	84
HBB-5220	Category B Vessel Welded Joints and Circumferential Welded Joints in Other Components	84
HBB-5230	Category C Vessel Welded Joints and Similar Welded Joints in Other Components	85
HBB-5240	Category D Vessel Welded Joints and Branch and Piping Con- nections in Other Components	85
HBB-5260	Fillet, Socket, and Attachment Welds	86

Article HBB-6000	Testing	87
HBB-6100	General Requirements	87
HBB-6110	Scope of Testing	87
HBB-6120	Preparation for Testing	88
HBB-6200	Hydrostatic Tests	89
HBB-6210	Hydrostatic Testing Procedure	89
HBB-6220	Hydrostatic Test Pressure Requirements	89
HBB-6300	Pneumatic Tests	90
HBB-6310	Pneumatic Testing Procedures	90
HBB-6320	Pneumatic Test Pressure Requirements	90
HBB-6400	Pressure Test Gages	91
Article HBB-7000	Overpressure Protection	92
HBB-7100	General Requirements	92
HBB-7110	Scope	92
HBB-7130	Verification of the Operation of Pressure Relief Devices	92
HBB-7170	Permitted Use of Pressure Relief Devices	92
HBB-7200	Content of Overpressure Protection Report	92
HBB-7300	Relieving Capacity	92
HBB-7600	Nonreclosing Pressure Relief Devices	93
HBB-7610	Use of Rupture Disk Devices	93
HBB-7620	.....	93
Article HBB-8000	Nameplates, Stamping With the Certification Mark, and Re-	
	ports	94
HBB-8100	Requirements	94
Mandatory Appendix HBB-I-14	Tables and Figures	95
Mandatory Appendix HBB-II	Use of SA-533 Type B, Class 1 Plate and SA-508 Grade 3, Class	
	1 Forgings and Their Weldments for Limited Elevated	
	Temperature Service	140
Nonmandatory Appendix HBB-T	Rules for Strain, Deformation, and Fatigue Limits at Elevated	
	Temperatures	163
Nonmandatory Appendix HBB-U	Guidelines for Restricted Material Specifications to Improve	
	Performance in Certain Service Applications	255
Nonmandatory Appendix HBB-Y	Guidelines for Design Data Needs for New Materials	257
Subsection HC	Class B Metallic Pressure Boundary Components	264
Subpart A	Low Temperature Service	264
Article HCA-1000	Introduction	264
HCA-1100	General	264
HCA-1110	Scope	264
Article HCA-8000	Nameplates, Stamping With the Certification Mark, and Re-	
	ports	265
HCA-8100	Requirements	265
Subpart B	Elevated Temperature Service	266
Article HCB-1000	Introduction	266
HCB-1100	General	266
HCB-1110	Scope	266
HCB-1120	Alternative Design Rules	267
Article HCB-2000	Material	268
HCB-2100	General Requirements for Material	268
HCB-2400	.....	268

HCB-2430	268
HCB-2500	268
HCB-2570	268
Article HCB-3000	Design 269
HCB-3100	General Design 269
HCB-3110	269
HCB-3140	Buckling Instability Loadings 269
HCB-3150	Limitations on Use 270
HCB-3160	Components Containing Lethal or Hazardous Substances 270
HCB-3300	Vessel Design 270
HCB-3310	General Requirements 270
HCB-3400	Pump Design 270
HCB-3500	Valve Design 271
HCB-3510	General Requirements 271
HCB-3600	Piping Design 271
HCB-3630	General Requirements 271
Article HCB-4000	Fabrication and Installation 273
HCB-4100	General Requirements 273
HCB-4160	Components Containing Lethal or Hazardous Substances 273
HCB-4200	273
HCB-4210	273
HCB-4400	274
HCB-4420	274
Article HCB-5000	Examination 275
HCB-5100	General Requirements for Examination 275
HCB-5160	Components Containing Lethal or Hazardous Substances 275
Article HCB-6000	Testing 276
HCB-6100	General Requirements 276
HCB-6110	276
HCB-6600	276
HCB-6630	Alternative Tests of Closure Welds and Access Hatches 276
HCB-6640	Alternative Tests at Specially Designed Welded Seals 276
Article HCB-7000	Overpressure Protection 277
HCB-7100	General Requirements 277
HCB-7110	Scope 277
HCB-7140	277
HCB-7200	277
HCB-7220	Content of Report 277
HCB-7600	278
HCB-7610	278
HCB-7620	278
Article HCB-8000	Nameplates, Stamping With the Certification Mark, and Re-
HCB-8100	ports 279
	Requirements 279
Mandatory Appendix HCB-I	Stress Range Reduction Factor for Piping 280
Mandatory Appendix HCB-II	Allowable Stress Values for Class B Components 284
Mandatory Appendix HCB-III	Time-Temperature Limits for Creep and Stress-Rupture Ef-
	fects 313
Subsection HF	Class A and Class B Metallic Supports 315
Subpart A	Low Temperature Service 315

Article HFA-1000	Introduction	315
HFA-1100	General	315
HFA-1110	Scope	315
Subsection HG	Class A Metallic Core Support Structures	317
Subpart A	Low Temperature Service	317
Article HGA-1000	Introduction	317
HGA-1100	General	317
HGA-1110	Scope	317
Article HGA-8000	Nameplates, Stamping With the Certification Mark, and Re-	
	ports	318
HGA-8100	Requirements	318
Subpart B	Elevated Temperature Service	319
Article HGB-1000	Introduction	319
HGB-1100	General	319
HGB-1110	Scope	319
HGB-1120	.....	320
Article HGB-2000	Material	321
HGB-2100	General Requirements for Material	321
HGB-2120	.....	321
HGB-2160	Deterioration of Material in Service	321
HGB-2400	.....	321
HGB-2430	.....	321
Article HGB-3000	Design	322
HGB-3100	General Design	322
HGB-3110	.....	322
HGB-3120	.....	323
HGB-3130	.....	324
HGB-3200	Design by Analysis	324
HGB-3210	Design Criteria	324
HGB-3220	Design Rules and Limits for Load-Controlled Stresses in Structures	
	Other Than Threaded Structural Fasteners	329
HGB-3230	Stress Limits for Load-Controlled Stresses in Threaded Structural	
	Fasteners	335
HGB-3240	Special Requirements for Elevated Temperature Components ..	336
HGB-3250	Limits on Deformation-Controlled Quantities	336
HGB-3300	.....	337
HGB-3350	.....	337
Article HGB-4000	Fabrication and Installation	338
HGB-4100	General Requirements	338
HGB-4200	.....	338
HGB-4210	.....	338
HGB-4230	.....	338
HGB-4400	.....	339
HGB-4420	.....	339
Article HGB-5000	Examination	340
HGB-5100	General Requirements for Examination	340
HGB-5200	.....	340
HGB-5220	Requirements for Radiography or Ultrasonic and Liquid Penetrant	
	or Magnetic Particle Examination	340
Article HGB-8000	Nameplates, Stamping With the Certification Mark, and Re-	
	ports	346

