ASME BPVC.SSC.X.II.V.XIII-2023

Summary of Significant Changes in the

2023 ASME Boiler and Pressure Vessel Code

Section X
Section II
Section V
Section XIII

ASME
SETTING THE STANDARD

ASME BPVC.SSC.X.II.V.XIII-2023

Summary of Significant Changes in the 2023 ASME Boiler and Pressure Vessel Code

Sections X, II, V, and XIII

The American Society of Mechanical Engineers
Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: April 28, 2023

ASME does not issue written replies to inquiries concerning this publication.

The American Society of Mechanical Engineers
Two Park Avenue, New York, NY 10016-5990

CONTENTS

LIST OF SECTIONS
IN THE ASME BOILER AND PRESSURE VESSEL CODE

I Rules for Construction of Power Boilers

II Materials
- Part A — Ferrous Material Specifications
- Part B — Nonferrous Material Specifications
- Part C — Specifications for Welding Rods, Electrodes, and Filler Metals
- Part D — Properties (Customary)
- Part D — Properties (Metric)

III Rules for Construction of Nuclear Facility Components
- Subsection NCA — General Requirements for Division 1 and Division 2
- Appendices
- Division 1
  - Subsection NB — Class 1 Components
  - Subsection NCD — Class 2 and Class 3 Components
  - Subsection NE — Class MC Components
  - Subsection NF — Supports
  - Subsection NG — Core Support Structures
- Division 2 — Code for Concrete Containments
- Division 3 — Containment Systems for Transportation and Storage of Spent Nuclear Fuel and High-Level Radioactive Material
- Division 4 — Fusion Energy Devices
- Division 5 — High Temperature Reactors

IV Rules for Construction of Heating Boilers

V Nondestructive Examination

VI Recommended Rules for the Care and Operation of Heating Boilers

VII Recommended Guidelines for the Care of Power Boilers

VIII Rules for Construction of Pressure Vessels
- Division 1
- Division 2 — Alternative Rules
- Division 3 — Alternative Rules for Construction of High Pressure Vessels

IX Welding, Brazing, and Fusing Qualifications

X Fiber-Reinforced Plastic Pressure Vessels

XI Rules for Inservice Inspection of Nuclear Reactor Facility Components
- Division 1 — Rules for Inspection and Testing of Components of Light-Water-Cooled Plants
- Division 2 — Requirements for Reliability and Integrity Management (RIM) Programs for Nuclear Reactor Facilities

XII Rules for Construction and Continued Service of Transport Tanks

XIII Rules for Overpressure Protection

FOREWORD

This book is a companion to the 2023 ASME Boiler and Pressure Vessel Code (BPVC). It explains only significant changes to Code requirements that will be published in the 2023 Edition. It covers the following ASME BPVC Sections:

- Section X
- Section II, Parts A, B, and D
- Section V
- Section XIII

For each of the above Sections, an Introduction describes the historical background, scope of coverage, and commercial application of that Section. The list of changes follows the Introduction. The "Explanation" for each change provides the reason for the action and the value to the Code user. The sequence of the changes follows the order of the Code requirements.

ACKNOWLEDGMENTS

This book is the work of the following ASME Standards and Certification (S&C) staff:
- Paul D. Stumpf, *S&C Project Engineering Advisor*, Section X
- Colleen E. Rodrigues, *S&C Project Engineering Manager*, Section II, Parts A, B, and D; and Section XIII
- Carlton R. Ramcharran, *S&C Project Engineering Manager*, Section V

ASME Press's *Online Companion Guide to the ASME Boiler and Pressure Vessel Codes: Criteria and Commentary on Select Aspects of the Boiler & Pressure Vessel and Piping Codes* (January 2020) provided source material for the Introduction preceding each list of changes. The complete Guide is available in the ASME Digital Collection at https://asmedigitalcollection.asme.org/ebooks/pages/onlinecompanionguide.

ASME gratefully acknowledges the members of the following volunteer committees, who are responsible for development of the ASME Boiler and Pressure Vessel Code Sections noted in this book:
- BPV Committee on Fiber-Reinforced Plastic Pressure Vessels (X)
- BPV Committee on Materials (II)
- BPV Committee on Nondestructive Examination (V)
- BPV Committee on Overpressure Protection (XIII)

SECTION X

Introduction

Section X is part of the ASME Boiler and Pressure Vessel Code (BPVC) and has been adopted by regulation in 37 jurisdictions of the United States and in the provinces of Canada. The scope of this Code covers pressure vessels constructed of thermosetting resin (e.g., epoxy, vinyl ester, polyester, furan, and phenolic) reinforced with glass fibers as well as pressure vessels reinforced with carbon or aramid fibers. The pressure range covered by Section X is 15 psig to 15,000 psig internal pressure, of which the upper limit depends on the size and construction of the vessel. In addition, Section X covers pressure vessels with external pressure from 0 psig to 15 psig.

The processes used to manufacture Section X pressure vessels include contact molding, bag molding, centrifugal casting, and filament winding.

Stress analysis of fiber-reinforced plastic (FRP) equipment involves plate-and-shell theory and lamination theory. Plate-and-shell theory is widely used by metal-vessel designers. Lamination theory is a branch of mechanics concerned with plates and shells made of layered material, where the layers are bonded together but have different elastic properties. Lamination theory is used in Section X and is essential to the engineering of FRP tanks and pressure vessels.

Acoustic-emission (AE) examination is a technology widely applied to new and in-service Section X FRP tanks and pressure vessels.

To ensure that pressure vessels fabricated according to Section X are capable of safely withstanding the operating conditions specified by the Design Specification, Section X

(a) gives minimum requirements for the materials of fabrication

(b) specifies test procedures for determining laminate mechanical properties

(c) defines methods of design qualification, as follows:

(1) Class I design is qualified by nondestructive qualification test.

(2) Class II design is qualified using mandatory design rules and acceptance testing by nondestructive evaluation methods.

(3) Class III design is qualified through the destructive test of a prototype.

