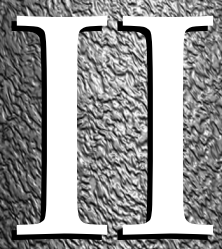
ASME BOILER AND PRESSURE VESSEL CODE
AN INTERNATIONAL CODE



MATERIALS

Part A –

Ferrous Material Specifications

2001 Edition
July 1, 2001

ASME BOILER AND PRESSURE VESSEL COMMITTEE
SUBCOMMITTEE ON MATERIALS

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
NEW YORK, NEW YORK

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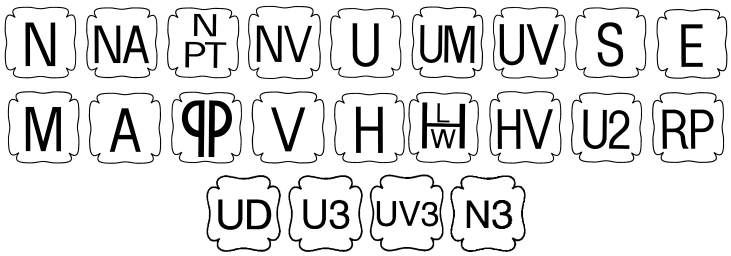
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2001 ASME
BOILER AND PRESSURE VESSEL CODE

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

III Subsection NCA — General Requirements for Division 1 and Division 2
III 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
- Appendices

III Division 2 — Code for Concrete Reactor Vessels and Containments
III Division 3 — Containment Systems for Storage and Transport Packagings of Spent Nuclear Fuel and High Level Radioactive Material and Waste
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 and Brazing Qualifications
X Fiber-Reinforced Plastic Pressure Vessels
XI Rules for Inservice Inspection of Nuclear Power Plant Components

ADDENDA

Colored-sheet Addenda, which include additions and revisions to individual Sections of the Code, are published annually and will be sent automatically to purchasers of the applicable Sections up to the publication of the 2004 Code. The 2001 Code is available only in the loose-leaf format; accordingly, the Addenda will be issued in the loose-leaf, replacement-page format.

INTERPRETATIONS

ASME issues written replies to inquiries concerning interpretation of technical aspects of the Code. The Interpretations for each individual Section will be published separately and will be included as part of the update service to that Section. They will be issued semiannually (July and December) up to the publication of the 2004 Code. Interpretations of Section III, Divisions 1 and 2, will be included with the update service to Subsection NCA.

CODE CASES

The Boiler and Pressure Vessel Committee meets 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 which have been adopted will appear in the appropriate 2001 Code Cases book: (1) Boilers and Pressure Vessels and (2) Nuclear Components. Supplements will be sent automatically to the purchasers of the Code Cases books up to the publication of the 2004 Code.

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CONTENTS

Foreword vii
Statements of Policy xi
Personnel xiii
ASTM Personnel xxiii
Preface xxv
Specification Listed by Materials xxvii
Specification Listed in Numeric Sequence xxxiii
Appendix 1 — Mandatory Preparation of Technical Inquiries to the Boiler and Pressure Vessel Committee xxxix
Appendix 2 — Mandatory Guideline on the Approval of New Materials Under the ASME Boiler and Pressure Vessel Code xli
Appendix A — Nonmandatory Acceptable ASTM Edition xlv
Appendix B — Nonmandatory Guidelines on Multiple Marking of Materials lv
SI Units lvii
Summary of Changes lxi

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FOREWORD

The American Society of Mechanical Engineers set up a committee in 1911 for the purpose of formulating standard rules for the construction of steam boilers and other pressure vessels. This committee is now called the Boiler and Pressure Vessel Committee.

The Committee's function is to establish rules of safety governing the design, fabrication, and inspection during construction of boilers and pressure vessels, and to interpret these rules when questions arise regarding their intent. 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 so as to give a reasonably long, safe period of usefulness. Advancements in design and material and the evidence of experience have been recognized.

This Code contains mandatory requirements, specific prohibitions, and nonmandatory guidance for construction[1] activities. The Code does not address all aspects of these activities and those aspects that are not specifically addressed should not be considered prohibited. The Code is not a handbook and cannot replace education, experience, and the use of engineering judgment. The phrase *engineering judgment* refers to technical judgments made by knowledgeable designers 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 they are responsible for the application of these programs to their design.

The Code does not fully address tolerances. When dimensions, sizes, or other parameters are not specified with tolerances, the values of these parameters are considered nominal and allowable tolerances or local variances may be considered acceptable when based on engineering judgment and standard practices as determined by the designer.

The Boiler and Pressure Vessel Committee deals with the care and inspection of boilers and pressure vessels in service only to the extent of providing suggested rules of good practice as an aid to owners and their inspectors.

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 Boiler and Pressure Vessel Committee meets regularly to consider revisions of the rules, new rules as dictated by technological development, Code Cases, and requests for interpretations. Only the Boiler and Pressure Vessel 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 Mandatory Appendix covering preparation of technical inquiries). Proposed revisions to the Code resulting from inquiries will be presented to the Main Committee for appropriate action. The action of the Main Committee becomes effective only after confirmation by letter 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 and published in *Mechanical Engineering* to invite comments from all interested persons. After the allotted time for public review and final approval by ASME, revisions are published annually in Addenda to the Code.

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

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Code Cases may be used in the construction of components to be stamped with the ASME Code symbol beginning with the date of their approval by ASME.

After Code revisions are approved by ASME, they may be used beginning with the date of issuance shown on the Addenda. Revisions, except for revisions to material specifications in Section II, Parts A and B, become mandatory 6 months after such date of issuance, except for boilers or pressure vessels contracted for prior to the end of the 6 month period. Revisions to material specifications are originated by the American Society for Testing and Materials (ASTM), and other recognized national or international organizations and are usually adopted by ASME. However, those revisions may or may not have any effect on the suitability of material, produced to earlier editions of specifications, for use in ASME construction. ASME material specifications approved for use in each construction Code are listed in the Appendices of Section II, Parts A and B. These Appendices list, for each specification, the latest edition adopted by ASME, and earlier and later editions considered by ASME to be identical for ASME construction.