HGB-8100	Requirements	346
Mandatory Appendix HGB-I	Rules for Strain, Deformation, and Fatigue Limits at Elevated Temperatures	347
Mandatory Appendix HGB-II	Rules for Construction of Core Support Structures, Extended for Restricted Service at Elevated Temperature, Without Explicit Consideration of Creep and Stress-Rupture	348
Mandatory Appendix HGB-III	Buckling and Instability	379
Mandatory Appendix HGB-IV	Time-Temperature Limits	382
Subsection HH	Class A Nonmetallic Core Support Structures	384
Subpart A	Graphite Materials	384
Article HHA-1000	Introduction	384
HHA-1100	Scope	384
HHA-1110	Aspects Covered	384
HHA-1120	Environmental Effects and Limits	384
HHA-1200	Requirements	384
HHA-1210	General	384
HHA-1220	Materials	384
HHA-1230	Design	385
HHA-1240	Graphite Core Component Machining	385
HHA-1250	Installation	385
HHA-1260	Responsibilities	385
HHA-1300	Application of These Rules	385
HHA-1400	Boundaries of Jurisdiction	385
HHA-1410	Boundary Between Graphite Core Components and Core Support Structures	385
HHA-1420	Boundary Between Graphite Core Components and Fuel Pebbles or Compacts	385
HHA-1430	Other Boundaries	385
Article HHA-2000	Materials	388
HHA-2100	General Requirements	388
HHA-2110	Material for Graphite Core Components	388
HHA-2120	Certification of Material	388
HHA-2130	Deterioration of Materials During Service	388
HHA-2140	Material Identification	389
HHA-2200	Material Properties for Design	389
HHA-2210	As-Manufactured Material Properties	389
HHA-2220	Irradiated Material Properties	389
HHA-2230	Oxidized Material Properties	389
HHA-2300	Sampling	389
HHA-2310	General Requirements	389
HHA-2400	Material Manufacturer's Quality System Program	390
HHA-2500	Examination and Repair of Graphite Core Component Material ..	390
HHA-2510	Examination	390
HHA-2520	Repair	390
HHA-2600	Packaging, Transportation, and Storage	390
Article HHA-3000	Design	391
HHA-3100	General Design	391
HHA-3110	Graphite Core Components	391
HHA-3120	Loading Criteria	392
HHA-3130	Nomenclature	392
HHA-3140	Special Considerations	393
HHA-3200	Design by Analysis — Graphite Core Components	394

HH A-3210	Design Criteria for Graphite Core Components	394
HH A-3220	Stress Limits for Graphite Core Component — Simplified Assessment	398
HH A-3230	Probability of Failure Limits for Graphite Core Components — Full Assessment	400
HH A-3240	Experimental Limits — Design by Test	402
HH A-3300	Requirements for Design of the Graphite Core Assembly	403
HH A-3310	General Requirements	403
HH A-3320	Design Considerations	403
HH A-3330	Design of the Graphite Core Assembly	403
Article HH A-4000	Machining, Examination, and Testing	406
HH A-4100	General Requirements	406
HH A-4110	Introduction	406
HH A-4120	Certification of Materials and Machining by the Graphite Core Component Manufacturer	406
HH A-4130	Joining	406
HH A-4200	Machining, Examination, and Testing	406
HH A-4210	Procedures, Qualification, and Evaluation	406
HH A-4220	Graphite Core Component Machining	407
HH A-4230	Graphite Core Component Examination	407
HH A-4240	Graphite Core Component Testing	408
HH A-4250	Graphite Core Component Packaging	408
Article HH A-5000	Installation and Examination	410
HH A-5100	General Requirements	410
HH A-5110	Introduction	410
HH A-5200	Storage, Unpackaging, and Examination	410
HH A-5210	Storage and Unpackaging	410
HH A-5220	Examination of Graphite Core Components	410
HH A-5300	Installation	411
HH A-5310	Documentation	411
HH A-5400	Examination During Installation	411
HH A-5500	Examination Post-Installation	411
Article HH A-8000	Nameplates, Stamping, and Reports	412
HH A-8100	Requirements	412
Mandatory Appendix HH A-I	Graphite Material Specifications	413
Mandatory Appendix HH A-II	Requirements for Preparation of a Material Data Sheet	414
Mandatory Appendix HH A-III	Requirements for Generation of Design Data for Graphite Grades	424
Nonmandatory Appendix HH A-A	Graphite as a Structural Material	429
Nonmandatory Appendix HH A-B	Effects of Fast Neutron Irradiation on Graphite	432
Nonmandatory Appendix HH A-C	Effects of Oxidation on Graphite	433
Nonmandatory Appendix HH A-D	Guidance on Defects and Flaws in Graphite	434
Subpart B	Composite Materials	435
Article HH B-1000	Introduction	435
HH B-1100	General	435
HH B-1110	Scope	435

FIGURES

HBB-3221-1	Flow Diagram for Elevated Temperature Analysis	60
HBB-3224-1	Use-Fractions for Membrane Stress	62

HBB-3224-2	Use-Fractions for Membrane Plus Bending Stress	63
HBB-3351-1	Welded Joint Locations Typical of Categories A, B, C, and D	72
HBB-3352-1	Typical Butt Joints	72
HBB-3354-1	Permissible Attachment Weld Location	73
HBB-3361-1	Category A and B Joints Between Sections of Unequal Thickness	74
HBB-3410.2-1	Typical Single Volute Casing	75
HBB-3410.2-2	Typical Double Volute Casing	75
HBB-3421.11-1	Minimum Tangential Inlet and Outlet Wall Thickness	76
HBB-4212-1	Permissible Time/Temperature Conditions for Material Which Has Been Cold Worked > 5% and < 20% and Subjected to Short-Time High Temperature Transients	83
HBB-I-14.3A	S_{mt} — Type 304 SS	99
HBB-I-14.3B	S_{mt} — Type 316 SS	101
HBB-I-14.3C	S_{mt} — Ni-Fe-Cr (Alloy 800H)	103
HBB-I-14.3D	S_{mt} — $2\frac{1}{4}$ Cr-1Mo	105
HBB-I-14.3E	S_{mt} — 9Cr-1Mo-V	107
HBB-I-14.4A	S_t — Type 304 SS	109
HBB-I-14.4B	S_t — Type 316 SS	111
HBB-I-14.4C	S_t — Ni-Fe-Cr (Alloy 800H)	113
HBB-I-14.4D	S_t — $2\frac{1}{4}$ Cr-1Mo	115
HBB-I-14.4E	S_t — 9Cr-1Mo-V	117
HBB-I-14.6A	Minimum Stress-to-Rupture	120
HBB-I-14.6B	Minimum Stress-to-Rupture	122
HBB-I-14.6C	Minimum Stress-to-Rupture — Ni-Fe-Cr (Alloy 800H)	124
HBB-I-14.6D	$2\frac{1}{4}$ Cr-1Mo — 100% of the Minimum Stress-to-Rupture	126
HBB-I-14.6E	Minimum Stress-to-Rupture, Alloy 718	127
HBB-I-14.6F	9Cr-1Mo-V — Expected Minimum Stress-to-Rupture, ksi (MPa)	128
HBB-I-14.13A	S_{mt} — Allowable Stress Intensity, Type 304 SS, Bolting	138
HBB-I-14.13B	S_{mt} — Allowable Stress Intensity, Type 316 SS, Bolting	138
HBB-I-14.13C	S_{mt} — Allowable Stress, Alloy 718, Bolting	139
HBB-II-3000-1	S_{mt} Values for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	143
HBB-II-3000-2	S_t Allowable Stress Intensity Values for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	144
HBB-II-3000-3	Stress-to-Rupture (Minimum) for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	145
HBB-II-3000-4	Isochronous Stress-Strain Curves for 700°F (371°C) for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	146
HBB-II-3000-5	Isochronous Stress-Strain Curves for 750°F (399°C) for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	147
HBB-II-3000-6	Isochronous Stress-Strain Curves for 800°F (427°C) for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	148
HBB-II-3000-7	Isochronous Stress-Strain Curves for 850°F (454°C) for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	149
HBB-II-3000-8	Isochronous Stress-Strain Curves for 900°F (482°C) for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	150
HBB-II-3000-9	Isochronous Stress-Strain Curves for 950°F (510°C) for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	151
HBB-II-3000-10	Isochronous Stress-Strain Curves for 1,000°F (538°C) for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	152
HBB-II-3000-11	Design Fatigue Strain Range for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	153
HBB-II-3000-12	Creep-Fatigue Damage Envelope for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	154
HBB-II-3000-13	S_t Versus Time-Isothermal Curves for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	155
HBB-II-3000-14	Minimum Stress Rupture as a Function of Time and Temperature for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	156
HBB-T-1332-1	Effective Creep Stress Parameter Z for Simplified Inelastic Analysis Using Test Nos. B-1 and B-3	167
HBB-T-1332-2	Effective Creep Stress Parameter Z for Simplified Inelastic Analysis Using Test No. B-2	168

