

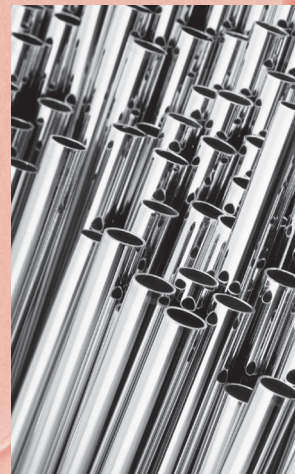
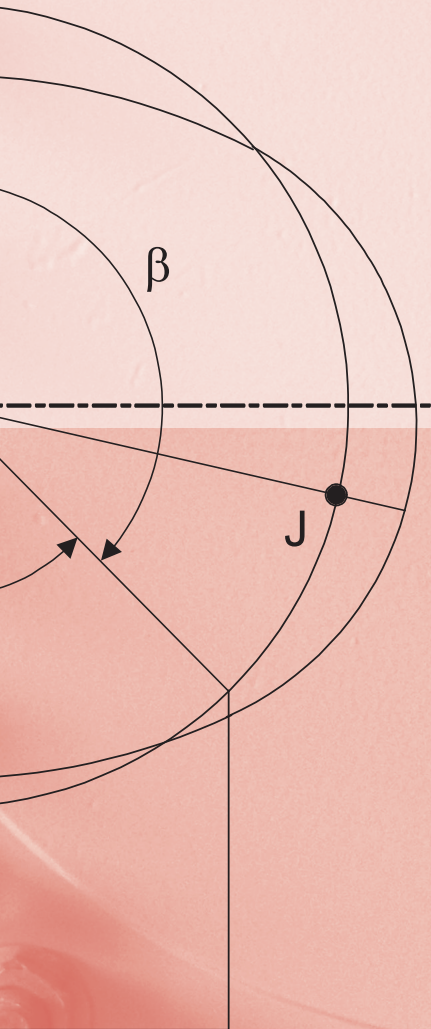
2013

ASME Boiler and Pressure Vessel Code

AN INTERNATIONAL CODE

II Materials

Part A Ferrous Material Specifications (Beginning to SA-450)



INTENTIONALLY LEFT BLANK

AN INTERNATIONAL CODE

2013 ASME Boiler & Pressure Vessel Code

2013 Edition

July 1, 2013

II MATERIALS

Part A

Ferrous Material Specifications (Beginning to SA-450)

ASME Boiler and Pressure Vessel Committee
on Materials



The American Society of
Mechanical Engineers

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: July 1, 2013

This international code or standard was developed under procedures accredited as meeting the criteria for American National Standards and it is an American National Standard. The Standards Committee that approved the code or standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment that provides an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

ASME does not “approve,” “rate,” or “endorse” any item, construction, proprietary device, or activity.

ASME does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this document, and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable letters patent, nor assume any such liability. Users of a code or standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

Participation by federal agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this code or standard.

ASME accepts responsibility for only those interpretations of this document issued in accordance with the established ASME procedures and policies, which precludes the issuance of interpretations by individuals.

The endnotes in this document (if any) are part of this American National Standard.



ASME collective membership mark



Certification Mark

The above ASME symbol is registered in the U.S. Patent Office.

“ASME” is the trademark of The American Society of Mechanical Engineers.

The Specifications published and copyrighted by the American Society for Testing and Materials are reproduced with the Society's permission.

No part of this document may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher.

Library of Congress Catalog Card Number: 56-3934
Printed in the United States of America

Adopted by the Council of The American Society of Mechanical Engineers, 1914; latest edition 2013.

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

Copyright © 2013 by
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
All rights reserved