Manufacturers and users of components are cautioned against making use of revisions and Cases that are less restrictive than former requirements without having assurance that they have been accepted by the proper authorities in the jurisdiction where the component is to be installed.

Each state and municipality in the United States and each province in Canada that adopts or accepts one or more Sections of the Boiler and Pressure Vessel Code is invited to appoint a representative to act on the Conference Committee to the Boiler and Pressure Vessel Committee. Since the members of the Conference Committee are in active contact with the administration and enforcement of the rules, the requirements for inspection in this Code correspond with those in effect in their respective jurisdictions. The required qualifications for an Authorized Inspector under these rules may be obtained from the administrative authority of any state, municipality, or province which has adopted these rules.

The Boiler and Pressure Vessel Committee in the formulation of its rules and in the establishment of maximum design and operating pressures considers materials, construction, methods of fabrication, inspection, and safety devices. Permission may be granted to regulatory bodies and organizations publishing safety standards to use a complete Section of the Code by reference. If usage of a Section, such as Section IX, involves exceptions, omissions, or changes in provisions, the intent of the Code might not be attained.

Where a state or other regulatory body, in the printing of any Section of the Boiler and Pressure Vessel Code, makes additions or omissions, it is recommended that such changes be clearly indicated.

The National Board of Boiler and Pressure Vessel Inspectors is composed of chief inspectors of states and municipalities in the United States and of provinces in Canada that have adopted the Boiler and Pressure Vessel Code. This Board, since its organization in 1919, has functioned to uniformly administer and enforce the rules of the Boiler and Pressure Vessel Code. The cooperation of that organization with the Boiler and Pressure Vessel Committee has been extremely helpful.

The Code 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. Laws or regulations issued by municipality, state, provincial, federal, or other enforcement or regulatory bodies having jurisdiction at the location of an installation establish the mandatory applicability of the Code rules, in whole or in part, within their jurisdiction. Those laws or regulations may require the use of this Code for vessels or components not considered to be within its Scope or may establish additions or deletions in that Scope. Accordingly, inquiries regarding such laws or regulations are to be directed to the issuing enforcement or regulatory body.

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 ASME Boiler and Pressure Vessel Committee. ASME is to be notified should questions arise concerning improper use of an ASME Code symbol.

The specifications for materials given in Section II are identical with or similar to those of the Specifications published by ASTM, AWS, and other recognized national or international organizations. When reference is made in an ASME material specification to a non-ASME specification for which a companion ASME specification exists, the reference shall be interpreted as applying to the ASME material specification. Not all materials included in the material specifications in Section II have been adopted for Code use. Usage is limited to those materials and grades adopted by at least one of the other Sections of the Code for application under rules of that Section. All materials allowed by these various Sections and used for construction within the scope of their rules shall be furnished in accordance with material specifications contained in

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Section II or referenced in Appendices A of Section II, Parts A and B except where otherwise provided in Code Cases or in the applicable Section of the Code. Materials covered by these specifications are acceptable for use in items covered by the Code Sections only to the degree indicated in the applicable Section. Materials for Code use should preferably be ordered, produced, and documented on this basis; Appendix A to Section II, Part A and Appendix A to Section II, Part B list editions of ASME and year dates of specifications that meet ASME requirements and that may be used in Code construction. Material produced to an acceptable specification with requirements different from the requirements of the corresponding specifications listed in Appendix A of Part A or Part B may also be used in accordance with the above, provided the material manufacturer or vessel manufacturer certifies with evidence acceptable to the Authorized Inspector that the corresponding requirements of specifications listed in Appendix A of Part A or Part B have been met. Material produced to an acceptable material specification is not limited as to country of origin.

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.

Publication of the SI (Metric) Edition of the ASME Boiler and Pressure Vessel Code was discontinued with the 1986 Edition. Effective October 1, 1986, the SI Edition was withdrawn as an ASME Boiler and Pressure Vessel Code document.

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STATEMENT OF POLICY ON THE USE OF CODE SYMBOLS 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 Code Symbols for marking items or constructions which 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 Code Symbols for the benefit of the users, the enforcement jurisdictions, and the holders of the symbols who comply with all requirements.

Based on these objectives, the following policy has been established on the usage in advertising of facsimiles of the symbols, 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 which might so indicate. An organization holding a Code Symbol 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."

The ASME Symbol 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 a Code Symbol who may also use the facsimile in advertising to show that clearly specified items will carry the symbol. General usage is permitted only when all of a manufacturer's items are constructed under the rules.

The ASME logo, which is the cloverleaf with the letters ASME within, shall not be used by any organization other than ASME.

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 Code Symbol Stamp described in the governing Section of the Code.

Markings such as "ASME," "ASME Standard," or any other marking including "ASME" or the various Code Symbols shall not be used on any item which 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 which tend to imply that all Code requirements have been met when, in fact, they have not been. Data Report Forms covering items not fully complying with ASME requirements should not refer to ASME or they should clearly identify all exceptions to the ASME requirements.

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PREFACE

The American Society of Mechanical Engineers (ASME) and the American Society for Testing and Materials (ASTM) have cooperated for more than fifty years in the preparation of material specifications adequate for safety in the field of pressure equipment for ferrous and nonferrous materials, contained in Section II (Part A — Ferrous and Part B — Nonferrous) of the ASME Boiler and Pressure Vessel Code.

The evolution of this cooperative effort is contained in Professor A. M. Greene's "History of the ASME Boiler Code," which was published as a series of articles in *Mechanical Engineering* from July 1952 through August 1953 and is now available from ASME in a special bound edition. The following quotations from this history, which was based upon the minutes of the ASME Boiler and Pressure Vessel Committee, will help focus on the cooperative nature of the specifications found in Section II, Material Specifications.

"General discussion of material specifications comprising Paragraphs 1 to 112 of Part 2 and the advisability of having them agree with ASTM specifications," (1914).

"ASME Subcommittee appointed to confer with ASTM," (1916).

"Because of this cooperation the specifications of the 1918 Edition of the ASME Boiler Code were more nearly in agreement with ASTM specifications. In the 1924 Edition of the Code, 10 specifications were in complete agreement with ASTM specifications, 4 in substantial agreement and 2 covered materials for which ASTM had no corresponding specifications."