HBB-T-1420-1A	Design Fatigue Strain Range, ϵ_t , for 304 SS	172
HBB-T-1420-1B	Design Fatigue Strain Range, ϵ_t , for 316 SS	174
HBB-T-1420-1C	Design Fatigue Strain Range, ϵ_t , for Ni-Fe-Cr Alloy 800H	176
HBB-T-1420-1D	Design Fatigue Strain Range, ϵ_t , for 2 $\frac{1}{4}$ Cr-1Mo Steel	178
HBB-T-1420-1E	Design Fatigue Strain Range, ϵ_t , for 9Cr-1Mo-V Steel	179
HBB-T-1420-2	Creep-Fatigue Damage Envelope	180
HBB-T-1432-1	Stress-Strain Relationship	180
HBB-T-1432-2	Inelastic Multiaxial Adjustments	181
HBB-T-1432-3	Adjustment for Inelastic Biaxial Poisson's Ratio	181
HBB-T-1433-1	Methods of Determining Relaxation	182
HBB-T-1433-2	Stress-Relaxation Limits for Creep Damage	183
HBB-T-1433-3	Stress-Relaxation Limits for Creep Damage	183
HBB-T-1433-4	Envelope Stress-Time History for Creep Damage Assessment	184
HBB-T-1522-1	Time-Temperature Limits for Application of Section II External Pressure Charts	187
HBB-T-1522-2	Time-Temperature Limits for Application of Section II External Pressure Charts	188
HBB-T-1522-3	Temperature Limits for Application of Section II External Pressure Charts	189
HBB-T-1800-A-1	Average Isochronous Stress-Strain Curves	191
HBB-T-1800-A-2	Average Isochronous Stress-Strain Curves	192
HBB-T-1800-A-3	Average Isochronous Stress-Strain Curves	193
HBB-T-1800-A-4	Average Isochronous Stress-Strain Curves	194
HBB-T-1800-A-5	Average Isochronous Stress-Strain Curves	195
HBB-T-1800-A-6	Average Isochronous Stress-Strain Curves	196
HBB-T-1800-A-7	Average Isochronous Stress-Strain Curves	197
HBB-T-1800-A-8	Average Isochronous Stress-Strain Curves	198
HBB-T-1800-A-9	Average Isochronous Stress-Strain Curves	199
HBB-T-1800-A-10	Average Isochronous Stress-Strain Curves	200
HBB-T-1800-A-11	Average Isochronous Stress-Strain Curves	201
HBB-T-1800-A-12	Average Isochronous Stress-Strain Curves	202
HBB-T-1800-A-13	Average Isochronous Stress-Strain Curves	203
HBB-T-1800-A-14	Average Isochronous Stress-Strain Curves	204
HBB-T-1800-A-15	Average Isochronous Stress-Strain Curves	205
HBB-T-1800-B-1	Average Isochronous Stress-Strain Curves	206
HBB-T-1800-B-2	Average Isochronous Stress-Strain Curves	207
HBB-T-1800-B-3	Average Isochronous Stress-Strain Curves	208
HBB-T-1800-B-4	Average Isochronous Stress-Strain Curves	209
HBB-T-1800-B-5	Average Isochronous Stress-Strain Curves	210
HBB-T-1800-B-6	Average Isochronous Stress-Strain Curves	211
HBB-T-1800-B-7	Average Isochronous Stress-Strain Curves	212
HBB-T-1800-B-8	Average Isochronous Stress-Strain Curves	213
HBB-T-1800-B-9	Average Isochronous Stress-Strain Curves	214
HBB-T-1800-B-10	Average Isochronous Stress-Strain Curves	215
HBB-T-1800-B-11	Average Isochronous Stress-Strain Curves	216
HBB-T-1800-B-12	Average Isochronous Stress-Strain Curves	217
HBB-T-1800-B-13	Average Isochronous Stress-Strain Curves	218
HBB-T-1800-B-14	Average Isochronous Stress-Strain Curves	219
HBB-T-1800-B-15	Average Isochronous Stress-Strain Curves	220
HBB-T-1800-C-1	Average Isochronous Stress-Strain Curves	221
HBB-T-1800-C-2	Average Isochronous Stress-Strain Curves	222
HBB-T-1800-C-3	Average Isochronous Stress-Strain Curves	223
HBB-T-1800-C-4	Average Isochronous Stress-Strain Curves	224
HBB-T-1800-C-5	Average Isochronous Stress-Strain Curves	225
HBB-T-1800-C-6	Average Isochronous Stress-Strain Curves	226
HBB-T-1800-C-7	Average Isochronous Stress-Strain Curves	227
HBB-T-1800-C-8	Average Isochronous Stress-Strain Curves	228
HBB-T-1800-C-9	Average Isochronous Stress-Strain Curves	229
HBB-T-1800-C-10	Average Isochronous Stress-Strain Curves	230

HBB-T-1800-C-11	Average Isochronous Stress–Strain Curves	231
HBB-T-1800-C-12	Average Isochronous Stress–Strain Curves	232
HBB-T-1800-D-1	Average Isochronous Stress–Strain Curves	233
HBB-T-1800-D-2	Average Isochronous Stress–Strain Curves	234
HBB-T-1800-D-3	Average Isochronous Stress–Strain Curves	235
HBB-T-1800-D-4	Average Isochronous Stress–Strain Curves	236
HBB-T-1800-D-5	Average Isochronous Stress–Strain Curves	237
HBB-T-1800-D-6	Average Isochronous Stress–Strain Curves	238
HBB-T-1800-D-7	Average Isochronous Stress–Strain Curves	239
HBB-T-1800-D-8	Average Isochronous Stress–Strain Curves	240
HBB-T-1800-D-9	Average Isochronous Stress–Strain Curves	241
HBB-T-1800-D-10	Average Isochronous Stress–Strain Curves	242
HBB-T-1800-D-11	Average Isochronous Stress–Strain Curves	243
HBB-T-1800-E-1	Average Isochronous Stress–Strain Curves	244
HBB-T-1800-E-2	Average Isochronous Stress–Strain Curves	245
HBB-T-1800-E-3	Average Isochronous Stress–Strain Curves	246
HBB-T-1800-E-4	Average Isochronous Stress–Strain Curves	247
HBB-T-1800-E-5	Average Isochronous Stress–Strain Curves	248
HBB-T-1800-E-6	Average Isochronous Stress–Strain Curves	249
HBB-T-1800-E-7	Average Isochronous Stress–Strain Curves	250
HBB-T-1800-E-8	Average Isochronous Stress–Strain Curves	251
HBB-T-1800-E-9	Average Isochronous Stress–Strain Curves	252
HBB-T-1800-E-10	Average Isochronous Stress–Strain Curves	253
HBB-T-1800-E-11	Average Isochronous Stress–Strain Curves	254
HBB-Y-3000-1	Conceptual Creep–Fatigue Damage Envelope	261
HCB-4215-1	Permissible Time/Temperature Conditions for Material That Has Been Cold Worked > 5% and < 20% and Subjected to Short-Time, High-Temperature Transients	274
HCB-II-1000-1	Determination of Allowable Stress, S , for Class B Components	285
HCB-III-1000-1	Time–Temperature Limits for Service Level A and B Events	314
HGB-3224-1	Use-Fractions for Membrane Stress	333
HGB-3224-2	Use-Fractions for Membrane Plus Bending Stress	333
HGB-5223-1	Full Penetration Corner Weld Details for Category C Joints	342
HGB-5224.2-1	Nozzles Joined by Full Penetration Corner Welds	343
HGB-5224.3-1	Deposited Weld Metal Used as Reinforcement of Openings for Nozzles	344
HGB-5224.4-1	Oblique Connections	345
HGB-IV-1000-1	Time at Elevated Temperature, hr	383
HHA-1400-1	Jurisdictional Boundary for Graphite Core Components and Assemblies — Circumferential Section View	386
HHA-1400-2	Jurisdictional Boundary for Graphite Core Components and Assemblies — Longitudinal Section View	387
HHA-3141-1	Dependence of Strength on Weight Loss in Uniformly Oxidized Graphite of Classes IIHP or INHP	404
HHA-3141-2	Dependence of Strength on Weight Loss in Uniformly Oxidized Graphite of Classes EIHP, ENHP, MIHP, and MNHP	404
HHA-3221-1	Design Allowable Stresses Flowchart for SRC-1 Graphite Core Component	405
HHA-II-3100-1	Correction Factor T of the Shape Parameter M of Two-Parameter Weibull Distribution ($\gamma = 0.95$)	421
HHA-II-3100-2	Correction Factor T' of the Characteristic Value S_c of Two-Parameter Weibull Distribution ($\gamma = 0.95$)	422
HHA-A-1100-1	.....	429
HHA-1160-1	Extrusion	430
HHA-1160-2	Molding	431