(d) suggests nonmandatory design procedures for Class I vessels

(e) provides mandatory design procedures and acceptance testing for Class II vessels

(f) defines the general methods of fabrication that may be used

(g) limits the types of end closures, connections, and attachments that may be used and the means used to join them to the vessels

(h) stipulates the procedures to be used in proving that prototype vessels will withstand specified operating and test conditions

(i) establishes rules under which fabricating procedures for Class I and Class III prototype and production vessels are qualified, and defines what deviations from such procedures necessitate requalification

(j) provides requirements to ensure that no essential variation in qualified fabrication procedures has occurred

(k) establishes rules for acceptance testing, inspection, and reporting

(l) gives requirements for ASME Certification, stamping, and marking

When metallic components are an integral part of Section X fiber-reinforced plastic vessels, they comply with the requirements of Section VIII, Division 1.

Mandatory Appendix 9 requires that the fabricator establish the effective Code Edition, Addenda, and Code Cases for pressure vessels and replacement parts.

Significant Changes

Location: Mandatory Appendix 8, 8-100.6
Subject: Service Life for Class III Vessels
Explanation: Paragraph 8-100.6 has been revised to clarify that the service life of glass-fiber-reinforced vessels is limited to 20 yr but the maximum service life of carbon-fiber-reinforced vessels is not limited.

Section X requirements do not limit the maximum life of Class I and Class II vessels. The limit on life for Section X Class III vessels is based on the fact that Class III vessels operate at higher pressures and have lower safety factors than Class I and Class II vessels. More than 40 yr of experience with carbon-fiber-reinforced ASME vessels and carbon-fiber-reinforced cylinders used in industry has shown that the life of Class III vessels reinforced with carbon fiber does not need to be limited. Other industries are also extending the life of composite vessels based on safe service records and periodic inspection. The maximum life limit on glass-fiber-reinforced vessels will be maintained in Section X while consideration is given to stress rupture characteristics of glass fiber at the given safety factor for Class III vessels and to the ability of nondestructive examination to assess degradation due to sustained loading of glass fiber over an extended life.

Location: Mandatory Appendix 8, 8-700.5.8
Subject: Leak Test for Class III Vessels
Explanation: Paragraph 8-700.5.8 has been revised to specify an additional leak test method: checking for water leakage during a hydraulic proof pressure test. This test method could be more cost effective than but just as satisfactory as bubble leak testing or measurement of trace gases.

The wording in the 2021 Edition states that leak-testing methods are not limited to bubble leak testing or measurement of trace gases, but the revision in the 2023 Edition provides clearer guidance that the leak testing described in 8-700.5.1 is an acceptable method. This option is also consistent with current practice for Class I and Class II vessels (see RT-450) but requires increased test time to improve sensitivity given that the higher viscosity of water compared with gas will result in less fluid flow per unit time.

Additionally, large, high-pressure vessels are currently being made under special permits from the U.S. Department of Transportation that allow leakage testing using water. No leaks are known to have occurred in service that would have been found with a gas leak test, which indicates the leakage test with water has sufficient sensitivity.

SECTION II

Introduction

Section II, Materials, is a "service section" of the ASME Boiler and Pressure Vessel Code (BPVC). This Section provides specifications for ferrous and nonferrous materials, and for welding rods, electrodes, and filler metals. It also provides material properties, including allowable, design, tensile, and yield stress values; physical properties; and external pressure charts and tables. Section II is divided into four parts, as follows:

- Part A — Ferrous Material Specifications
- Part B — Nonferrous Material Specifications
- Part C — Specifications for Welding Rods, Electrodes, and Filler Metals
- Part D — Properties

(a) Parts A and Part B contain material specifications published by ASTM International, Inc., and other national and international developers. These specifications have been modified as necessary for use in ASME BPVC construction. These specifications are designated with an "S" added to the beginning of the other organization's specification designation (e.g., ASTM A105 becomes ASME SA-105). These specifications contain requirements for chemical and mechanical properties, heat treatment, manufacture, heat and product analyses, and methods of testing. Note that all materials contained within a specification adopted by ASME and included in Parts A and B are not necessarily permitted for use in ASME BPVC construction. This Summary of Significant Changes describes only significant specification changes affecting materials permitted by the ASME BPVC. It does not include specification changes affecting materials not permitted by the ASME BPVC.

(b) Part C contains material specifications, most of which are identical to corresponding specifications published by the American Welding Society (AWS) and other recognized national or international organizations. All adopted specifications are either reproduced in Part C, where permission to do so has been obtained from the originating organization, or so referenced and information about how to obtain them from the originating organization is provided. The ASME BPV Committee on Welding, Brazing, and Fusing (Section IX) reviews all material specifications submitted to it and, if the Committee feels a specification needs to be adapted for ASME BPVC purposes, they revise it accordingly. However, ASME, AWS, and other originating organizations communicate regularly in an effort to maintain identical specifications.

(c) Part D primarily comprises tables providing stress and property data for materials permitted for use in ASME BPVC construction. These tables contain allowable stresses; design stress intensities; mechanical properties, including tensile strength and yield strength; and physical properties, including thermal expansion, thermal conductivity and diffusivity, moduli of elasticity, and Poisson's ratio. In addition to these tables, Part D provides charts and tables for determining shell thickness of components under external pressure.

Part A

Location: Statement of Policy on the Use of ASME Material Specifications, and Mandatory Appendix II
Subject: Use of ASME Material Specifications
Explanation: A new statement of policy on the use of ASME material specifications has been added to clarify terminology used in the body of the specifications. Mandatory Appendix II has been retitled "The Framework of ASME Material Specifications" and completely rewritten.

Location: SA-29/SA-29M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A29/A29M-20 has been adopted as the revised ASME SA-29/SA-29M. The SA-29/SA-29M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) In Table 2, the carbon content for 5160 has been revised.

(b) The maximum Cb, V, Cb + V verbiage has been deleted, and the maximums for Cb, V, and Cb + V in regards to grain-refining usage have been removed.

Location: SA-53/SA-53M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A53/A53M-20 has been adopted as the revised ASME SA-53/SA-53M. The SA-53/SA-53M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) Distinctions for types and other manufacturing processes have been removed from Table 2.

(b) The flattening test requirements for seamless pipe formerly in para. 9.2 have been moved to Supplementary Requirement S1.