"In Section II, Material Specifications, the paragraphs were given new numbers beginning with S-1 and extending to S-213," (1925).

"Section II was brought into agreement with changes made in the latest ASTM specifications since 1921," (1932).

"The Subcommittee on Material Specifications arranged for the introduction of the revisions of many of the specifications so that they would agree with the latest form of the earlier ASTM specifications...," (1935).

From the preceding, it is evident that many of the material specifications were prepared by the Boiler and Pressure Vessel Code Committees, then subsequently, by cooperative action, modified and identified as ASTM specifications. Section II, Parts A and B, currently contain many material specifications which are identical with the corresponding ASTM specifications and some which have been modified for Code usage.

In 1969, the American Welding Society began publication of specifications for welding rods, electrodes, and filler metals, hitherto issued by ASTM. The Boiler and Pressure Vessel Committee has recognized this new arrangement, and is now working with AWS on these specifications. Section II, Part C, contains the welding material specifications approved for Code use.

In 1992, the ASME Board of Pressure Technology Codes and Standards endorsed the use, of non-ASTM material for Boiler and Pressure Vessel Code applications. It is the intent to follow the procedures and practices currently in use to implement the adoption of non-ASTM materials.

All identical specifications are indicated by the ASME/originating organization symbols. The specifications prepared and copyrighted by ASTM, AWS, and other originating organizations are reproduced in the Code with the permission of the respective Society. The ASME Boiler and Pressure Vessel Committee has given careful consideration to each new and revised specification, and has made such changes as they deemed necessary to make the specification adaptable for Code usage. In addition, ASME has furnished ASTM with the basic requirements that should govern many proposed new specifications. Joint action will continue an effort to make the ASTM, AWS, and ASME specifications identical.

To assure that there will be a clear understanding on the part of the users of Section II, ASME publishes both the identical specifications and those amended for Code usage in three parts every three years, in the same page size to match the other sections of the Code, and Addenda are issued annually to provide the latest changes in Section II specifications.

The ASME Boiler and Pressure Vessel Code has been adopted into law by 48 states and many municipalities in the United States and by all of the Canadian Provinces.

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Specifications
Listed by Materials

Steel Pipe

SA-53/SA-53M	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless	172
SA-106	Seamless Carbon Steel Pipe for High-Temperature Service	209
SA-134	Pipe, Steel, Electric-Fusion (Arc)-Welded (Sizes NPS 16 and Over)	225
SA-135	Electric-Resistance-Welded Steel Pipe	230
SA-312/SA-312M	Seamless and Welded Austenitic Stainless Steel Pipe	494
SA-333/SA-333M	Seamless and Welded Steel Pipe for Low-Temperature Service	531
SA-335/SA-335M	Seamless Ferritic Alloy-Steel Pipe for High-Temperature Service	553
SA-358/SA-358M	Electric-Fusion-Welded Austenitic Chromium-Nickel Alloy Steel Pipe for High-Temperature Service	616
SA-369/SA-369M	Carbon and Ferritic Alloy Steel Forged and Bored Pipe for High-Temperature Service	623
SA-376/SA-376M	Seamless Austenitic Steel Pipe for High-Temperature Central-Station Service	696
SA-409/SA-409M	Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service	740
SA-426	Centrifugally Cast Ferritic Alloy Steel Pipe for High-Temperature Service	771
SA-430/SA-430M	Austenitic Steel Forged and Bored Pipe for High-Temperature Service	777
SA-451	Centrifugally Cast Austenitic Steel Pipe for High-Temperature Service	813
SA-452	Centrifugally Cast Austenitic Steel Cold-Wrought Pipe for High-Temperature Service	819
SA-524	Seamless Carbon Steel Pipe for Atmospheric and Lower Temperatures	945
SA-530/SA-530M	General Requirements for Specialized Carbon and Alloy Steel Pipe	955
SA-587	Electric-Resistance-Welded Low-Carbon Steel Pipe for the Chemical Industry	1068
SA-660	Centrifugally Cast Carbon Steel Pipe for High-Temperature Service	1119
SA-671	Electric-Fusion-Welded Steel Pipe for Atmospheric and Lower Temperatures	1142
SA-672	Electric-Fusion-Welded Steel Pipe for High-Pressure Service at Moderate Temperatures	1152
SA-691	Carbon and Alloy Steel Pipe, Electric-Fusion-Welded for High-Pressure Service at High Temperatures	1177
SA-727/SA-727M	Forgings, Carbon Steel, for Piping Components With Inherent Notch Toughness	1240
SA-731/SA-731M	Seamless, Welded Ferritic, and Martensitic Stainless Steel Pipe	1246
SA-790/SA-790M	Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe	1343
SA-813/SA-813M	Single- or Double-Welded Austenitic Stainless Steel Pipe	1365
SA-814/SA-814M	Cold-Worked Welded Austenitic Stainless Steel Pipe	1374
SA-941	Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys	1418
SA-961	Common Requirements for Steel, Flanges, Forged Fittings, Valves, and Parts for Piping Applications	1436

Steel Tubes

SA-178/SA-178M	Electric-Resistance-Welded Carbon Steel and Carbon-Manganese Steel Boiler and Superheater Tubes	239
SA-179/SA-179M	Seamless Cold-Drawn Low-Carbon Steel Heat Exchanger and Condenser Tubes	244
SA-192/SA-192M	Seamless Carbon Steel Boiler Tubes for High-Pressure Service	274
SA-199/SA-199M	Seamless Cold-Drawn Intermediate Alloy Steel Heat Exchanger and Condenser Tubes	313
SA-209/SA-209M	Seamless Carbon-Molybdenum Alloy-Steel Boiler and Superheater Tubes	329
SA-210/SA-210M	Seamless Medium-Carbon Steel Boiler and Superheater Tubes	335
SA-213/SA-213M	Seamless Ferritic and Austenitic Alloy Steel Boiler, Superheater, and Heat Exchanger Tubes	340