TABLES

HAA-1130-1	Values of $T_{\max}$ for Various Classes of Permitted Materials	2
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HAA-7100-1	Standards and Specifications Referenced in Division 5 Associated With Metallic Components	4
HAB-3255-1	Document Distribution for Design and Construction of Graphite Core Components and Assemblies	24
HAB-4134.17-1	Lifetime Quality Assurance Records	27
HAB-4134.17-2	Nonpermanent Quality Assurance Records	28
HAB-7100-1	Standards and Specifications Referenced in This Subpart and Subsection HH, Subpart A	32
HAB-8100-1	Certificates Issued by the Society for Construction of Nuclear Graphite Core Components and Assemblies	34
HBB-3133-1	Size Restrictions on Connections	50
HBB-3217-1	Classification of Stress Intensity in Vessels for Some Typical Cases	57
HBB-3217-2	Classification of Stress Intensity in Piping, Typical Cases	59
HBB-3225-1	Tensile Strength Values, S_u	65
HBB-3225-2	Tensile and Yield Strength Reduction Factor Due to Long Time Prior Elevated Temperature Service	66
HBB-3225-3A	Yield Strength Reduction Factors for $2\frac{1}{4}$ Cr-1Mo	66
HBB-3225-3B	Tensile Strength Reduction Factors for $2\frac{1}{4}$ Cr-1Mo	67
HBB-3225-4	Tensile Strength Reduction Factors for 9Cr-1Mo-V	68
HBB-3642.1-1	Bend Radius Versus Thickness	78
HBB-I-14.1(a)	Permissible Base Materials for Structures Other Than Bolting	96
HBB-I-14.1(b)	Permissible Weld Materials	97
HBB-I-14.2	S_o — Maximum Allowable Stress Intensity, ksi (MPa), for Design Condition Calculations	98
HBB-I-14.3A	S_{mt} — Allowable Stress Intensity Values, 1,000 psi, Type 304 SS — 30-YS, 75-UTS (30-YS, 70-UTS)	100
HBB-I-14.3B	S_{mt} — Allowable Stress Intensity Values, 1,000 psi, Type 316 SS — 30-YS, 75-UTS (30-YS, 70-UTS)	102
HBB-I-14.3C	S_{mt} — Allowable Stress Intensity Values, ksi (MPa), Ni-Fe-Cr (Alloy 800H)	104
HBB-I-14.3D	S_{mt} — Allowable Stress Intensity Values, ksi (MPa), $2\frac{1}{4}$ Cr-1Mo	106
HBB-I-14.3E	S_{mt} — Allowable Stress Intensity Values, ksi (MPa), 9Cr-1Mo-V	108
HBB-I-14.4A	S_t — Allowable Stress Intensity Values, 1,000 psi (MPa), Type 304 SS	110
HBB-I-14.4B	S_t — Allowable Stress Intensity Values, 1,000 psi (MPa), Type 316 SS	112
HBB-I-14.4C	S_t — Allowable Stress Intensity Values, ksi (MPa), Ni-Fe-Cr (Alloy 800H)	114
HBB-I-14.4D	S_t — Allowable Stress Intensity Values, ksi (MPa), $2\frac{1}{4}$ Cr-1Mo	116
HBB-I-14.4E	S_t — Allowable Stress Intensity Values, ksi (MPa), 9Cr-1Mo-V	118
HBB-I-14.5	Yield Strength Values, S_y , Versus Temperature	119
HBB-I-14.6A	Expected Minimum Stress-to-Rupture Values, 1,000 psi (MPa), Type 304 SS	121
HBB-I-14.6B	Expected Minimum Stress-to-Rupture Values, 1,000 psi (MPa), Type 316 SS	123
HBB-I-14.6C	Expected Minimum Stress-to-Rupture Values, ksi (MPa), Ni-Fe-Cr (Alloy 800H)	125
HBB-I-14.6D	$2\frac{1}{4}$ Cr-1Mo — Expected Minimum Stress-to-Rupture Values, ksi (MPa)	126
HBB-I-14.6E	Expected Minimum Stress-to-Rupture Values, ksi (MPa), Ni-Cr-Fe-Mo-Cb (Alloy 718) ..	127
HBB-I-14.6F	9Cr-1Mo-V, S_r — Expected Minimum Stress-to-Rupture Values, ksi (MPa)	128
HBB-I-14.10A-1	Stress Rupture Factors for Type 304 Stainless Steel Welded With SFA-5.22 E 308T and E 308LT; SFA-5.4 E 308 and E 308L; and SFA-5.9 ER 308 and ER 308L	129
HBB-I-14.10A-2	Stress Rupture Factors for Type 304 Stainless Steel Welded With SFA-5.22 EXXXT-G (16-8-2 Chemistry); SFA-5.4 E 16-8-2; and SFA-5.9 ER 16-8-2	129
HBB-I-14.10A-3	Stress Rupture Factors for Type 304 Stainless Steel Welded With SFA-5.22 E 316T and E 316LT-1, -2, and -3; SFA-5.4 E 316 and E 316L; and SFA-5.9 ER 316 and ER 316L ..	130
HBB-I-14.10B-1	Stress Rupture Factors for Type 316 Stainless Steel Welded With SFA-5.22 E 308T and E 308L T; SFA-5.4 E 308 and E 308L; and SFA-5.9 ER 308 and ER 308L	131
HBB-I-14.10B-2	Stress Rupture Factors for Type 316 Stainless Steel Welded With SFA-5.22 EXXXT-G (16-8-2 Chemistry); SFA-5.4 E 16-8-2; and SFA-5.9 ER 16-8-2	132
HBB-I-14.10B-3	Stress Rupture Factors for Type 316 Stainless Steel Welded With SFA-5.22 E 316T and E 316LT-1 and -2; SFA-5.4 E 316 and E 316L; and SFA-5.9 ER 316 and ER 316L	133
HBB-I-14.10C-1	Stress Rupture Factors for Alloy 800H Welded With SFA-5.11 ENiCrFe-2 (INCO A)	134
HBB-I-14.10C-2	Stress Rupture Factors for Alloy 800H Welded With SFA-5.14 ERNiCr-3 (INCO 82)	135