(c) ASTM Practice E273 has been added to para. 9.1.1 for nondestructive test of electric-resistance-welded pipe.

(d) Paragraph 9.1.1 has been revised to require the use of full-volumetric nondestructive examination on Type E pipe produced on a hot-stretch reducing mill.

(e) Paragraph 17.2 has been revised to remove allowance to take tension test specimen from the skelp as well as other considerations related to full-size tension test specimens.

Location: SA-105/SA-105M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A105/A105M-21 has been adopted as the revised ASME SA-105/SA-105M. The SA-105/SA-105M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) In Table 2, para. 8.3.4, and Supplementary Requirement S1, the hardness limit has been increased from 187 to 197 HBW.

(b) Paragraph 7.4 has been revised to clarify hardness testing requirements.

(c) Paragraph 12.2.4 has been revised to clarify the number of hardness results required to be reported.

(d) Paragraph 12.2.3 has been revised on chemistry reporting.

(e) In Table 1, the allowable manganese content has been increased from 1.35% to 1.65%.

(f) Paragraph 6.2 has been revised on heat treatment.

(g) Multiple quenching has been reinstated as a heat treatment option in para. 6.2.1.

(h) Paragraph 8.2 has been revised to clarify test specimen location.

(i) Paragraph 8.3.2 has been revised to address testing requirements for different size forgings in the same heat-treatment charge, to clarify the location for removal of test specimens, and to move mandatory Note 2 into the text.

(j) Section 11 on appearance, surface protection, and corrosion protection has been added.

(k) Sections 13 and 14 on certification and marking have been revised.

Location: SA-182/SA-182M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A182/A182M-21 has been adopted as the revised ASME SA-182/SA-182M. The SA-182/SA-182M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) Material Grades F115 UNS K91060, F317LNCb UNS S31740, and F347LNCuB UNS S34752 have been added to Tables 1, 2, 3, and 4.

(b) In Table 3, the mechanical properties for F53 ≤2 in. (≤50 mm) have been split into two classes.

(c) In Table 2, footnote O, the formula for UNS S32760 has been modified to % Cr + 3.3 × %(Mo + ½ W) + 16 × % N = 41 min.

(d) In Table 2, Notes J and K, nitrogen has been added to the formula that determines titanium content for Grades F321 and F321H.

(e) A511/A511M hollow bar has been added as a starting material alternative to forged or rolled bar in para. 1.2, section 2, paras. 6.4.2 and 6.4.3 on cylindrical shaped products, and para. 7.6 on heat treatment.

(f) Paragraphs 13.1, 13.2, and 13.3 have been revised to clarify the time of examination for required nondestructive examination of hollow forgings of Grade F 91 Types 1 and 2, and Grades F 92, F 115, F 122, and F 911.

(g) Predominantly ferrous materials, Grades F700 UNS N08700, FNIC UNS N08800, FNIC10 UNS N08810, FNIC11 UNS N08811, F1925 UNS N08925, and F1925N UNS N08926, coming from ASTM B366/B366M have been added to Tables 1 through 4 and para. 15.1.2 for repair welding.

Location: SA-193/SA-193M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A193/A193M-20 has been adopted as the revised ASME SA-193/SA-193M. The SA-193/SA-193M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) In Table 1, the carbon, manganese, and chromium limits for Grade B7, B7M have been changed; tantalum has been removed for Grades B8C, B8CA, B8R, and B8RA; and the nitrogen maximum for UNS S31254 has been raised to 0.25.

(b) Alloy UNS S34752 has been added to Tables 1 through 3.

(c) Grades B8ML4CuNa, B8ML4CuNa, and UNS S31730 have been added in Tables 1, 2, 3, and 5.

(d) Table 3 has been revised to correct the maximum size range for B16.

(e) Grade B8MLNCuB has been added to para. 6.2.3 and Table 5.

(f) Paragraph 9.1.1 has been revised to allow for machined specimen testing for bolting greater than 1.500 in. in diameter.

Location: SA-194/SA-194M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A194/A194M-22 has been adopted as the revised ASME SA-194/SA-194M. The SA-194/SA-194M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) The title of the specification has been revised to include “Stainless Steel.”

(b) Paragraph 8.1.3.1 has been revised to permit use of electromagnetic hardness testing.

(c) Grade 7 nuts have been identified as a suitable substitute for Grade 4 nuts.

(d) The nitrogen maximum for UNS S31254 has been raised to 0.25 from 0.22.

(e) Chemistry has been harmonized with specifications ASTM A29/A29M and ASTM A276 as applicable in Table 1.

(f) UNS S31730, Grades 8ML4CuN and 8ML4CuNA, have been added to paras. 6.5 and 6.6 and Tables 1, 2, and 7.

(g) Grade 4 has been removed throughout.

(h) References to metric sizes smaller than M12 and to ISO 4033 have been removed throughout.

(i) Grades 8CLNCuBA and 8CLNCuB have been added to paras. 6.5 and 6.6 and Tables 1, 2, and 7.

(j) Grade 43 has been added to sections 3, 8, and 12; para. 6.4; and Tables 1, 2, 3, 4, and 7.

Location: SA-213/SA-213M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A213/A213M-22 has been adopted as the revised ASME SA-213/SA-213M. The SA-213/SA-213M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) The nitrogen content for UNS S31254 has been revised from 0.18–0.22 to 0.18–0.25.

(b) The carbon maximum for UNS S31002 has been revised from 0.02 to 0.015.

(c) Grades T128 (UNS K91421) and T921 (UNS K91201) have been added to para. 9.1.2 and Tables 1, 3, 4, and 5.

(d) UNS S31043, UNS S31740, and UNS S34752 have been added to Tables 2, 3, and 4.

Location: SA-266/SA-266M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A266/A266M-21 has been adopted as the revised ASME SA-266/SA-266M. The SA-266/SA-266M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) In para. 8.1.1.1, the description of the test depth for hollow forgings has been reworded from "midway between the center and outer surfaces of the wall" to "midwall."

(b) An alternative test depth has been added for forgings heat treated as a solid and then subsequently bored.