TABLE OF CONTENTS

List of Sections	x
Foreword	xii
Statement of Policy on the Use of the Certification Mark and Code Authorization in Advertising	xiv
Statement of Policy on the Use of ASME Marking to Identify Manufactured Items	xiv
Submittal of Technical Inquiries to the Boiler and Pressure Vessel Standards Committees	xv
Personnel	xvii
ASTM Personnel	xxxii
Preface	xxxiii
Specifications Listed by Materials	xxxiv
Specification Removal	xlii
Summary of Changes	xliii
List of Changes in Record Number Order	xlv
Cross-Referencing and Stylistic Changes in the Boiler and Pressure Vessel Code	xlvii
SA-6/SA-6M Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling	1
SA-20/SA-20M Specification for General Requirements for Steel Plates for Pressure Vessels	85
SA-29/SA-29M Specification for Steel Bars, Carbon and Alloy, Hot-Wrought, General Requirements for	119
SA-31 Specification for Steel Rivets and Bars for Rivets, Pressure Vessels	139
SA-36/SA-36M Specification for Carbon Structural Steel	145
SA-47/SA-47M Specification for Ferritic Malleable Iron Castings	151
SA-53/SA-53M Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless	161
SA-105/SA-105M Specification for Carbon Steel Forgings, for Piping Applications	189
SA-106/SA-106M Specification for Seamless Carbon Steel Pipe for High-Temperature Service	197
SA-134 Specification for Pipe, Steel, Electric-Fusion (ARC)-Welded (Sizes NPS 16 and Over)	209
SA-135 Specification for Electric-Resistance-Welded Steel Pipe	215
SA-178/SA-178M Specification for Electric-Resistance-Welded Carbon Steel and Carbon-Manganese Steel Boiler and Superheater Tubes	225
SA-179/SA-179M Specification for Seamless Cold-Drawn Low-Carbon Steel Heat-Exchanger and Condenser Tubes	231
SA-181/SA-181M Specification for Carbon Steel Forgings, for General-Purpose Piping	235
SA-182/SA-182M Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service	241
SA-192/SA-192M Specification for Seamless Carbon Steel Boiler Tubes for High-Pressure Service	259
SA-193/SA-193M Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature or High Pressure Service and Other Special Purpose Applications	263
SA-194/SA-194M Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both	281
SA-202/SA-202M Specification for Pressure Vessel Plates, Alloy Steel, Chromium-Manganese-Silicon	297
SA-203/SA-203M Specification for Pressure Vessel Plates, Alloy Steel, Nickel	301
SA-204/SA-204M Specification for Pressure Vessel Plates, Alloy Steel, Molybdenum	305
SA-209/SA-209M Specification for Seamless Carbon-Molybdenum Alloy-Steel Boiler and Superheater Tubes	309

SA-210/SA-210M	Specification for Seamless Medium-Carbon Steel Boiler and Superheater Tubes	313
SA-213/SA-213M	Specification for Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes	319
SA-214/SA-214M	Specification for Electric-Resistance-Welded Carbon Steel Heat-Exchanger and Condenser Tubes	333
SA-216/SA-216M	Specification for Steel Castings, Carbon, Suitable for Fusion Welding for High-Temperature Service	337
SA-217/SA-217M	Specification for Steel Castings, Martensitic Stainless and Alloy, for Pressure-Containing Parts, Suitable for High-Temperature Service	343
SA-225/SA-225M	Specification for Pressure Vessel Plates, Alloy Steel, Manganese-Vanadium-Nickel	351
SA-231/SA-231M	Specification for Chromium-Vanadium Alloy Steel Spring Wire	355
SA-232/SA-232M	Specification for Chromium-Vanadium Alloy Steel Valve Spring Quality Wire	361
SA-234/SA-234M	Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High-Temperature Service	367
SA-240/SA-240M	Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications	377
SA-249/SA-249M	Specification for Welded Austenitic Steel Boiler, Superheater, Heat-Exchanger, and Condenser Tubes	391
SA-250/SA-250M	Specification for Electric-Resistance-Welded Ferritic Alloy-Steel Boiler and Superheater Tubes	403
SA-263	Specification for Stainless Chromium Steel-Clad Plate	409
SA-264	Specification for Stainless Chromium-Nickel Steel-Clad Plate	415
SA-265	Specification for Nickel and Nickel-Base Alloy-Clad Steel Plate	421
SA-266/SA-266M	Specification for Carbon Steel Forgings for Pressure Vessel Components ...	429
SA-268/SA-268M	Specification for Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service	435
SA-276	Specification for Stainless Steel Bars and Shapes	447
SA-278/SA-278M	Specification for Gray Iron Castings for Pressure Containing Parts for Temperatures up to 650°F (350°C)	459
SA-283/SA-283M	Specification for Low and Intermediate Tensile Strength Carbon Steel Plates	465
SA-285/SA-285M	Specification for Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength	469
SA-299/SA-299M	Specification for Pressure Vessel Plates, Carbon Steel, Manganese-Silicon ..	473
SA-302/SA-302M	Specification for Pressure Vessel Plates, Alloy Steel, Manganese-Molybdenum and Manganese-Molybdenum-Nickel	477
SA-307	Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength	481
SA-311/SA-311M	Specification for Cold-Drawn, Stress-Relieved Carbon Steel Bars Subject to Mechanical Property Requirements	491
SA-312/SA-312M	Specification for Seamless and Welded Austenitic Stainless Steel Pipes	497
SA-320/SA-320M	Specification for Alloy Steel and Stainless Steel Bolting Materials for Low-Temperature Service	511
SA-325	Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength	523
SA-333/SA-333M	Specification for Seamless and Welded Steel Pipe for Low-Temperature Service	535
SA-334/SA-334M	Specification for Seamless and Welded Carbon and Alloy-Steel Tubes for Low-Temperature Service	547
SA-335/SA-335M	Specification for Seamless Ferritic Alloy-Steel Pipe for High-Temperature Service	559
SA-336/SA-336M	Specification for Alloy Steel Forgings for Pressure and High-Temperature Parts	575
SA-350/SA-350M	Specification for Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components	585