HBB-I-14.10D-1	Stress Rupture Factors for $2\frac{1}{4}\text{Cr-1Mo}$ (60/30) Welded With SFA-5.28 E 90C-B3; SFA-5.28 ER 90S-B3; SFA-5.5 E 90XX-B3 (> 0.05C); SFA-5.23 EB 3; SFA-5.23 ECB 3 (> 0.05C); SFA-5.29 E 90T1-B3 (> 0.05C)	136
HBB-I-14.10E-1	Stress Rupture Factors for 9Cr-1Mo-V Welded With SFA-5.28 ER 90S-B9; SFA-5.5 E90XX-B9; SFA-5.23 EB9	136
HBB-I-14.11	Permissible Materials for Bolting	137
HBB-I-14.12	S_o Values for Design Conditions Calculation of Bolting Materials S_o Maximum Allowable Stress Intensity, ksi (MPa)	137
HBB-I-14.13C	S_{mt} — Allowable Stress Values, ksi (MPa), Alloy 718, Bolting	139
HBB-II-3000-1	S_{mt} — Allowable Stress Intensity Values for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1, ksi (MPa)	156
HBB-II-3000-2	S_t — Allowable Stress Intensity Values for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1, ksi (MPa)	157
HBB-II-3000-3	Allowable Stress Intensity Values for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1, S_m Yield Strength and Tensile Strength Versus Temperature	157
HBB-II-3000-4	Expected Minimum Stress-to-Rupture Values for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1, ksi (MPa)	157
HBB-II-3000-5	Modulus of Elasticity Versus Temperature for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	157
HBB-II-3000-6	Instantaneous Coefficient of Thermal Expansion Versus Temperature for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	158
HBB-II-3000-7	Mean Coefficient of Thermal Expansion Versus Temperature for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1	158
HBB-II-3000-8	Design Fatigue Strain Range for SA-533 Type B, Class 1 and SA-508 Grade 3, Class 1 Up to 1,000°F (540°C)	158
HBB-T-1323	Temperatures at Which $S_m = S_t$ at 10^5 hr	164
HBB-T-1324	Values of the r and s Parameters	165
HBB-T-1411-1	.....	170
HBB-T-1521-1	Time-Independent Buckling Factors	186
HBB-T-1522-1	Time-Dependent Load-Controlled Buckling Factors	186
HBB-T-1820-1	.....	190
HBB-U-1	Recommended Restrictions	256
HCB-I-2000-1	Stress Range Reduction Factor	281
HCB-I-2000-2	Maximum Number of Cycles, N_1 , Permissible With $f = 1$	282
HCB-II-2000-1	Allowable Stress Values for Ferritic Steel Class B Components	288
HCB-II-2000-2	Allowable Stress Values for Class B Bolting Materials	293
HCB-II-2000-3	Allowable Stress Values for Austenitic Steel Class B Components	295
HCB-II-2000-4	Allowable Stress Values for High-Nickel Alloy Class B Components	302
HCB-II-2000-5	Reduction Factors for Aging	303
HCB-II-3000-1	Allowable Stress Values for Ferritic Steel Class B Components	304
HCB-II-3000-2	Allowable Stress Values for Class B Bolting	306
HCB-II-3000-3	Allowable Stress Values for Austenitic Steel Class B Components	307
HCB-II-3000-4	Allowable Stress Values for High-Nickel Alloy Class B Components	310
HCB-II-3000-5	Reduction Factors to Be Applied to Parent Metal Allowable Stresses for 304 SS Weldments	311
HCB-II-3000-6	Reduction Factors to Be Applied to Parent Metal Allowable Stresses for 316 SS Weldments	311
HCB-II-3000-7	Reduction Factors to Be Applied to Parent Metal Allowable Stresses for Alloy 800H Weldments	311
HCB-II-3000-8	Reduction Factors to Be Applied to Parent Metal Allowable Stresses for $2\frac{1}{4}\text{Cr-1Mo}$ Weldments	312
HCB-II-3000-9	Reduction Factors to Be Applied to Parent Metal Allowable Stresses for Modified 9Cr-1Mo Weldments	312
HCB-III-1000-1	Maximum Metal Temperatures During Level C Events	314
HGB-3217-1	Classification of Stress Intensity for Some Typical Cases	330

HGB-II-2121-1	Design Stress Intensity Values, S_m , for Ferritic Steels at Elevated Temperatures in Core Support Structure Applications	350
HGB-II-2121-2	Design Stress Intensity Values, S_m , for Ferritic Steels at Elevated Temperatures in Threaded Structural Fastener Applications	352
HGB-II-2121-3	Design Stress Intensity Values, S_m , for Austenitic and High Nickel Alloys at Elevated Temperatures in Core Support Structure Applications	354
HGB-II-2121-4	Design Stress Intensity Values, S_m , for Austenitic and High Nickel Alloys at Elevated Temperatures in Threaded Structural Fastener Applications	357
HGB-II-3222.4-1	Design Fatigue Limits for Solution Annealed Type 304SS	364
HGB-II-3222.4-2	Design Fatigue Limits for Solution Annealed Type 316SS	365
HGB-II-3222.4-3	Design Fatigue Limits for Ni-Cr-Fe Alloy 800H	366
HGB-II-3222.4-4	Design Fatigue Limits for 2 $\frac{1}{4}$ Cr-1Mo Steel	367
HGB-II-3229-1	Yield Strength Values, S_y , for Ferritic Steels at Elevated Temperatures in Core Support Structure Applications	368
HGB-II-3229-2	Yield Strength Values, S_y , for Ferritic Steels at Elevated Temperatures in Threaded Structural Fastener Applications	370
HGB-II-3229-3	Yield Strength Values, S_y , for Austenitic and High Nickel Alloys at Elevated Temperatures in Core Support Structure and Threaded Structural Fastener Applications	372
HGB-II-3229-4	Tensile Strength Values, S_u , for Ferritic Steels at Elevated Temperatures in Core Support Structure Applications	373
HGB-II-3229-5	Tensile Strength Values, S_u , for Ferritic Steels at Elevated Temperatures in Threaded Structural Fastener Applications	375
HGB-II-3229-6	Tensile Strength Values, S_u , for Austenitic and High Nickel Alloys at Elevated Temperatures in Core Support Structure and Threaded Structural Fastener Applications	376
HGB-III-2000-1	Time-Independent Buckling Limits	380
HHA-3221-1	Design Allowable Probability of Failure	405
HHA-4222-1	Prohibited and Controlled Substances	409
HHA-II-2000-1	Notes on Material Data Sheet, Forms MDS-1 and MDS-2	418
FORMS		
MDS-1	Material Data Sheet (SI Units)	416
MDS-2	Material Data Sheet (U.S. Customary)	417
ENDNOTES		437

(15)

LIST OF SECTIONS

SECTIONS

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

* The 2015 Edition of Section III is the last edition in which Section III, Division 1, Subsection NH, *Class 1 Components in Elevated Temperature Service*, will be published. The requirements located within Subsection NH have been moved to Section III, Division 5, Subsection HB, Subpart B for the elevated temperature construction of Class A components.

INTERPRETATIONS

Interpretations of the Code have historically been posted in January and July at <http://cstools.asme.org/interpretations.cfm>. Interpretations issued during the previous two calendar years are included with the publication of the applicable Section of the Code in the 2015 Edition. Interpretations of Section III, Divisions 1 and 2 and Section III Appendices are included with Subsection NCA.

Following the 2015 Edition, interpretations will not be included in editions; they will be issued in real time in ASME's Interpretations Database at <http://go.asme.org/Interpretations>. Historical BPVC interpretations may also be found in the Database.

CODE CASES

The Boiler and Pressure Vessel Code committees meet regularly to consider proposed additions and revisions to the Code and to formulate Cases to clarify the intent of existing requirements or provide, when the need is urgent, rules for materials or constructions not covered by existing Code rules. Those Cases that have been adopted will appear in the appropriate 2015 Code Cases book: "Boilers and Pressure Vessels" or "Nuclear Components." Supplements will be sent or made available automatically to the purchasers of the Code Cases books up to the publication of the 2017 Code.

FOREWORD*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The Certification Mark shall be used only for stamping and nameplates as specifically provided in the Code. However, facsimiles may be used for the purpose of fostering the use of such construction. Such usage may be by an association or a society, or by a holder of the Certification Mark who may also use the facsimile in advertising to show that clearly specified items will carry the Certification Mark. General usage is permitted only when all of a manufacturer’s items are constructed under the rules.

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

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

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

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

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

1 INTRODUCTION

(a) The following information provides guidance to Code users for submitting technical inquiries to the committees. See Guideline on the Approval of New Materials Under the ASME Boiler and Pressure Vessel Code in Section II, Parts C and D for additional requirements for requests involving adding new materials to the Code. Technical inquiries include requests for revisions or additions to the Code rules, requests for Code Cases, and requests for Code Interpretations, as described below.