Location: SA-276/SA-276M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A276/A276M-17 has been adopted as the revised and redesignated ASME SA-276/SA-276M. The SA-276 listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) UNS N08020, UNS N08367, UNS N08800, UNS N08810, UNS N08811, UNS N0925, UNS N08926, UNS N08904 (904L), UNS S20162, UNS S31266, UNS S31727, UNS S31730, UNS S32053, UNS S32101, UNS S31010, UNS S32202, UNS S32506, UNS S32654, UNS S32750, UNS S34565, UNS S40976, and UNS 40976 have been added to Tables 1 and 2.

(b) The tensile strength for UNS S32205 has been increased from 90 ksi to 95 ksi (620 MPa to 655 MPa).

(c) A 0.03 carbon minimum has been added to UNS S41000.

(d) The nitrogen maximum for UNS S31254 has been raised from 0.22 to 0.25.

Location: SA-283/SA-283M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A283/A283M-13 has been adopted as the revised ASME SA-283/SA-283M. The SA-283/SA-283M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) Grades A and B have been deleted due to lack of use.

(b) Paragraph 4.2 has been added.

(c) The title of para. 6 has been revised from "Tensile Properties" to "Mechanical Properties."

(d) Paragraph 6.1 has been added, and the previous para. 6.1 redesignated as 6.1.1.

(e) In Table 1, the requirements for phosphorus have been changed from 0.035% to 0.030%, and the requirements for sulfur from 0.040% to 0.030%.

(f) Supplementary Requirement S97 has been deleted.

Location: SA-320/SA-320M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A320/A320M-22 has been adopted as the revised ASME SA-320/SA-320M. The SA-320/SA-320M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) The minimum reduction area for Class 2 Grades B8, B8C, B8P, B8F, and B8T, sizes over $^{3}/_{4}$ to 1, has been revised from 30% to 35%.

(b) The nickel limits for Grades B8LN, B8LNA, B8MLN, and B8MLNA have been changed.

(c) The titanium limits for Grades B8T and B8TA have been changed.

(d) The carbon and nickel limits for Grades B8P and B8PA have been changed.

(e) Paragraph 5.1.2 has been added and subsequent paragraphs redesignated.

Location: SA-350/SA-350M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A350/A350M-18 has been adopted as the revised ASME SA-350/SA-350M. The SA-350/SA-350M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) In Table 1, footnote C has been removed from copper grades LF3 and LF5.

(b) In Table 1, Grades LF1 and LF2 have been revised to allow higher columbium by agreement.

(c) Paragraph 5.4.2.1(3) has been added to allow intermediate heat treatment in the quenching and tempering process, at the option of the manufacturer.

(d) Paragraph 5.4.2 has been revised to add normalizing prior to the quenched and tempered (Q&T) heat treatment, at the option of the manufacturer.

(e) Paragraphs 7.1.3.2(1) through 7.1.3.2(3) and Figures 2 through 4 have been added to specify impact test specimen locations in separately forged test blanks for forgings that are not Q&T and in forgings that are Q&T or are quenched and precipitation hardened.

Location: SA-351/SA-351M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A351/A351M-18e1 has been adopted as the revised ASME SA-351/SA-351M. The SA-351/SA-351M listing in Table II-200-1 has been revised accordingly. This specification has been revised in its entirety, and the title of the specification has also been revised.

Location: SA-358/SA-358M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A358/A358M-19 has been adopted as the revised ASME SA-358/SA-358M. The SA-358/SA-358M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) UNS S31655 has been added to Table 1.
(b) Alloy heat treatment has been added to Table 2.
(c) UNS S34752 has been added to paras. 7.2 and 7.3.

Location: SA-370/SA-370M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A370/A370M-21 has been adopted as the revised and redesignated ASME SA-370/SA-370M. The SA-370 listing in Table II-200-1 has been revised accordingly. This specification has been revised in its entirety.

Location: SA-372/SA-372M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A372/A372M-20e1 has been adopted as the revised ASME SA-372/SA-372M. The SA-372/SA-372M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) In Table 1, phosphorus and sulfur values have been updated to 0.015% and 0.010% maximum, respectively, for all grades.
(b) Normalized, liquid quenched, and tempered have been added as heat treatment options for several grades and classes in paras. 4.3.1 and 4.3.2.
(c) Grades N and P have been added to paras. 4.3.2 and 4.3.3.1 and Tables 1 through 4.
(d) Class 90 for Grade J has been added to paras. 4.3.2 and 4.3.3.1 and Tables 2 through 4.
(e) Grade R has been added to paras. 4.3.2 and 4.3.3.1 and Tables 1 through 4.
(f) Paragraph 4.1 has been revised to add Grades N, P, and J Class 110 mandatory vacuum treating.
(g) Paragraph 5.4 has been added, pointing the purchaser to S24 of ASTM A788 if temper embrittlement is of concern (J factor).
(h) Paragraph 6.4.1.1 has been revised to clarify that the test depth requirement does not apply for bending properties.
(i) Paragraph 6.3.2 has been revised to permit all applicable ASTM E290 bend test methods, not just Arrangement C.

Location: SA-376/SA-376M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A376/A376M-19 has been adopted as the revised ASME SA-376/SA-376M. The SA-376/SA-376M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) Grade TP347LN (UNS S34751) has been added to para. 5.2.3 and Tables 1 and 2.
(b) UNS S31266 has been added to para. 5.2.6 and Tables 1 and 2.
(c) Section 11 has been revised as follows:
(1) Paragraph 11.1 has been revised to add more detail to testing definitions.
(2) In para. 11.2, the number of required tension tests has been revised.
(3) Paragraph 11.3 has been revised to distinguish the flattening test requirements for batch furnaces with recording pyrometers from the requirements for batch furnaces without recording pyrometers.

Location: SA-403/SA-403M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A403/A403M-19a has been adopted as the revised ASME SA-403/SA-403M. The SA-403/SA-403M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) Type 310H has been added back into the specification.
(b) In Table 2, the nickel minimum for UNS S38815 has been revised from 13.00 to 15.00.
(c) The interchangeable use of the terms “niobium” and “columbium” has been addressed in Table 2 and section 7.