SA-351/SA-351M	Specification for Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts	597
SA-352/SA-352M	Specification for Steel Castings, Ferritic and Martensitic, for Pressure-Containing Parts, Suitable for Low-Temperature Service	605
SA-353/SA-353M	Specification for Pressure Vessel Plates, Alloy Steel, Double-Normalized and Tempered 9% Nickel	611
SA-354	Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners	617
SA-358/SA-358M	Specification for Electric-Fusion-Welded Austenitic Chromium-Nickel Alloy Steel Pipe for High-Temperature Service	627
SA-369/SA-369M	Specification for Carbon and Ferritic Alloy Steel Forged and Bored Pipe for High-Temperature Service	637
SA-370	Test Methods and Definitions for Mechanical Testing of Steel Products	643
SA-372/SA-372M	Specification for Carbon and Alloy Steel Forgings for Thin-Walled Pressure Vessels	703
SA-376/SA-376M	Specification for Seamless Austenitic Steel Pipe for High-Temperature Central-Station Service	711
SA-387/SA-387M	Specification for Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum	723
SA-395/SA-395M	Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures	731
SA-403/SA-403M	Specification for Wrought Austenitic Stainless Steel Piping Fittings	745
SA-409/SA-409M	Specification for Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service	757
SA-414/SA-414M	Specification for Steel, Sheet, Carbon, for Pressure Vessels	769
SA-420/SA-420M	Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service	775
SA-423/SA-423M	Specification for Seamless and Electric-Welded Low-Alloy Steel Tubes	785
SA-426/SA-426M	Specification for Centrifugally Cast Ferritic Alloy Steel Pipe for High-Temperature Service	791
SA-435/SA-435M	Specification for Straight-Beam Ultrasonic Examination of Steel Plates	799
SA-437/SA-437M	Specification for Alloy Steel Turbine-Type Bolting Material Specially Heat Treated for High-Temperature Service	803
SA-449	Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use	809
SA-450/SA-450M	Specification for General Requirements for Carbon, Ferritic Alloy, and Austenitic Alloy Steel Tubes	821
SA-451/SA-451M	Specification for Centrifugally Cast Austenitic Steel Pipe for High-Temperature Service	835
SA-453/SA-453M	Specification for High-Temperature Bolting Materials With Expansion Coefficients Comparable to Austenitic Stainless Steels	841
SA-455/SA-455M	Specification for Pressure Vessel Plates, Carbon Steel, High-Strength Manganese	849
SA-476/SA-476M	Specification for Ductile Iron Castings for Paper Mill Dryer Rolls	853
SA-479/SA-479M	Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels	861
SA-480/SA-480M	Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip	869
SA-484/SA-484M	Specification for General Requirements for Stainless Steel Bars, Billets, and Forgings	895
SA-487/SA-487M	Specification for Steel Castings Suitable for Pressure Service	909
SA-508/SA-508M	Specification for Quenched and Tempered Vacuum-Treated Carbon and Alloy Steel Forgings for Pressure Vessels	915
SA-513	Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing	927
SA-515/SA-515M	Specification for Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service	953