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SA-214/SA-214M	Electric-Resistance-Welded Carbon Steel Heat-Exchanger and Condenser Tubes	352
SA-226/SA-226M	Electric-Resistance-Welded Carbon Steel Boiler and Superheater Tubes for High-Pressure Service	368
SA-249/SA-249M	Welded Austenitic Steel Boiler, Superheater, Heat Exchanger, and Condenser Tubes	396
SA-250/SA-250M	Electric-Resistance-Welded Ferritic Alloy Steel Boiler and Superheater Tubes	406
SA-268/SA-268M	Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service	446
SA-334/SA-334M	Seamless and Welded Carbon and Alloy Steel Tubes for Low-Temperature Service	543
SA-423/SA-423M	Seamless and Electric Welded Low-Alloy Steel Tubes	765
SA-450/SA-450M	General Requirements for Carbon, Ferritic Alloy, and Austenitic Alloy Steel Tubes	800
SA-556/SA-556M	Seamless Cold-Drawn Carbon Steel Feedwater Heater Tubes	1010
SA-557/SA-557M	Electric-Resistance-Welded Carbon Steel Feedwater Heater Tubes	1017
SA-688/SA-688M	Welded Austenitic Stainless Steel Feedwater Heater Tubes	1168
SA-789/SA-789M	Seamless and Welded Ferritic/Austenitic Stainless Steel Tubing for General Service	1336
SA-803/SA-803M	Welded Ferritic Stainless Steel Feedwater Heater Tubes	1352
SA-941	Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys	1418

Steel Flanges, Fittings, Valves, and Parts

SA-105/SA-105M	Carbon Steel Forgings, for Piping Applications	200
SA-181/SA-181M	Carbon Steel Forgings, for General-Purpose Piping	247
SA-182/SA-182M	Forged or Rolled Alloy Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service	253
SA-216/SA-216M	Steel Castings, Carbon, Suitable for Fusion Welding for High-Temperature Service	354
SA-217/SA-217M	Steel Castings, Martensitic Stainless and Alloy, for Pressure Containing Parts Suitable for High-Temperature Service	358
SA-232/SA-232M	Chromium-Vanadium Alloy Steel Valve Spring Quality Wire	372
SA-234/SA-234M	Piping Fittings of Wrought Carbon Steel and Alloy for Moderate and High-Temperature Service	376
SA-350/SA-350M	Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components	574
SA-351/SA-351M	Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts	586
SA-352/SA-352M	Steel Castings, Ferritic and Martensitic, for Pressure Containing Parts, Suitable for Low Temperature Service	593
SA-403/SA-403M	Wrought Austenitic Stainless Steel Piping Fittings	730
SA-420/SA-420M	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service	754
SA-522/SA-522M	Forged or Rolled 8 and 9% Nickel Alloy Steel Flanges, Fittings, Valves, and Parts for Low-Temperature Service	939
SA-592/SA-592M	High-Strength Quenched and Tempered Low-Alloy Steel Forged Fittings and Parts for Pressure Vessels	1076
SA-815/SA-815M	Wrought Ferritic, Ferritic/Austenitic, and Martensitic Stainless Steel Piping Fittings	1383
SA-905	Steel Wire, Pressure Vessel Winding	1413
SA-960	Common Requirements for Wrought Steel Piping Fittings	1425
SA-961	Common Requirements for Steel Flanges, Forged Fittings, Valves and Parts for Piping Applications	1436
SA-995	Castings, Austenitic-Ferritic (Duplex) Stainless Steel, for Pressure-Containing Parts	1456

Steel Plates, Sheets, and Strip for Pressure Vessels

SA-20/SA-20M	General Requirements for Steel Plates for Pressure Vessels	85
SA-202/SA-202M	Pressure Vessel Plates, Alloy Steel, Chromium-Manganese-Silicon	318
SA-203/SA-203M	Pressure Vessel Plates, Alloy Steel, Nickel	321
SA-204/SA-204M	Pressure Vessel Plates, Alloy Steel, Molybdenum	325
SA-225/SA-225M	Pressure Vessel Plates, Alloy Steel, Manganese-Vanadium-Nickel	364
SA-240	Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels	387
SA-263	Corrosion-Resisting Chromium Steel Clad Plate, Sheet, and Strip	410
SA-264	Stainless Chromium-Nickel Steel Clad Plate, Sheet, and Strip	422
SA-265	Nickel and Nickel-Base Alloy Clad Steel Plate	433
SA-285/SA-285M	Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength	471

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SA-299/SA-299M	Pressure Vessel Plates, Carbon Steel, Manganese-Silicon	474
SA-302/SA-302M	Pressure Vessel Plates, Alloy Steel, Manganese-Molybdenum and Manganese-Molybdenum-Nickel	477
SA-353/SA-353M	Pressure Vessel Plates, Alloy Steel, 9 Percent Nickel, Double-Normalized and Tempered	601
SA-387/SA-387M	Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum	704
SA-414/SA-414M	Steel, Sheet, Carbon, for Pressure Vessels	750
SA-455/SA-455M	Pressure Vessel Plates, Carbon Steel, High-Strength Manganese	836
SA-480/SA-480M	General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip	858
SA-515/SA-515M	Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service	926
SA-516/SA-516M	Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service	931
SA-517/SA-517M	Pressure Vessel Plates, Alloy Steel, High Strength, Quenched and Tempered	935
SA-533/SA-533M	Pressure Vessel Plates, Alloy Steel, Quenched and Tempered, Manganese-Molybdenum and Manganese-Molybdenum-Nickel	965
SA-537/SA-537M	Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel	970
SA-542/SA-542M	Pressure Vessel Plates, Alloy Steel, Quenched and Tempered, Chromium-Molybdenum and Chromium-Molybdenum-Vanadium	996
SA-543/SA-543M	Pressure Vessel Plates, Alloy Steel, Quenched and Tempered, Nickel-Chromium-Molybdenum	1000
SA-553/SA-553M	Pressure Vessel Plates, Alloy Steel, Quenched and Tempered, 8 and 9 Percent Nickel	1004
SA-562/SA-562M	Pressure Vessel Plates, Carbon Steel, Manganese-Titanium for Glass or Diffused Metallic Coatings	1024
SA-612/SA-612M	Pressure Vessel Plates, Carbon Steel, High Strength, for Moderate and Lower Temperature Service	1095
SA-620/SA-620M	Steel Sheet, Carbon, Drawing Quality, Special Killed, Cold-Rolled	1100
SA-645/SA-645M	Pressure Vessel Plates, Five Percent Nickel Alloy Steel, Specially Heat Treated	1108
SA-662/SA-662M	Pressure Vessel Plates, Carbon-Manganese, for Moderate and Lower Temperature Service	1125
SA-666	Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar	1130
SA-693	Precipitation-Hardening Stainless and Heat-Resisting Steel Plate, Sheet, and Strip	1185
SA-724/SA-724M	Pressure Vessel Plates, Carbon Steel, Quenched and Tempered, for Welded Layered Pressure Vessels	1236
SA-736/SA-736M	Pressure Vessel Plates, Low-Carbon Age-Hardening Nickel-Copper-Chromium-Molybdenum-Columbium and Nickel-Copper-Manganese-Molybdenum-Columbium Alloy Steel	1252
SA-737/SA-737M	Pressure Vessel Plates, High-Strength, Low-Alloy Steel	1257
SA-738/SA-738M	Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel, for Moderate and Lower Temperature Service	1261
SA-770/SA-770M	Through-Thickness Tension Testing of Steel Plates for Special Applications	1298
SA-812/SA-812M	Steel Sheet, High-Strength, Low-Alloy, Hot-Rolled, for Welded Layered Pressure Vessels	1362
SA-832/SA-832M	Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum-Vanadium	1394
SA-841/SA-841M	Steel Plates for Pressure Vessels, Produced by the Thermo-Mechanical Control Process (TMCP)	1407