(d) In paras. 6.2 and 6.4 and Supplementary Requirement S2, "stabilization" has been revised to "a stabilizing treatment" and the option for resolution anneal has been eliminated.
(e) Paragraph 10.7 has been added to reinstate passivation as part of surface preparation.
(f) Supplementary Requirement S3 has been added for ASME BPVC Section III construction.

Location: SA-409/SA-409 and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A409/A409M-14(R19) has been adopted as the revised ASME SA-409/SA-409M. The SA-409/SA-409M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following change: Supplementary Requirement S7 has been added for ASME BPVC Section III and Section VIII, Division 1 construction.

Location: SA-414/SA-414M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A414/A414M-14(R19) has been adopted as the revised ASME SA-414/SA-414M. The SA-414/SA-414M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:
(a) Testing requirements have been revised.
(b) Grade H has been added.

Location: SA-423/SA-423M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A423/A423M-19 has been adopted as the revised ASME SA-423/SA-423M. The SA-423/SA-423M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following change: Grade 3 has been added to Tables 1 and 3.

Location: SA-439/SA-439 and Mandatory Appendix II, Table II-200-1
Subject: Added Specification
Explanation: ASTM A439/A439M-18 has been adopted as ASME SA-439/SA-439M. SA-439/SA-439M has been added to Table II-200-1.

Location: SA-450/SA-450 and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A450/A450M-21 has been adopted as the revised ASME SA-450/SA-450M. The SA-450/SA-450M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:
(a) Paragraph 12.1 has been added.
(b) Paragraph 27.1 has been revised to make providing a material test report mandatory.
(c) ASTM test method A1058 has been incorporated throughout.

Location: SA-453/SA-453M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A453/A453M-17 has been adopted as the revised ASME SA-453/SA-453M. The SA-453/SA-453M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following change: separate strength requirements for Class 660 D bolting materials >$2^{1}/_{2}$ in. (>63.5 mm) in diameter have been added to Table 5.

Location: SA-479/SA-479M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A479/A479M-21 has been adopted as the revised ASME SA-479/SA-479M. The SA-479/SA-479M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following change: UNS S34752 has been added to Tables 1 and 2.

Location: SA-484/SA-484M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A484/A484M-21 has been adopted as the revised ASME SA-484/SA-484M. The SA-484/SA-484M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:
(a) UNS S34752 has been added to Table 2.
(b) Paragraph 6.2.1 has been added to address rules for checking tolerance limits for ratios.

(c) Paragraphs 7.2.3 and 8.1.4 have been revised.
(d) Section 17 on certification has been rewritten, and paras. 17.1.1, 17.2, and 17.4 have been added.

Location: SA-487/SA-487M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A487/A487M-21 has been adopted as the revised ASME SA-487/SA-487M. The SA-487/SA-487M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following change: Grade 17 has been added to Tables 1 through 4.

Location: SA-508/SA-508M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A508/A508M-18 has been adopted as the revised ASME SA-508/SA-508M. The SA-508/SA-508M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:
(a) In Table 1, the maximum aluminum content for Grades 1, 1a, 2, and 3 has been changed from 0.025% to 0.030%.
(b) Paragraph 7.1.2.1 has been revised to allow individual forgings that were not made in multiples and that weigh less than 1,000 lb to be qualified on a per-heat per-lot basis.

Location: SA-530/SA-530M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A530/A530M-18 has been adopted as the revised ASME SA-530/SA-530M. The SA-530/SA-530M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:
(a) Material test reports are now required.
(b) Paragraph 5.2 has been revised in its entirety.
(c) ASTM A1058 has been added to section 7.
(d) Section 20 has been revised so that test specimens must be removed from the "as-heat treated" finished pipe.

Location: SA-557/SA-557M and Mandatory Appendix II, Table II-200-1
Subject: Deleted Specification
Explanation: ASME SA-557/SA-557M has been deleted and Table II-200-1 updated accordingly.

Location: SA-572/SA-572M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A572/A572M-21e1 has been adopted as the revised ASME SA-572/SA-572M. The SA-572/SA-572M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:
(a) In Table 1, the maximum thickness or size of plates and bars has been increased from 2 in. to 2½ in. (50 mm to 64 mm) for Grade 55, from 1¼ in. to 2½ in. (32 mm to 64 mm) for Grade 60, and from 1¼ in. to 2 in. (32 mm to 50 mm) for Grade 65.
(b) In Table 2, diameter, thickness, and distance between parallel faces, plates, and bars have been revised to increase maximum thickness to 2½ in. (64 mm) for Grades 55 and 60, and to 2 in. (50 mm) for Grade 65.

Location: SA-691/SA-691M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A691/A691M-19 has been adopted as the revised ASME SA-691/SA-691M. The SA-691/SA-691M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:
(a) In Table 1, columbium has been replaced with niobium.
(b) Supplementary Requirement S13 has been added for ASME BPVC Section III construction.

Location: SA-727/SA-727M and Table II-200-1
Subject: Revised Specification
Explanation: ASTM A727/A727M-14(R19) has been adopted as the revised ASME SA-727/SA-727M. The SA-727/SA-727M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:
(a) References to A370 have been replaced with A961/A961M.
(b) Section 12 on surface finish, appearance, and corrosion protection has been added.
(c) The language in Section 15 has been simplified.

Location: SA-731/SA-731M and Mandatory Appendix II, Table II-200-1
Subject: Deleted Specification
Explanation: ASME SA-731/SA-731M has been deleted and Table II-200-1 updated accordingly.

Location: SA-751/SA-751M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A751/A751M-21 has been adopted as the revised and redesignated ASME SA-751/SA-751M. The SA-751 listing in Table II-200-1 has been revised accordingly. This specification has been revised in its entirety.

Location: SA-813/SA-813M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A813/A813M-14(R19) has been adopted as the revised and redesignated ASME SA-813/SA-813M. The SA-813/SA-813M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) UNS S31727 and UNS S32053 have been added to Tables 2 and 3 and their heat treatment requirements added in new para. 4.2.4.

(b) Types 201 and 201LN have been added to Tables 2 and 3.

(c) UNS S31266 has been added to Table 2 (and Note J) and Table 3.