SA-516/SA-516M	Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service	959
SA-517/SA-517M	Specification for Pressure Vessel Plates, Alloy Steel, High-Strength, Quenched and Tempered	967
SA-522/SA-522M	Specification for Forged or Rolled 8 and 9% Nickel Alloy Steel Flanges, Fittings, Valves, and Parts for Low-Temperature Service	973
SA-524	Specification for Seamless Carbon Steel Pipe for Atmospheric and Lower Temperatures	979
SA-530/SA-530M	Specification for General Requirements for Specialized Carbon and Alloy Steel Pipe	989
SA-533/SA-533M	Specification for Pressure Vessel Plates, Alloy Steel, Quenched and Tempered, Manganese-Molybdenum and Manganese-Molybdenum-Nickel	999
SA-537/SA-537M	Specification for Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel	1003
SA-540/SA-540M	Specification for Alloy Steel Bolting Materials for Special Applications	1009
SA-541/SA-541M	Specification for Quenched and Tempered Carbon and Alloy Steel Forgings for Pressure Vessel Components	1021
SA-542/SA-542M	Specification for Pressure Vessel Plates, Alloy Steel, Quenched-and-Tempered, Chromium-Molybdenum and Chromium-Molybdenum-Vanadium	1031
SA-543/SA-543M	Specification for Pressure Vessel Plates, Alloy Steel, Quenched and Tempered, Nickel-Chromium-Molybdenum	1037
SA-553/SA-553M	Specification for Pressure Vessel Plates, Alloy Steel, Quenched and Tempered 8 and 9% Nickel	1041
SA-556/SA-556M	Specification for Seamless Cold-Drawn Carbon Steel Feedwater Heater Tubes	1047
SA-557/SA-557M	Specification for Electric-Resistance-Welded Carbon Steel Feedwater Heater Tubes	1055
SA-562/SA-562M	Specification for Pressure Vessel Plates, Carbon Steel, Manganese-Titanium for Glass or Diffused Metallic Coatings	1063
SA-563	Specification for Carbon and Alloy Steel Nuts	1067
SA-564/SA-564M	Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes	1079
SA-568/SA-568M	Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for	1091
SA-572/SA-572M	Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel	1127
SA-574	Specification for Alloy Steel Socket-Head Cap Screws	1133
SA-577/SA-577M	Specification for Ultrasonic Angle-Beam Examination of Steel Plates	1143
SA-578/SA-578M	Specification for Straight-Beam Ultrasonic Examination of Rolled Steel Plates for Special Applications	1147
SA-587	Specification for Electric-Resistance-Welded Low-Carbon Steel Pipe for the Chemical Industry	1153
SA-592/SA-592M	Specification for High-Strength Quenched and Tempered Low-Alloy Steel Forged Fittings and Parts for Pressure Vessels	1161
SA-609/SA-609M	Specification for Castings, Carbon, Low-Alloy, and Martensitic Stainless Steel, Ultrasonic Examination Thereof	1165
SA-612/SA-612M	Specification for Pressure Vessel Plates, Carbon Steel, High Strength, for Moderate and Lower Temperature Service	1179
SA-638/SA-638M	Specification for Precipitation Hardening Iron Base Superalloy Bars, Forgings, and Forging Stock for High-Temperature Service	1183
SA-645/SA-645M	Specification for Pressure Vessel Plates, 5% and 5½% Nickel Alloy Steels, Specially Heat Treated	1189
SA-649/SA-649M	Specification for Forged Steel Rolls, Used for Corrugating Paper Machinery	1195
SA-656/SA-656M	Specification for Hot-Rolled Structural Steel, High-Strength Low-Alloy Plate With Improved Formability	1201
SA-660	Specification for Centrifugally Cast Carbon Steel Pipe for High-Temperature Service	1205