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

(2) *Code Cases.* Code Cases represent alternatives or additions to existing Code rules. Code Cases are written as a question and reply, and are usually intended to be incorporated into the Code at a later date. When used, Code Cases prescribe mandatory requirements in the same sense as the text of the Code. However, users are cautioned that not all jurisdictions or owners automatically accept Code Cases. The most common applications for Code Cases are:

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

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

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

(3) *Code Interpretations.* Code Interpretations provide clarification of the meaning of existing rules in the Code, and are also presented in question and reply format. Interpretations do not introduce new requirements. In cases where existing Code text does not fully convey the meaning that was intended, and revision of the rules is required to support an interpretation, an Intent Interpretation will be issued and the Code will be revised.

(b) The Code rules, Code Cases, and Code Interpretations established by the committees are not to be considered as approving, recommending, certifying, or endorsing any proprietary or specific design, or as limiting in any way the freedom of manufacturers, constructors, or owners to choose any method of design or any form of construction that conforms to the Code rules.

(c) Inquiries that do not comply with these provisions or that do not provide sufficient information for a committee's full understanding may result in the request being returned to the inquirer with no action.

2 INQUIRY FORMAT

Submittals to a committee shall include:

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

(1) revision of present Code rules

(2) new or additional Code rules

(3) Code Case

(4) Code Interpretation

(b) *Background.* Provide the information needed for the committee's understanding of the inquiry, being sure to include reference to the applicable Code Section, Division, edition, addenda (if applicable), paragraphs, figures, and tables. Preferably, provide a copy of the specific referenced portions of the Code.

(c) *Presentations.* The inquirer may desire or be asked to attend a meeting of the committee to make a formal presentation or to answer questions from the committee members with regard to the inquiry. Attendance at a committee meeting shall be at the expense of the inquirer. The inquirer's attendance or lack of attendance at a meeting shall not be a basis for acceptance or rejection of the inquiry by the committee.

3 CODE REVISIONS OR ADDITIONS

Requests for Code revisions or additions shall provide the following:

(a) *Proposed Revisions or Additions.* For revisions, identify the rules of the Code that require revision and submit a copy of the appropriate rules as they appear in the Code, marked up with the proposed revision. For additions, provide the recommended wording referenced to the existing Code rules.

(b) *Statement of Need.* Provide a brief explanation of the need for the revision or addition.

(c) *Background Information.* Provide background information to support the revision or addition, including any data or changes in technology that form the basis for the request that will allow the committee to adequately evaluate the proposed revision or addition. Sketches, tables, figures, and graphs should be submitted as appropriate. When applicable, identify any pertinent paragraph in the Code that would be affected by the revision or addition and identify paragraphs in the Code that reference the paragraphs that are to be revised or added.

4 CODE CASES

Requests for Code Cases shall provide a Statement of Need and Background Information similar to that defined in 3(b) and 3(c), respectively, for Code revisions or additions. The urgency of the Code Case (e.g., project underway or imminent, new procedure, etc.) must be defined and it must be confirmed that the request is in connection with equipment that will bear the Certification Mark, with the exception of Section XI applications. The proposed Code Case should identify the Code Section and Division, and be written as a *Question* and a *Reply* in the same format as existing Code Cases. Requests for Code Cases should also indicate the applicable Code editions and addenda (if applicable) to which the proposed Code Case applies.

5 CODE INTERPRETATIONS

(a) Requests for Code Interpretations shall provide the following:

(1) *Inquiry.* Provide a condensed and precise question, omitting superfluous background information and, when possible, composed in such a way that a “yes” or a “no” *Reply*, with brief provisos if needed, is acceptable. The question should be technically and editorially correct.

(2) *Reply.* Provide a proposed *Reply* that will clearly and concisely answer the *Inquiry* question. Preferably, the *Reply* should be “yes” or “no,” with brief provisos if needed.

(3) *Background Information.* Provide any background information that will assist the committee in understanding the proposed *Inquiry* and *Reply*.

(b) Requests for Code Interpretations must be limited to an interpretation of a particular requirement in the Code or a Code Case. The committee cannot consider consulting type requests such as the following:

(1) a review of calculations, design drawings, welding qualifications, or descriptions of equipment or parts to determine compliance with Code requirements;

(2) a request for assistance in performing any Code-prescribed functions relating to, but not limited to, material selection, designs, calculations, fabrication, inspection, pressure testing, or installation;

(3) a request seeking the rationale for Code requirements.

6 SUBMITTALS

Submittals to and responses from the committees shall meet the following:

(a) *Submittal.* Inquiries from Code users shall be in English and preferably be submitted in typewritten form; however, legible handwritten inquiries will also be considered. They shall include the name, address, telephone number, fax number, and e-mail address, if available, of the inquirer and be mailed to the following address:

Secretary
ASME Boiler and Pressure Vessel Committee
Two Park Avenue
New York, NY 10016-5990

As an alternative, inquiries may be submitted via e-mail to: SecretaryBPV@asme.org or via our online tool at <http://go.asme.org/InterpretationRequest>.

(b) *Response.* The Secretary of the appropriate committee shall acknowledge receipt of each properly prepared inquiry and shall provide a written response to the inquirer upon completion of the requested action by the committee.

PERSONNEL

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January 1, 2015

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ORGANIZATION OF SECTION III

1 GENERAL

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

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

2 SUBSECTIONS

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

* The 2015 Edition of Section III is the last edition in which Section III, Division 1, Subsection NH, *Class 1 Components in Elevated Temperature Service*, will be published. The requirements located within Subsection NH have been moved to Section III, Division 5, Subsection HB, Subpart B for the elevated temperature construction of Class A components.

3 ARTICLES

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

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

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

4 SUBARTICLES

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

5 SUBSUBARTICLES

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

6 PARAGRAPHS

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

7 SUBPARAGRAPHS

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

8 SUBSUBPARAGRAPHS

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

9 REFERENCES

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

(a) *References to Other Portions of Section III.* When a reference is made to another Article, subarticle, or paragraph, all numbers subsidiary to that reference shall be included. For example, reference to NB-3000 includes all material in Article NB-3000; reference to NB-3200 includes all material in subarticle NB-3200; reference to NB-3230 includes all paragraphs, NB-3231 through NB-3236.

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

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

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

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

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

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

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

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

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

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

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

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

(1) Section III Appendices are contained in a separate book titled “Appendices.” These appendices have the potential for multiple subsection applicability. Mandatory Appendices are designated by a Roman numeral followed, when appropriate, by Arabic numerals to indicate various articles, subarticles, and paragraphs of the appendix, such as II-1500 or XIII-2131. Nonmandatory Appendices are designated by a capital letter followed, when appropriate, by Arabic numerals to indicate various articles, subarticles, and paragraphs of the appendix, such as D-1200 or Y-1440.

(2) Subsection Appendices are specifically applicable to just one subsection and are contained within that subsection. Subsection-specific mandatory and nonmandatory appendices are numbered in the same manner as Section III Appendices, but with a subsection identifier (e.g., NF, NH, D2, etc.) preceding either the Roman numeral or the capital letter for a unique designation. For example, NF-II-1100 or NF-A-1200 would be part of a Subsection NF mandatory or nonmandatory appendix, respectively. For Subsection CC, D2-IV-1120 or D2-D-1330 would be part of a Subsection CC mandatory or nonmandatory appendix, respectively.

(3) It is the intent of this Section that the information provided in both Mandatory and Nonmandatory Appendices may be used to meet the rules of any Division or Subsection. In case of conflict between Appendix rules and Division/Subsection rules, the requirements contained in the Division/Subsection shall govern. Additional guidance on Appendix usage is provided in the front matter of Section III Appendices.

^{**} The American National Standards Institute (ANSI) was formerly known as the American Standards Association. Standards approved by the Association were designated by the prefix “ASA” followed by the number of the standard and the year of publication. More recently, the American National Standards Institute was known as the United States of America Standards Institute. Standards were designated by the prefix “USAS” followed by the number of the standard and the year of publication. While the letters of the prefix have changed with the name of the organization, the numbers of the standards have remained unchanged.