Structural Steel

SA-6/SA-6M	General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling	1
SA-36/SA-36M	Carbon Structural Steel	157
SA-283/SA-283M	Low- and Intermediate-Tensile Strength Carbon Steel Plates	468

Steel Bars

SA-6/SA-6M	General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling	1

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SA-29/SA-29M	General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought and Cold-Finished	131
SA-311/SA-311M	Steel Bars, Carbon, Stress-Relieved Cold-Drawn, Subject to Mechanical Property Requirements	489
SA-479/SA-479M	Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels	845
SA-484/SA-484M	General Requirements for Stainless and Steel Bars, Billets, and Forgings	891
SA-564/SA-564M	Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes	1041
SA-638/SA-638M	Precipitation Hardening Iron Base Superalloy Bars, Forgings, and Forging Stock for High-Temperature Service	1104
SA-675/SA-675M	Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties	1162
SA-695	Steel Bars, Carbon, Hot-Wrought, Special Quality, for Fluid Power Applications	1194
SA-696	Steel Bars, Carbon, Hot-Wrought or Cold-Finished, Special Quality, for Pressure Piping Components	1198
SA-739	Steel Bars, Alloy, Hot-Wrought, for Elevated Temperature or Pressure-Containing Parts, or Both	1267

Steel Bolting Materials

SA-193/SA-193M	Alloy Steel and Stainless Steel Bolting Materials for High-Temperature Service	277
SA-194/SA-194M	Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service	295
SA-307	Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength	481
SA-320/SA-320M	Alloy Steel Bolting Materials for Low-Temperature Service	508
SA-325	Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength	520
SA-354	Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners	606
SA-437/SA-437M	Alloy Steel Turbine-Type Bolting Material Specially Heat Treated for High-Temperature Service	787
SA-449	Quenched and Tempered Steel Bolts and Studs	792
SA-453/SA-453M	High-Temperature Bolting Materials, With Expansion Coefficients Comparable to Austenitic Steel	825
SA-540/SA-540M	Alloy Steel Bolting Materials for Special Applications	975
SA-563	Carbon and Alloy Steel Nuts	1028
SA-574	Alloy Steel Socket-Head Screws	1050
SA-962/SA-962M	Common Requirements for Steel Fasteners or Fastener Materials, or Both, Intended for Use at Any Temperature from Cryogenic to the Creep Range	1446
SF-568	Carbon and Alloy Steel Externally Threaded Metric Fasteners	1461

Steel Billets and Forgings

SA-105/SA-105M	Carbon Steel Forgings, for Piping Applications	200
SA-181/SA-181M	Carbon Steel Forgings, for General-Purpose Piping	247
SA-266/SA-266M	Carbon Steel Forgings, for Pressure Vessel Components	440
SA-336/SA-336M	Alloy Steel Forgings for Pressure and High-Temperature Parts	565
SA-350/SA-350M	Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components	574
SA-372/SA-372M	Carbon and Alloy Steel Forgings for Thin-Walled Pressure Vessels	689
SA-484/SA-484M	General Requirements for Stainless Steel Bars, Billets, and Forgings	891
SA-508/SA-508M	Quenched and Tempered Vacuum-Treated Carbon and Alloy Steel Forgings for Pressure Vessels	916
SA-541/SA-541M	Quenched and Tempered Carbon and Alloy Steel Forgings for Pressure Vessel Components	988
SA-638/SA-638M	Precipitation Hardening Iron Base Superalloy Bars, Forgings, and Forging Stock for High-Temperature Service	1104
SA-649/SA-649M	Forged Steel Rolls, Used for Corrugating Paper Machinery	1114
SA-705/SA-705M	Age-Hardening Stainless and Heat-Resisting Steel Forgings	1221
SA-723/SA-723M	Alloy Steel Forgings for High-Strength Pressure Component Application	1230
SA-745/SA-745M	Ultrasonic Examination of Austenitic Steel Forgings	1270
SA-765/SA-765M	Carbon Steel and Low-Alloy Steel Pressure Vessel Component Forgings With Mandatory Toughness Requirements	1291

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SA-788	Steel Forgings, General Requirements	1324
SA-836/SA-836M	Forgings, Titanium-Stabilized Carbon Steel, for Glass-Lined Piping and Pressure Vessel Service	1402