Location: SA-814/SA-814M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A814/A814M-15(R19) has been adopted as the revised ASME SA-814/SA-814M. The SA-814/SA-814M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) SI units have been added to Table 1.

(b) ASME B31.3 has been added to section 2.

(c) UNS S31727 and UNS S32053 have been added to Tables 2 and 3 and their heat treatment requirements added in new para. 4.2.4.

(d) Types 201 and 201LN have been added to Tables 2 and 3.

Location: SA-836/SA-836M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A836/A836M-14(R20) has been adopted as the revised ASME SA-836/SA-836M. The SA-836/SA-836M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) Section 10 on surface finish, appearance, and corrosion protection has been added.

(b) Language in sections 13 and 14 has been simplified.

Location: SA-941/SA-941M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A941/A941M-22a has been adopted as the revised and redesignated ASME SA-941/SA-941M. The SA-941 listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) Definitions of “controlling cross section thickness (Tc)” and “wrought product” have been added.

(b) Definitions of “fine grain practice” and “patenting” have been revised.

(c) In section 3, discussion has been added to “nonferrous material” and discussion of “stabilized stainless steel” has been revised.

Location: SA-960/SA-960M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A960/A960M-20 has been adopted as the revised ASME SA-960/SA-960M. The SA-960/SA-960M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) ASTM A1058 has been added to the references.

(b) Paragraph 4.1.6 has been added to indicate that ordering information should include the chosen testing track from the options in ASTM A1058.

(c) Paragraph 9.1 has been revised to reference ASTM A1058 if the M suffix (SI Units) standard is specified.

(d) Paragraphs 9.4.1 and 9.4.2 have been revised to allow test methods per ASTM A1058 if SI units are specified.

Location: SA-962/SA-962M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A962/A962M-22 has been adopted as the revised ASME SA-962/SA-962M. The SA-962/SA-962M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) References to ASME B18.2.2, ASME B18.2.6, ASME B18.2.4.6M, ASME B18.2.6, ASME B18.31.2, and ISO 4762 have been added.

(b) Dimensional references have been added to section 13.

(c) Requirements for carburization have been added to section 14.

(d) Test requirements have been added to para. 15.2.

(e) Retest and rework requirements have been updated in section 16.

Location: SA-965/SA-965M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A965/A965M-21a has been adopted as the revised ASME SA-965/ SA-965M. The SA-965/SA-965M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) Paragraph 6.3 has been revised to remove FXM-19 with a 1,950°F anneal.

(b) Grades UNS N08020, UNS N08367, UNS N08904, UNS N08700, UNS N08800, UNS N08810, UNS N08811, UNS N08925, and UNS N08926 have been added. Tables 1 and 2 and Sections 6, 9, and 10 have been revised to include the new grades.

Location: SA-995/SA-996M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM A995/A995M-20 has been adopted as the revised and redesignated ASME SA-995/ SA-995M. The SA-995 listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes in Table 1:

(a) Additional heat-treat options have been added for Grade 6A to allow for a drop in temperature before the rapid cool.

(b) The composition formula for CD3MWCuN has been updated to include W.

Location: SA-1058 and Mandatory Appendix II, Table II-200-1
Subject: Added Specification
Explanation: ASTM A1058-19 has been adopted as ASME SA-1058. SA-1058 has been added to Table II-200-1.

Location: Non-ASTM Specifications SA-CSA-G40.21, SA/EN 10025-2, SA/IS 2062, and SA/JIS G3118
Subject: Marking Requirements
Explanation: Marking requirements have been added to the cover pages of SA-CSA-G40.21, SA/EN 10025-2, SA/IS 2062, and SA/JIS G3118.

Location: Mandatory Appendix II, Table II-200-1
Subject: Lowered Maximum Carbon Content for SA-266/SA-266M
Explanation: For SA-266/SA-266M, the earliest other acceptable ASTM edition has been changed from 1987 to 1999 because the maximum carbon content for Grade 3 was changed in the 1999 edition.

Part B

Location: Use of ASME Material Specifications, and Mandatory Appendix II
Subject: Use of ASME Material Specifications
Explanation: A new statement on the Use of ASME Material Specifications has been added. Mandatory Appendix II has been retitled "The Framework of ASME Material Specifications" and completely rewritten.

Location: SB-167 and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM B167-18 has been adopted as the revised ASME SB-167. The SB-167 listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes: UNS N06696, UNS N06674, UNS N06235, and UNS N06699 have been added.

Location: SB-168 and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM B168-19 has been adopted as the revised ASME SB-168. The SB-168 listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes: UNS N06696, UNS N06674, UNS N06235, and UNS N06699 have been added.

Location: SB-211/SB-211M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM B211/B211M-19 has been adopted as the revised and redesignated ASME SB-211/SB-211M. The SB-211 listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) ASTM has combined specifications B211 and B211M.
(b) ASTM B985 and ASTM E3061 have been added to section 2 and ASTM E34 has been deleted.
(c) The phrase "(US Customary)" has been added to the title of Table 2 and "(Metric SI)" to the title of Table 3.
(d) The unnumbered table in section 14 that referred to specific ANSI H35.2 [H35.2M] tolerance tables has been deleted, and section 14 has been revised to point the reader to ANSI H35.2 [H35.2M].

Location: SB-625 and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM B625-17 has been adopted as the revised ASME SB-625. The SB-625 listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes: UNS N08034, UNS N08354, and UNS N08830 have been added, and UNS N08904 has been deleted.

Location: SB-649 and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM B649-17 has been adopted as the revised ASME SB-649. The SB-649 listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) UNS N08034, UNS N08354, and UNS N08936 have been added, and UNS N08904 has been deleted.
(b) Table 2 has been deleted, and para. 6.2.1 has been revised to refer users to ASTM B880 for tolerance limits.

Location: SB-677 and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM B677-21 has been adopted as the revised ASME SB-677. The SB-677 listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:

(a) The title of SB-677 has changed: alloy descriptors have replaced the UNS numbers.
(b) UNS N08354 has been added, and UNS N08904 has been deleted.
(c) Table 3 has been deleted and text revised to refer users to ASTM B829.
(d) Sections 9 through 18 and Appendix X1 have been replaced with Section 4, which mandates conformance to B829 for a number of topics.
(e) Ordering information in section 5 has been changed from mandatory requirements to guidance.
(f) Section 8 has been revised to require that nondestructive tests be done in accordance with B829.