SA-662/SA-662M	Specification for Pressure Vessel Plates, Carbon-Manganese-Silicon Steel, for Moderate and Lower Temperature Service	1211
SA-666	Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar	1215
SA-667/SA-667M	Specification for Centrifugally Cast Dual Metal (Gray and White Cast Iron) Cylinders	1227
SA-671	Specification for Electric-Fusion-Welded Steel Pipe for Atmospheric and Lower Temperatures	1231
SA-672	Specification for Electric-Fusion-Welded Steel Pipe for High-Pressure Services at Moderate Temperatures	1243
SA-675/SA-675M	Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties	1253
SA-688/SA-688M	Specification Welded Austenitic Stainless Steel Feedwater Heater Tubes . . .	1259
SA-691	Specification for Carbon and Alloy Steel Pipe, Electric-Fusion-Welded for High-Pressure Service at High Temperatures	1271
SA-693	Specification for Precipitation-Hardening Stainless and Heat-Resisting Steel Plate, Sheet, and Strip	1281
SA-696	Specification for Steel Bars, Carbon, Hot-Wrought or Cold-Finished, Special Quality, for Pressure Piping Components	1293
SA-703/SA-703M	Specification for Steel Castings, General Requirements, for Pressure-Containing Parts	1297
SA-705/SA-705M	Specification for Age-Hardening Stainless Steel Forgings	1319
SA-723/SA-723M	Specification for Alloy Steel Forgings for High-Strength Pressure Component Application	1329
SA-724/SA-724M	Specification for Pressure Vessel Plates, Carbon-Manganese-Silicon Steel, Quenched and Tempered, for Welded Pressure Vessels	1337
SA-727/SA-727M	Specification for Carbon Steel Forgings for Piping Components with Inherent Notch Toughness	1343
SA-731/SA-731M	Specification for Seamless, Welded Ferritic, and Martensitic Stainless Steel Pipe	1349
SA-736/SA-736M	Specification for Pressure Vessel Plates, Low-Carbon Age-Hardening Nickel-Copper-Chromium-Molybdenum-Columbium and Nickel-Copper-Manganese-Molybdenum-Columbium Alloy Steel	1355
SA-737/SA-737M	Specification for Pressure Vessel Plates, High-Strength Low-Alloy Steel	1361
SA-738/SA-738M	Specification for Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel, for Moderate and Lower Temperature Service	1365
SA-739	Specification for Steel Bars, Alloy, Hot-Wrought, for Elevated Temperature or Pressure-Containing Parts, or Both	1373
SA-745/SA-745M	Practice for Ultrasonic Examination of Austenitic Steel Forgings	1377
SA-747/SA-747M	Specification for Steel Castings, Stainless, Precipitation Hardening	1385
SA-748/SA-748M	Specification for Statically Cast Chilled White Iron-Gray Iron Dual Metal Rolls for Pressure Vessel Use	1391
SA-749/SA-749M	Specification for Steel, Strip, Carbon and High-Strength, Low-Alloy, Hot-Rolled, General Requirements for	1395
SA-751	Specification for Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products	1407
SA-765/SA-765M	Specification for Carbon Steel and Low-Alloy Steel Pressure-Vessel-Component Forgings With Mandatory Toughness Requirements	1415
SA-770/SA-770M	Specification for Through-Thickness Tension Testing of Steel Plates for Special Applications	1425
SA-781/SA-781M	Specification for Castings, Steel and Alloy, Common Requirements, for General Industrial Use	1431
SA-788/SA-788M	Specification for Steel Forgings, General Requirements	1451
SA-789/SA-789M	Specification for Seamless and Welded Ferritic/Austenitic Stainless Steel Tubing for General Service	1467