SUMMARY OF CHANGES

After publication of the 2015 Edition, Errata to the BPV Code may be posted on the ASME Web site to provide corrections to incorrectly published items, or to correct typographical or grammatical errors in the BPV Code. Such Errata shall be used on the date posted.

Information regarding Special Notices and Errata is published by ASME at <http://go.asme.org/BPVCerrata>.

Changes given below are identified on the pages by a margin note, **(15)**, placed next to the affected area.

The Record Numbers listed below are explained in more detail in “List of Changes in Record Number Order” following this Summary of Changes.

<i>Page</i>	<i>Location</i>	<i>Change (Record Number)</i>
xviii	List of Sections	Revised
xx	Foreword	(1) Revised (2) New footnote added by errata (13-860)
xxiii	Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees	In last line of 6(a), URL revised
xxv	Personnel	Updated
xlii	Organization of Section III	(1) New footnote added (2) 9(d)(3) added (13-1032)
1	HAA-1110	First paragraph revised (13-830)
3	HAA-2120	In first paragraph, second sentence revised (13-830)
40	HBA-1110	First paragraph revised (13-830)
42	HBB-1110	(1) First paragraph revised (13-830) (2) Subparagraphs (b) and (c) deleted and subsequent subparagraphs redesignated (14-26) (3) In subpara. (j), cross-reference to Mandatory Appendix HBB-I revised (14-26) (4) Cross-references to Subsection NH revised (14-26)
43	HBB-1120	Added (14-26)
43	HBB-1130	Added (14-26)
44	Article HBB-2000	Added (formerly Article NH-2000) (14-26)
47	Article HBB-3000	Added (formerly Article NH-3000) (14-26)
48	HBB-3112.2	In subpara. (a), “centigrade” corrected by errata to “Celsius” (11-1074)
82	Article HBB-4000	Added (formerly Article NH-4000) (14-26)
84	Article HBB-5000	Added (formerly Article NH-5000) (14-26)
87	Article HBB-6000	Added (formerly Article NH-6000) (14-26)
92	Article HBB-7000	Added (formerly Article NH-7000) (14-26)

<i>Page</i>	<i>Location</i>	<i>Change (Record Number)</i>
95	Mandatory Appendix HBB-I-14	Added (formerly Mandatory Appendix NH-I-14) (14-26)
140	Mandatory Appendix HBB-II	(1) Former Mandatory Appendix HBB-I redesignated (14-26) (2) In Article HBB-II-1000 (formerly Article HBB-I-1000), last line revised (14-1699) (3) "Class 1" revised to "Class A" throughout Appendix (14-26) (4) Cross-references to Subsection NH revised throughout Appendix (14-26)
163	Nonmandatory Appendix HBB-T	Added (formerly Nonmandatory Appendix NH-T) (14-26)
255	Nonmandatory Appendix HBB-U	Added (formerly Nonmandatory Appendix NH-U) (14-26)
257	Nonmandatory Appendix HBB-Y	Added (11-1195)
264	HCA-1110	In the first paragraph, first sentence revised (13-830)
266	HCB-1110	In the first paragraph, first sentence revised (13-830)
270	HCB-3142	Cross-reference to Subsection NH revised (14-26)
270	HCB-3143	Cross-reference to Subsection NH revised (14-26)
270	HCB-3310	Subparagraph (c) revised (13-50)
270	HCB-3400	Subparagraph (d) revised (13-50)
271	HCB-3510	Subparagraph (c) revised (13-50)
271	HCB-3634	(1) In subpara. (a), first sentence revised (13-50) (2) In the nomenclature below eq. (10c), " ΔT " corrected by errata to " ΔT_i " (14-1174)
284	Article HCB-II-1000	Last line revised (14-1699)
285	Figure HCB-II-1000-1	Revised in its entirety (13-50)
288	Table HCB-II-2000-1	(1) In the ninth column, reference to Note (6) deleted by errata (14-1174) (2) Tenth column head corrected by errata (14-1174) (3) For SA-533 with S_y/S_u 345/550, nominal composition corrected by errata to " $\text{Mn}-\frac{1}{2}\text{Mo}-\frac{3}{4}\text{Ni}$ " (14-1174) (4) For SA-217 with S_y/S_u 275/485, nominal composition corrected by errata to " $1\frac{1}{4}\text{Cr}-\frac{1}{2}\text{Mo}$ " (14-1174) (5) For SA-182, P-No. 5A, Group No. 1, Grade/Type F22, specified minimum strength corrected by errata to "310/515" (14-1174) (6) Note (1)(c) corrected by errata (14-1174)
293	Table HCB-II-2000-2	(1) Ninth column head corrected by errata (14-1174) (2) For SA-193 with S_y/S_u 85/100, nominal composition corrected by errata to " $1\text{Cr}-\frac{1}{2}\text{Mo}-\text{V}$ " (14-1174) (3) Under "Diameter, in." column, " t " corrected by errata to " D "; and for SA-193 with S_y/S_u 105/125, " $2\frac{1}{2}$ " under "Diameter, in." column corrected by errata to " $2\frac{1}{2}$ " (14-1174) (4) For SA-193 with S_y/S_u 655/760 and 585/690, nominal composition corrected by errata to " $1\text{Cr}-\frac{1}{2}\text{Mo}-\text{V}$ " (14-1174)
295	Table HCB-II-2000-3	(1) In the ninth column, reference to Note (6) deleted by errata (14-1174)

<i>Page</i>	<i>Location</i>	<i>Change (Record Number)</i>
		(2) Tenth column head corrected by errata (14-1174)
		(3) Reference Note (1)(c) corrected by errata (14-1174)
302	Table HCB-II-2000-4	(1) Tenth column head corrected by errata (14-1174)
		(2) Reference Note (1) corrected by errata (14-1174)
304	Article HCB-II-3000	In subpara. (d), second sentence revised (13-50)
304	Table HCB-II-3000-1	(1) In the ninth (formerly tenth) column, reference to Note (6) deleted by errata (14-1174)
		(2) For SA-533 with S_y/S_u 50/80 ksi, nominal composition corrected by errata to "Mn- $\frac{1}{2}$ Mo- $\frac{3}{4}$ Ni" (14-1174)
		(3) For SA-217 with S_y/S_u 40/70 ksi, nominal composition corrected by errata to " $\frac{1}{4}$ Cr- $\frac{1}{2}$ Mo" (14-1174)
		(4) For SA-182 and SA-234 with S_y/S_u 30/60 ksi, nominal composition corrected by errata to " $\frac{1}{4}$ Cr-1Mo" (14-1174)
		(5) Note (1)(c) corrected by errata (14-1174)
306	Table HCB-II-3000-2	Under "Diameter, in." column, "t" corrected by errata to "D" (14-1174)
307	Table HCB-II-3000-3	(1) For SA-403 (Grade/Type: WP304), nominal composition, P-No., and Group No. added by errata (14-1174)
		(2) In the ninth (formerly tenth) column, reference to Note (6) deleted by errata (14-1174)
		(3) Note (1)(c) deleted by errata (14-1174)
		(4) In Note (2), cross-reference to Section II, Part D corrected by errata (14-1174)
		(5) In Notes (3) and (4), second sentence corrected by errata (14-1174)
		(6) In Note (11), "in" corrected by errata to "for" (14-1174)
310	Table HCB-II-3000-4	Note (1) corrected by errata (14-1174)
315	HFA-1110	First paragraph revised (13-830)
317	HGA-1110	First paragraph revised (13-830)
319	HGB-1110	First paragraph revised (13-830)
319	HGB-1111	In subpara. (b), cross-references to Subsection NH revised (14-26)
320	HGB-1124	Cross-reference to Subsection NH revised (14-26)
321	HGB-2121	In subpara. (a), cross-references to Subsection NH revised (14-26)
321	HGB-2160	In subpara. (a), cross-reference to Subsection NH revised (14-26)
322	Article HGB-3000	Cross-references to Subsection NH revised throughout Article (14-26)
324	HGB-3132	Revised (12-269)
329	HGB-3220	In the title, "or" corrected by errata to "for" (13-1885)
338	HGB-4212	In subpara. (a)(2), cross-reference to Subsection NH revised (14-26)
347	Article HGB-I-1000	Cross-references to Subsection NH revised throughout Article (14-26)
350	Table HGB-II-2121-1	(1) Tenth column head corrected by errata (14-1174)
		(2) For SA-182 with S_y/S_u 40/70 ksi and 275/485 ksi, nominal composition corrected by errata to " $\frac{1}{4}$ Cr- $\frac{1}{2}$ Mo-Si" (14-1174)
352	Table HGB-II-2121-2	(1) Ninth column head corrected by errata (14-1174)