Steel Castings

SA-216/SA-216M	Steel Castings, Carbon, Suitable for Fusion Welding for High-Temperature Service	354
SA-217/SA-217M	Steel Castings, Martensitic Stainless and Alloy, for Pressure-Containing Parts Suitable for High-Temperature Service	358
SA-351/SA-351M	Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts	586
SA-352/SA-352M	Steel Castings, Ferritic and Martensitic, for Pressure-Containing Parts, Suitable for Low Temperature Service	593
SA-487/SA-487M	Steel Castings Suitable for Pressure Service	908
SA-494/SA-494M	Castings, Nickel and Nickel Alloy	915
SA-609/SA-609M	Castings, Carbon, Low-Alloy, and Martensitic Stainless Steel, Ultrasonic Examination Thereof	1081
SA-667/SA-667M	Centrifugally Cast Dual Metal (Gray and White Cast Iron) Cylinders	1140
SA-703/SA-703M	Steel Castings, General Requirements, for Pressure-Containing Parts	1202
SA-747/SA-747M	Precipitation Hardening Stainless Steel Castings	1277
SA-781/SA-781M	Castings, Steel and Alloy, Common Requirements, for General Industrial Use	1306
SA-995	Castings, Austenitic-Ferritic (Duplex) Stainless Steel, for Pressure-Containing Parts	1456

Corrosion-Resisting and Heat-Resisting Steels

SA-182/SA-182M	Forged or Rolled Alloy Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service	253
SA-193/SA-193M	Alloy Steel and Stainless Steel Bolting Materials for High-Temperature Service	277
SA-194/SA-194M	Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both	295
SA-213/SA-213M	Seamless Ferritic and Austenitic Alloy Steel Boiler, Superheater, and Heat Exchanger Tubes	340
SA-216/SA-216M	Steel Castings, Carbon, Suitable for Fusion Welding for High-Temperature Service	354
SA-217/SA-217M	Steel Castings, Martensitic Stainless and Alloy, for Pressure Containing Parts Suitable for High-Temperature Service	358
SA-240	Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels	387
SA-249/SA-249M	Welded Austenitic Steel Boiler, Superheater, Heat Exchanger, and Condenser Tubes	396
SA-263	Corrosion-Resisting Chromium Steel Clad Plate, Sheet, and Strip	410
SA-264	Stainless Chromium-Nickel Steel Clad Plate, Sheet, and Strip	422
SA-265	Nickel and Nickel-Base Alloy Clad Steel Plate	433
SA-268/SA-268M	Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service	446
SA-312/SA-312M	Seamless and Welded Austenitic Stainless Steel Pipe	494
SA-320/SA-320M	Alloy Steel Bolting Materials for Low-Temperature Service	508
SA-336/SA-336M	Alloy Steel Forgings for Pressure and High-Temperature Parts	565
SA-351/SA-351M	Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts	586
SA-358/SA-358M	Electric-Fusion-Welded Austenitic Chromium-Nickel Alloy Steel Pipe for High-Temperature Service	616
SA-369/SA-369M	Carbon and Ferritic Alloy Steel Forged and Bored Pipe for High-Temperature Service	623
SA-376/SA-376M	Seamless Austenitic Steel Pipe for High-Temperature Central-Station Service	696
SA-403/SA-403M	Wrought Austenitic Stainless Steel Piping Fittings	730
SA-409/SA-409M	Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service	740
SA-426	Centrifugally Cast Ferritic Alloy Steel Pipe for High-Temperature Service	771
SA-430/SA-430M	Austenitic Steel Forged and Bored Pipe for High-Temperature Service	777
SA-437/SA-437M	Alloy Steel Turbine-Type Bolting Material Specially Heat Treated for High-Temperature Service	787
SA-451	Centrifugally Cast Austenitic Steel Pipe for High-Temperature Service	813
SA-452	Centrifugally Cast Austenitic Steel Cold-Wrought Pipe for High-Temperature Service	819

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SA-479/SA-479M	Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels	845
SA-484/SA-484M	General Requirements for Stainless Steel Bars, Billets, and Forgings	891
SA-515/SA-515M	Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service	926
SA-564/SA-564M	Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes	1041
SA-638/SA-638M	Precipitation Hardening Iron Base Superalloy Bars, Forgings, and Forging Stock for High-Temperature Service	1104
SA-660	Centrifugally Cast Carbon Steel Pipe for High-Temperature Service	1119
SA-666	Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar	1130
SA-691	Carbon and Alloy Steel Pipe, Electric-Fusion-Welded for High-Pressure Service at High Temperatures	1177
SA-705/SA-705M	Age-Hardening Stainless and Heat-Resisting Steel Forgings	1221
SA-789/SA-789M	Seamless and Welded Ferritic/Austenitic Stainless Steel Tubing for General Service	1336
SA-790/SA-790M	Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe	1343
SA-814/SA-814M	Cold-Worked Welded Austenitic Stainless Steel Pipe	1374
SA-815/SA-815M	Wrought Ferritic, Ferritic/Austenitic, and Martensitic Stainless Steel Piping Fittings	1383
SA-995	Castings, Austenitic-Ferritic (Duplex) Stainless Steel, for Pressure-Containing Parts	1456

Wrought Iron, Cast Iron, and Malleable Iron

SA-47	Ferritic Malleable Iron Castings	164
SA-278	Gray Iron Castings for Pressure Containing Parts for Temperatures Up to 650°F	463
SA-395	Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures	718
SA-476	Ductile Iron Castings for Paper Mill Dryer Rolls	839
SA-748/SA-748M	Statically Cast Chilled White Iron-Gray Iron Dual Metal Rolls for Pressure Vessel Use	1283
SA-834	Common Requirements for Iron Castings for General Industrial Use	1398

Methods

SA-275/SA-275M	Magnetic Particle Examination of Steel Forgings	454
SA-370	Standard Test Methods and Definitions for Mechanical Testing of Steel Products	628
SA-388/SA-388M	Ultrasonic Examination of Heavy Steel Forgings	710
SA-435/SA-435M	Straight-Beam Ultrasonic Examination of Steel Plates	784
SA-577/SA-577M	Ultrasonic Angle-Beam Examination of Steel Plates	1059
SA-578/SA-578M	Straight-Beam Ultrasonic Examination of Plain and Clad Steel Plates for Special Applications	1062
SA-745/SA-745M	Ultrasonic Examination of Austenitic Steel Forgings	1270
SA-751	Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products	1285