Location: SB-729 and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM B729-20 has been adopted as the revised ASME SB-729. The SB-729 listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes:
(a) The title of SB-729 has changed: alloy descriptors have replaced the UNS numbers.
(b) Ordering information in section 4 has been changed from mandatory requirements to guidance.
(c) The maximum hydrostatic pressure values have been removed, and the text revised to refer users to the hydrostatic pressure equation found in B829.
(d) Furnishing the certification and test report has been made mandatory.

Location: SB-752/SB-752M and Mandatory Appendix II, Table II-200-1
Subject: Revised Specification
Explanation: ASTM B752/B752M-22 has been adopted as the revised ASME SB-752/SB-752M. The SB-752/SB-752M listing in Table II-200-1 has been revised accordingly. The revised specification includes the following changes: UNS numbers have been added to the Zr casting grades.

Location: SB/EN 1706 and Mandatory Appendix II, Table II-200-1
Subject: Updated Specification and Tables
Explanation: ASME SB/EN1706 has been updated to reference the 2020 edition of EN1706. Corresponding changes have been made to the Section II, Part D tables.

Part D
Customary and Metric

Location: Tables 1A, 2A, and 5A
Subject: Lowered Maximum Carbon Content
Explanation: The following notes have been deleted for SA-266 Grade 3: Note W8 in Table 1A, Note W1 in Table 2A, and Note W1 in Table 5A.

Location: Table 1A
Subject: Incorporation of Code Case 2577
Explanation: Type/grade 316L is now permitted for Section VIII, Division 1 applications, and allowable stress values have been added above 1,000°F (500°C). Note T12 has been applied to the revised lines.

Location: Tables 1A, U, and Y-1
Subject: SA-240 S43932 for Section VIII, Division 1 Applications
Explanation: Allowable stress values for 18Cr–Ti SA-240 S43932 have been added to Table 1A for Section VIII, Division 1 applications. Additionally, the values for this material have been added to Tables U and Y-1.

Location: Tables 1A, U, and Y-1
Subject: Incorporation of Code Case 2903
Explanation: SA-240 S31655 has been added to Tables 1A, U, and Y-1.

Location: Tables 1A, 2A, 5A, U, and Y-1
Subject: Remove SA-283 Grades A and B
Explanation: Due to the adoption of ASTM A283/A283M-13, SA-283 grades A and B have been removed from Tables 1A, 2A, 5A, U, and Y-1.

Location: Tables 1A, U, and Y-1
Subject: Incorporation of Code Case 2591
Explanation: New lines for SA-213 S31002 and SA-312 S31002 have been added to Tables 1A, U, and Y-1 U.

Location: Tables 1A, U, Y-1, TE-1, TCD, and TM-1
Subject: Incorporation of Code Case 2586-1
Explanation: New lines for SA-789 S32707 and SA-790 S32707 have been added to Tables 1A, U, and Y-1. In addition, 27Cr–7.5Ni–4.5Mo–Co–N has been added to Note 2 of Table TE-1, Note 11 of Table TCD, and Note 8 of Table TM-1.

Location: Table 1B
Subject: Specification Reference Update for N08904 Bar and Seamless Tube
Explanation: Alloy N08904, formerly considered a nickel-base alloy, was reclassified by ASTM as a stainless steel alloy and has been incorporated in the respective stainless specifications. Table 1B has been revised to update the specification references to SA-479 for N08904 bar and to SA-213 for N08904 seamless tube.

Location: Table 1B
Subject: Application of SB-366 Fittings to Section III, Class 2 and Class 3 Construction
Explanation: Table 1B has been revised to allow use of fittings manufactured to SB-366 alloys N02201, N04400, N06002, N06022, N06030, N06600, N06625, N08020, N08367, N08800, N08825, N10276, and N10665 for Section III construction.

Location: Table 1B
Subject: UNS N06025
Explanation: Several lines for time-dependent values for UNS N06025 have been revised in Table 1B.

Location: Table 1B
Subject: Addition of Section XII Applicability
Explanation: Section XII applicability temperatures for SB-75 C12000 and C12200, SB-359 and SB-466 C70600 and C70620, and SB-148 C95800 and C95820 have been added to Table 1B.

Location: Table 1B
Subject: High Stress Lines
Explanation: High stress lines have been added to Table 1B for SB-111 and SB-395 C19200 and for SB-543 C19400 WO61. Stress values for SB-543 C19400 WO61 and WC55 temper lines were also revised.

Location: Table 1B
Subject: High Stress Lines
Explanation: Stress values for SB-111, SB-359, SB-395, and SB-466 C71000 in Table 1B have been revised, and new high stress lines have been added.

Location: Table 1B
Subject: High Stress Lines
Explanation: High stress lines have been added to Table 1B for C68700.

Location: Tables 1B and 3
Subject: New and Revised Stress Lines
Explanation: High stress lines have been added for SB-283 C64200 in Table 1B. In addition, stress lines have been revised for SB-283 C64200 in Table 1B and for SB-150 C64200 in Table 3.

Location: Tables 1B, 2B, and 5B
Subject: Addition of Stress Lines
Explanation: High stress lines have been added to Table 1B for SB-98 C65100, C65500, and C66100 and to Tables 2B and 5B for SB-98 C65100, C65500, and C66100. In addition, SB-96 C65500 lines have been revised in Tables 2B and 5B.

Location: Tables 1B, 2B, U, and Y-1
Subject: C72200, C71500 HR 50, C71520 HR50, and C68700
Explanation: Values have been added to Tables 1B, U, and Y-1 for C72200, C71500 HR 50, C71520 HR50, and C68700. Some values in Tables 1B and 2B have also been revised.

Location: Tables 1B and 6B
Subject: SB-75 O50 Temper Lines
Explanation: Stress lines for SB-75 O50 temper have been added to Table 1B for C10200 and to Table 6B for C10200, C12000, and C12200. Additionally, Applicability columns for these SB-75 alloys have been revised in Table 1B.