<i>Page</i>	<i>Location</i>	<i>Change (Record Number)</i>
		(2) Nominal Composition for the first eight entries corrected by errata to "1Cr- $\frac{1}{2}$ Mo-V" (14-1174)
		(3) For SA-193 with S_y/S_u 85/100 ksi, size/thickness corrected by errata to " $4 < t \leq 7$ " (14-1174)
		(4) For SA-540 with S_y/S_u 690/795 MPa, size/thickness corrected by errata to " $50 < t \leq 200$ " (14-1174)
		(5) For SA-193 with S_y/S_u 655/760 MPa, size/thickness corrected by errata to " $64 < t \leq 100$ " (14-1174)
		(6) For SA-193 with S_y/S_u 585/690, MPa, size/thickness corrected by errata to " $100 < t \leq 175$ " (14-1174)
		(7) For SA-336 with S_y/S_u 205/415 MPa, nominal composition corrected by errata to " $2\frac{1}{4}$ Cr-1Mo" (14-1174)
354	Table HGB-II-2121-3	Eighth column head corrected by errata (14-1174)
357	Table HGB-II-2121-4	Eighth column head corrected by errata (14-1174)
363	HGB-II-3228.3	In subpara. (b), the third column head in the in-text table corrected by errata to (14-1174)
367	Table HGB-II-3222.4-4	In first column for U.S. Customary Units, eleventh entry corrected by errata to " 4×10^4 " (14-1174)
368	Table HGB-II-3229-1	For SA-182 with S_y/S_u 40/70 ksi and 275/485 MPa and for SA-387 with S_y/S_u 45/75 ksi and 310/515 MPa, material corrected by errata to " $1\frac{1}{4}$ Cr- $\frac{1}{2}$ Mo-Si" (14-1174)
370	Table HGB-II-3229-2	(1) For SA-193 with S_y 85 ksi and 95 ksi, the first " $\leq$ " corrected by errata to "<" (14-1174) (2) For SA-540 with S_y 100 ksi, the first " $\leq$ " corrected by errata to "<" (14-1174) (3) For SA-540 with S_y 140 ksi, material corrected by errata to "1Cr- $\frac{1}{2}$ Mo-V" (14-1174)
376	Table HGB-II-3229-6	General Note corrected by errata (14-1174)
382	Article HGB-IV-1000	In last line, cross-reference to Subsection NH revised (14-26)
384	HHA-1110	First paragraph revised (13-830)
384	HHA-1120	Last sentence added (13-830)
385	HHA-1300	Subparagraph (a) revised (13-830)
391	HHA-3111	In the last paragraph, last sentence revised (14-1550)
393	HHA-3140	Last sentence added (13-830)
394	HHA-3142.2	Revised (14-1550)
420	HHA-II-3100	Equation (7) corrected by errata (14-1550)

NOTE: Volume 63 of the Interpretations to Section III, Division 5 of the ASME Boiler and Pressure Vessel Code follows the last page of Section III, Division 5.

LIST OF CHANGES IN RECORD NUMBER ORDER

Record Number	Change
11-1195	Added new Nonmandatory Appendix HBB-Y. This Appendix provides guidelines for design data needs of new materials in Division 5, Subsection HB, Subpart B.
12-269	Revised HGB-3132 for clarity and to provide the specific requirement to use HGB-3200 methods for the evaluation of primary stress limits due to loadings other than internal pressure difference.
13-50	Revised to clarify/incorporate the Level D Service Limits for Class B components and clarify the allowable stress values, S , to be used in Article HCB-3000 in Subsection HC, Subpart B.
13-830	Made editorial and technical changes so that the rules for metallic and graphite components are applicable to high temperature gas-cooled and liquid-cooled reactors. The proposal has been revised to address negatives from Ballot #13-1389.
13-860	In the Foreword, the subtitle has been deleted and replaced with an ANSI disclaimer as a footnote.
13-1032	Added a paragraph to the introduction of Section III, Division 1, Organization of Section III, Article 9(d), References to Appendices, to add guidance on the use of Nonmandatory Appendices for Section III.
13-1885	Errata correction. See Summary of Changes for details.
14-26	Moved Division 1, Subsection NH to Division 5, Subsection HB, Subpart B, including appropriate changes to Subsection NH references in Subsection NCA and Section III Appendices.
14-1174	Errata correction. See Summary of Changes for details.
14-1550	Revised HHA-3111, HHA-3142.2, and HHA-II-3100, eq. (7).
14-1699	Revised Article HCB-II-1000.

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

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

Subparagraph Breakdowns/Nested Lists Hierarchy

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

Footnotes

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

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

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

Cross-References

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

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

SUBSECTION HA GENERAL REQUIREMENTS

SUBPART A METALLIC MATERIALS

ARTICLE HAA-1000 INTRODUCTION

HAA-1100 GENERAL

(15) HAA-1110 SCOPE

The rules of this [Subsection HA, Subpart A](#) constitute the general requirements associated with metallic components used in the construction of high temperature reactor systems and their supporting systems. Only those metallic components that are considered to be “safety related” or “non-safety related with special treatment” (see [HAA-2120](#)) are covered by these rules.

(a) The rules of [Subsection HA, Subpart A](#) are contained in Divisions 1 and 2, Subsection NCA, except for those paragraphs or subparagraphs (with numbered headers) replaced by corresponding numbered HAA paragraphs or subparagraphs in this Subpart or new numbered HAA paragraphs or subparagraphs added to this Subpart.

(b) Division 1 rules may use different terminology than Division 5 (e.g., Class 1 and Class 2 versus Class A and Class B, etc.) but the application and use of these rules is identical for Division 5 construction.

(c) Division 1, Class 1 requirements are applicable to Division 5 construction but shall be referred to as Division 5, Class A.

(d) Division 1, Class CS requirements are applicable to Division 5 construction but shall be referred to as Division 5, Class A.

(e) Division 1, Class 2 requirements are applicable to Division 5 construction but shall be referred to as Division 5, Class B.

(f) Division 1, Class 3 and Class MC requirements are not applicable to Division 5 construction.

(g) References to Appendices are to the Section III Appendices, unless otherwise identified.

HAA-1120 DEFINITIONS

Definitions of key terms used in this Division for metallic components are included in [Article HAA-9000](#). The definitions in [Article HAA-9000](#) shall prevail should a conflict exist with definitions found in Division 1 or in other documents referenced in this Division. Unless defined in [Article HAA-9000](#), the definitions of Divisions 1 and 2, Article NCA-9000 shall apply.

HAA-1130 LIMITS OF THESE RULES

(a) The rules of this Division for metallic materials provide requirements for new construction and include consideration of mechanical and thermal stresses due to cyclic operation and high temperature creep. They do not cover deterioration that may occur in service as a result of radiation effects, corrosion, erosion, thermal embrittlement, or instability of the material. These effects shall be taken into account with a view to realizing the design or the specified life of the components and supports. The changes in properties of materials subjected to neutron radiation may be checked periodically by means of material surveillance programs.

(b) The rules are not intended to be applicable to valve operators, controllers, position indicators, pump impellers, pump drivers, or other accessories and devices, unless they are pressure-retaining parts or act as core support structures or supports. If such items are in a support load path, the provisions of [HFA-1100](#) apply.