SA-790/SA-790M	Specification for Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe	1473
SA-803/SA-803M	Specification for Welded Ferritic Stainless Steel Feedwater Heater Tubes ..	1483
SA-813/SA-813M	Specification for Single- or Double-Welded Austenitic Stainless Steel Pipe ..	1495
SA-814/SA-814M	Specification for Cold-Worked Welded Austenitic Stainless Steel Pipe	1507
SA-815/SA-815M	Specification for Wrought Ferritic, Ferritic/Austenitic, and Martensitic Stainless Steel Piping Fittings	1517
SA-832/SA-832M	Specification for Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum-Vandium	1525
SA-834	Specification for Common Requirements for Iron Castings for General Industrial Use	1533
SA-836/SA-836M	Specification for Titanium-Stabilized Carbon Steel Forgings for Glass-Lined Piping and Pressure Vessel Service	1539
SA-841/SA-841M	Specification for Steel Plates for Pressure Vessels, Produced by Thermo-Mechanical Control Process (TMCP)	1543
SA-874/SA-874M	Specification for Ferritic Ductile Iron Castings Suitable for Low-Temperature Service	1555
SA-905	Specification for Steel Wire, Pressure Vessel Winding	1559
SA-941	Specification for Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys	1565
SA-960/SA-960M	Specification for Common Requirements for Wrought Steel Piping Fittings ..	1575
SA-961/SA-961M	Specification for Common Requirements for Steel Flanges, Forged Fittings, Valves, and Parts for Piping Applications	1589
SA-962/SA-962M	Specification for Common Requirements for Steel Fasteners or Fastener Materials, or Both, Intended for Use at any Temperature From Cryogenic to the Creep Range	1601
SA-965/SA-965M	Specification for Steel Forgings, Austenitic, for Pressure and High-Temperature Parts	1615
SA-985/SA-985M	Specification for Steel Investment Castings General Requirements, for Pressure-Containing Parts	1623
SA-995	Specification for Castings, Austenitic-Ferritic (Duplex) Stainless Steel, for Pressure-Containing Parts	1645
SA-999/SA-999M	Specification for General Requirements for Alloy and Stainless Steel Pipe ..	1651
SA-1008/SA-1008M	Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy With Improved Formability	1663
SA-1010/SA-1010M	Specification for Higher-Strength Martensitic Stainless Steel Plate, Sheet, and Strip	1673
SA-1011/SA-1011M	Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy With Improved Formability, and Ultra-High-Strength	1677
SA-1016/SA-1016M	Specification for General Requirements for Ferritic Alloy Steel, Austenitic Alloy Steel, and Stainless Steel Tubes	1687
SA-1017/SA-1017M	Specification for Pressure Vessel Plates, Alloy-Steel, Chromium-Molybdenum-Tungsten	1703
SF-568M	Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners	1707
SA/AS 1548	Specification for Fine Grained, Weldable Steel Plates for Pressure Equipment	1719
SA/CSA-G40.21	Specification for Structural Quality Steels	1721
SA/EN 10025-2	Specification for Hot Rolled Products of Structural Steels	1723
SA/EN 10028-2	Specification for Flat Products Made of Steels for Pressure Purposes	1725
SA/EN 10028-3	Specification for Flat Products Made of Steels For Pressure Purposes	1727
SA/EN 10028-4	Specification for Flat Products Made of Steels For Pressure Purposes	1729
SA/EN 10028-7	Specification for Flat Products Made of Steels for Pressure Purposes	1733
SA/EN 10088-2	Specification for Stainless Steels	1735
SA/EN 10216-2	Specification for Seamless Steel Tubes for Pressure Purposes	1737
SA/EN 10217-1	Specification for Welded Steel Tubes for Pressure Purposes	1739

SA/GB 713	Specification for Steel Plates for Boilers and Pressure Vessels	1741
SA/IS 2062	Specification for Steel for General Structural Purposes	1745
SA/JIS G3118	Specification for Carbon Steel Plates for Pressure Vessels for Intermediate and Moderate Temperature Service	1747
SA/JIS G4303	Specification for Stainless Steel Bars	1749
SA/JIS G5504	Specification for Heavy-Walled Ferritic Spheroidal Graphite Iron Castings for Low Temperature Service	1751
SA/NF A 36-215	Specification for Weldable Fine Grain Steels for Transportation of Dangerous Substances	1753
Mandatory Appendix I	Standard Units for Use in Equations	1755
Mandatory Appendix II	Basis for Use of Acceptable ASME, ASTM, and Non-ASTM Editions	1756
Mandatory Appendix III	Guidelines on Multiple Marking of Materials	1768
Mandatory Appendix IV	Guidelines on the Approval of New Materials Under the ASME Boiler and Pressure Vessel Code	1770
Nonmandatory Appendix A	Sources of Standards	1775

(13)

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

INTERPRETATIONS

ASME issues written replies to inquiries concerning interpretation of technical aspects of the Code.

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

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 2013 Code Cases book: "Boilers and Pressure Vessels" or "Nuclear Components." Supplements will be sent automatically to the purchasers of the Code Cases books up to the publication of the 2015 Code.

FOREWORD

(This Foreword is provided as an aid to the user and is not part of the rules of this Code.)

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)

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. 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 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.

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

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://cstools.asme.org/csconnect/public/index.cfm?PublicReview=Revisions> 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.

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

1 INTRODUCTION

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

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

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

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

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

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

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

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

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

2 INQUIRY FORMAT

Submittals to a committee shall include:

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

(1) revision of present Code rules

(2) new or additional Code rules

(3) Code Case

(4) Code Interpretation

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

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