Location: Tables 1B, 6B, U, and Y-1
Subject: SB-283 C37700 Stress Values
Explanation: Several lines for SB-283 C37700 have been revised in Tables 1B, 6B, U, and Y-1.

Location: Tables 1B, U, and Y-1
Subject: UNS R60705
Explanation: Tensile and yield strength values for 95.5Zr + 2.5Nb UNS R60705 (both 70/55 and 80/55) have been added to Tables U and Y-1. Several allowable stress values in Table 1B for this material have also been revised.

Location: Tables 1B, U, and Y-1
Subject: Incorporation of Code Case 2923
Explanation: 52Ni–22Cr–13Co–9Mo (UNS N06617) welded tube lines have been added to Tables 1B, U, and Y-1 for Section I and Section VIII, Division 1 use.

Location: Tables 1B, U, and Y-1
Subject: Incorporation of Code Case 2633
Explanation: The following changes have been made:
(a) The maximum allowable stress values from Code Case 2633 have been added to Tables 1B, U, and Y-1.
(b) In Table 1B, for all R60705 zirconium alloy product forms, Note W2 has been deleted and grade NFZ-2 has been changed to NFZ-1.

Location: Table 2A
Subject: 17Cr–4Ni–4Cu H1100
Explanation: Applicability and maximum use temperature limits for Section VIII, Division 2, Class 1 have been revised for 17Cr–4Ni–4Cu H1100 in Table 2A.

Location: Tables 2A and 2B
Subject: Addition of Materials for Section VIII Use
Explanation: Numerous lines have been added to Tables 2A and 2B for materials for Section VIII use. These materials were previously included in Tables 5A and 5B only.

Location: Tables 2B and 5B
Subject: Type/Grade Column
Explanation: A Type/Grade column has been added to Tables 2B and 5B and titanium grade designations have been added in these tables.

Location: Table 3
Subject: Size and Stress Line Correction
Explanation: The thickness range has been corrected for SA-540 B23 H43400 and K24064. Additionally, stress lines have been revised for SB-335 N10001.

Location: Table 5A
Subject: SA-537 Stress Values
Explanation: Several lines in Table 5A have been revised to modify the maximum allowable stress values for SA-537.

Location: Table 5A (Metric Only)
Subject: Modification to Allowable Stress Values
Explanation: Allowable stress values in Table 5A for SA-487 Gr 8 Class A, SA-508 Gr 22 Class 3, and SA-541 Gr 22 Class 4 at 450°C have been changed from 197 to 162.

Location: Table 6A
Subject: Incorporation of Code Cases 2687-1 and 2849
Explanation: Allowable stress values for UNS S31635 Grade TP316Ti for SA-213 tubing and SA-312 seamless and welded pipe have been added to Table 6A.

Location: Table U (Metric Only)
Subject: Missing Values
Explanation: Values for SB-283 and SB-150 C64200 have been added to metric Table U.

Location: Tables U and Y-1
Subject: Aluminum Alloy AlSi7Mg SB/EN 1706 AC42000
Explanation: Yield and tensile strength values for aluminum alloy AlSi7Mg SB/EN 1706 AC42000 have been incorporated into Tables U and Y-1 from Section IV, Code Case 2483.

Location: Tables U and Y-1
Subject: Addition for S31635
Explanation: Values for S31635 tube (SA-213) and pipe (SA-312) have been added to Tables U and Y-1. Additionally, revisions have been made to plate (SA-240) values in Table U.

Location: Tables U and Y-1 (Metric Only)
Subject: Addition of Line Entries for Nine Specifications
Explanation: Values have been added to metric Tables U and Y-1 for the following:
17.5Cr–17.5Ni–5.3Si SA-240 S30601
18Cr–15Ni–4Si SA-182 S30600
18Cr–15Ni–4Si SA-240 S30600
18Cr–15Ni–4Si SA-312 S30600
18Cr–15Ni–4Si SA-479 S30600
18Cr–20Ni–5.5Si SA-213 S32615
18Cr–20Ni–5.5Si SA-240 S32615
18Cr–20Ni–5.5Si SA-312 S32615
18Cr–20Ni–5.5Si SA-479 S32615

Location: Table Y-1
Subject: SA-736 Grade A Class 1 and Class 2
Explanation: Lines for SA-736 Grade A Class 1 and Class 2 have been removed from Table Y-1.

Location: Table TM-3
Subject: Copper Alloys
Explanation: Lines for C19200, C37700, C46500, C62300, C72200, and C96200 with modulus values have been added to Table TM-3.

Location: Nonmandatory Appendix A, A702.1.6
Subject: Hydrogen Environment Embrittlement of Cold-Worked Stainless Steels
Explanation: Paragraph A-702.1.6 on hydrogen environment embrittlement of cold-worked stainless steels t low temperatures has been added to Nonmandatory Appendix A.

SECTION V

Introduction

Section V of the ASME Boiler and Pressure Vessel Code (BPVC) contains requirements and methods for nondestructive examination (NDE), which are referenced and required by other ASME BPVC Sections or other referencing documents. These NDE methods are intended to detect surface and internal imperfections in materials, welds, fabricated parts, and components. They include requirements for radiographic examination, ultrasonic examination for welds and materials, liquid penetrant examination, magnetic particle examination, eddy current examination, visual examination, leak testing, acoustic emission examination, alternating current field measurement, and magnetic flux leakage. Article 1, Mandatory Appendix II covers supplemental personnel qualification requirements for NDE Certification to be included in the employer's written practice for NDE personnel certification when the employer uses computed radiography, digital radiography, phased array ultrasonics, ultrasonic time-of-flight diffraction, and ultrasonic full matrix capture.

Section V is divided into two Subsections that include both Mandatory and Nonmandatory Appendices. Subsection A describes the methods of NDE to be used when referenced by other Code Sections or referencing documents. Subsection B includes ASME/ASTM standards covering various NDE methods. These standards are not mandatory unless specifically referenced in whole or in part by Subsection A or as indicated in other Code Sections or referencing documents.