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Specifications
Listed in Numeric Sequence

SA-6/SA-6M	General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling	1
SA-20/SA-20M	General Requirements for Steel Plates for Pressure Vessels	85
SA-29/SA-29M	General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought and Cold-Finished	131
SA-36/SA-36M	Carbon Structural Steel	157
SA-47	Ferritic Malleable Iron Castings	164
SA-53/SA-53M	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless	172
SA-105/SA-105M	Carbon Steel Forgings for Piping Applications	200
SA-106	Seamless Carbon Steel Pipe for High-Temperature Service	209
SA-134	Pipe, Steel, Electric-Fusion (Arc)-Welded (Sizes NPS 16 and Over)	225
SA-135	Electric-Resistance-Welded Steel Pipe	230
SA-178/SA-178M	Electric-Resistance-Welded Carbon Steel and Carbon-Manganese Steel Boiler and Superheater Tubes	239
SA-179/SA-179M	Seamless Cold-Drawn Low-Carbon Steel Heat Exchanger and Condenser Tubes	244
SA-181/SA-181M	Carbon Steel Forgings, for General-Purpose Piping	247
SA-182/SA-182M	Forged or Rolled Alloy Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service	253
SA-192/SA-192M	Seamless Carbon Steel Boiler Tubes for High-Pressure Service	274
SA-193/SA-193M	Alloy Steel and Stainless Steel Bolting Materials for High-Temperature Service	277
SA-194/SA-194M	Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both	295
SA-199/SA-199M	Seamless Cold-Drawn Intermediate Alloy-Steel Heat-Exchanger and Condenser Tubes	313
SA-202/SA-202M	Pressure Vessel Plates, Alloy Steel, Chromium-Manganese-Silicon	318
SA-203/SA-203M	Pressure Vessel Plates, Alloy Steel, Nickel	321
SA-204/SA-204M	Pressure Vessel Plates, Alloy Steel, Molybdenum	325
SA-209/SA-209M	Seamless Carbon-Molybdenum Alloy-Steel Boiler and Superheater Tubes	329
SA-210/SA-210M	Seamless Medium-Carbon Steel Boiler and Superheater Tubes	335
SA-213/SA-213M	Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes	340
SA-214/SA-214M	Electric-Resistance-Welded Carbon Steel Heat-Exchanger and Condenser Tubes	352
SA-216/SA-216M	Steel Castings, Carbon, Suitable for Fusion Welding for High-Temperature Service	354
SA-217/SA-217M	Steel Castings, Martensitic Stainless and Alloy, for Pressure-Containing Parts Suitable for High-Temperature Service	358
SA-225/SA-225M	Pressure Vessel Plates, Alloy Steel, Manganese-Vanadium-Nickel	364
SA-226/SA-226M	Electric-Resistance-Welded Carbon Steel Boiler and Superheater Tubes for High-Pressure Service	368
SA-232/SA-232M	Chromium-Vanadium Alloy Steel Valve Spring Quality Wire	372
SA-234/SA-234M	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High-Temperature Service	376
SA-240	Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels	387
SA-249/SA-249M	Welded Austenitic Steel Boiler, Superheater, Heat-Exchanger, and Condenser Tubes	396
SA-250/SA-250M	Electric-Resistance-Welded Ferritic Alloy-Steel Boiler and Superheater Tubes	406
SA-263	Corrosion-Resisting Chromium Steel Clad Plate, Sheet, and Strip	410
SA-264	Stainless Chromium-Nickel Steel Clad Plate, Sheet, and Strip	422

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SA-265	Nickel and Nickel-Base Alloy-Clad Steel Plate	433
SA-266/SA-266M	Carbon Steel Forgings, for Pressure Vessel Components	440
SA-268/SA-268M	Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service	446
SA-275/SA-275M	Magnetic Particle Examination of Steel Forgings	454
SA-278	Gray Iron Castings for Pressure-Containing Parts for Temperature Up to 650°F	463
SA-283/SA-283M	Low- and Intermediate-Tensile Strength Carbon Steel Plates	468
SA-285/SA-285M	Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength	471
SA-299/SA-299M	Pressure Vessel Plates, Carbon Steel, Manganese-Silicon	474
SA-302/SA-302M	Pressure Vessel Plates, Alloy Steel, Manganese-Molybdenum and Manganese-Molybdenum-Nickel	477
SA-307	Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength	481
SA-311/SA-311M	Steel Bars, Carbon, Stress-Relieved Cold-Drawn, Subject to Mechanical Property Requirements	489
SA-312/SA-312M	Seamless and Welded Austenitic Stainless Steel Pipe	494
SA-320/SA-320M	Alloy Steel Bolting Materials for Low-Temperature Service	508
SA-325	Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength	520
SA-333/SA-333M	Seamless and Welded Steel Pipe for Low-Temperature Service	531
SA-334/SA-334M	Seamless and Welded Carbon and Alloy Steel Tubes for Low-Temperature Service	543
SA-335/SA-335M	Seamless Ferritic Alloy-Steel Pipe for High-Temperature Service	553
SA-336/SA-336M	Alloy Steel Forgings for Pressure and High-Temperature Parts	565
SA-350/SA-350M	Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components	574
SA-351/SA-351M	Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts	586
SA-352/SA-352M	Steel Castings, Ferritic and Martensitic, for Pressure Containing Parts, Suitable for Low Temperature Service	593
SA-353/SA-353M	Pressure Vessel Plates, Alloy Steel, 9 Percent Nickel, Double-Normalized and Tempered	601
SA-354	Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners	606
SA-358/SA-358M	Electric-Fusion-Welded Austenitic Chromium-Nickel Alloy Steel Pipe for High-Temperature Service	616
SA-369/SA-369M	Carbon and Ferritic Alloy Steel Forged and Bored Pipe for High-Temperature Service	623
SA-370	Standard Test Methods and Definitions for Mechanical Testing of Steel Products	628
SA-372/SA-372M	Carbon and Alloy Steel Forgings for Thin-Walled Pressure Vessels	689
SA-376/SA-376M	Seamless Austenitic Steel Pipe for High-Temperature Central-Station Service	696
SA-387/SA-387M	Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum	704
SA-388/SA-388M	Ultrasonic Examination of Heavy Steel Forgings	710
SA-395	Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures	718
SA-403/SA-403M	Wrought Austenitic Stainless Steel Piping Fittings	730
SA-409/SA-409M	Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service	740
SA-414/SA-414M	Steel, Sheet, Carbon, for Pressure Vessels	750
SA-420/SA-420M	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service	754
SA-423/SA-423M	Seamless and Electric-Welded Low-Alloy Steel Tubes	765
SA-426	Centrifugally Cast Ferritic Alloy Steel Pipe for High-Temperature Service	771
SA-430/SA-430M	Austenitic Steel Forged and Bored Pipe for High-Temperature Service	777
SA-435/SA-435M	Straight-Beam Ultrasonic Examination of Steel Plates	784
SA-437/SA-437M	Alloy Steel Turbine-Type Bolting Material Specially Heat Treated for High-Temperature Service	787
SA-449	Quenched and Tempered Steel Bolts and Studs	792
SA-450/SA-450M	General Requirements for Carbon, Ferritic Alloy, and Austenitic Alloy Steel Tubes	800
SA-451	Centrifugally Cast Austenitic Steel Pipe for High-Temperature Service	813
SA-452	Centrifugally Cast Austenitic Steel Cold-Wrought Pipe for High-Temperature Service	819
SA-453/SA-453M	High-Temperature Bolting Materials, With Expansion Coefficients Comparable to Austenitic Steels	825
SA-455/SA-455M	Pressure Vessel Plates, Carbon Steel, High-Strength Manganese	836

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SA-476	Ductile Iron Castings for Paper Mill Dryer Rolls	839
SA-479/SA-479M	Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels	845
SA-480/SA-480M	General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip	858
SA-484/SA-484M	General Requirements for Stainless Steel Bars, Billets, and Forgings	891
SA-487/SA-487M	Steel Castings Suitable for Pressure Service	908
SA-494/SA-494M	Castings, Nickel and Nickel Alloy	915
SA-508/SA-508M	Quenched and Tempered Vacuum-Treated Carbon and Alloy Steel Forgings for Pressure Vessels	916
SA-515/SA-515M	Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service	926
SA-516/SA-516M	Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service	931
SA-517/SA-517M	Pressure Vessel Plates, Alloy Steel, High Strength, Quenched and Tempered	935
SA-522/SA-522M	Forged or Rolled 8 and 9% Nickel Alloy Steel Flanges, Fittings, Valves, and Parts for Low-Temperature Service	939
SA-524	Seamless Carbon Steel Pipe for Atmospheric and Lower Temperatures	945
SA-530/SA-530M	General Requirements for Specialized Carbon and Alloy Steel Pipe	955
SA-533/SA-533M	Pressure Vessel Plates, Alloy Steel, Quenched and Tempered, Manganese-Molybdenum and Manganese-Molybdenum-Nickel	965
SA-537/SA-537M	Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel	970
SA-540/SA-540M	Alloy Steel Bolting Materials for Special Applications	975
SA-541/SA-541M	Quenched and Tempered Carbon and Alloy Steel Forgings for Pressure Vessel Components	988
SA-542/SA-542M	Pressure Vessel Plates, Alloy Steel, Quenched and Tempered Chromium-Molybdenum and Chromium-Molybdenum-Vanadium	996
SA-543/SA-543M	Pressure Vessel Plates, Alloy Steel, Quenched and Tempered, Nickel-Chromium-Molybdenum	1000
SA-553/SA-553M	Pressure Vessel Plates, Alloy Steel, Quenched and Tempered 8 and 9 Percent Nickel	1004
SA-556/SA-556M	Seamless Cold-Drawn Carbon Steel Feedwater Heater Tubes	1010
SA-557/SA-557M	Electric-Resistance-Welded Carbon Steel Feedwater Heater Tubes	1017
SA-562/SA-562M	Pressure Vessel Plates, Carbon Steel, Manganese-Titanium for Glass or Diffused Metallic Coatings	1024
SA-563	Carbon and Alloy Steel Nuts	1028
SA-564/SA-564M	Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes	1041
SA-574	Alloy Steel Socket-Head Screws	1050
SA-577/SA-577M	Ultrasonic Angle-Beam Examination of Steel Plates	1059
SA-578/SA-578M	Straight-Beam Ultrasonic Examination of Plain and Clad Steel Plates for Special Applications	1062
SA-587	Electric-Resistance-Welded Low-Carbon Steel Pipe for the Chemical Industry	1068
SA-592/SA-592M	High-Strength Quenched and Tempered Low-Alloy Steel Forged Fittings and Parts for Pressure Vessels	1076
SA-609/SA-609M	Castings, Carbon, Low-Alloy, and Martensitic Stainless Steel, Ultrasonic Examination Thereof	1081
SA-612/SA-612M	Pressure Vessel Plates, Carbon Steel, High Strength, for Moderate and Lower Temperature Service	1095
SA-620/SA-620M	Steel Sheet, Carbon, Drawing Quality, Special Killed, Cold-Rolled	1100
SA-638/SA-638M	Precipitation Hardening Iron Base Superalloy Bars, Forgings, and Forging Stock for High-Temperature Service	1104
SA-645/SA-645M	Pressure Vessel Plates, Five Percent Nickel Alloy Steel, Specially Heat Treated	1108
SA-649/SA-649M	Forged Steel Rolls, Used for Corrugating Paper Machinery	1114
SA-660	Centrifugally Cast Carbon Steel Pipe for High-Temperature Service	1119
SA-662/SA-662M	Pressure Vessel Plates, Carbon-Manganese, for Moderate and Lower Temperature Service	1125
SA-666	Annealed or Cold-Worked Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar	1130
SA-667/SA-667M	Centrifugally Cast Dual Metal (Gray and White Cast Iron) Cylinders	1140
SA-671	Electric-Fusion-Welded Steel Pipe for Atmospheric and Lower Temperatures	1142
SA-672	Electric-Fusion-Welded Steel Pipe for High-Pressure Service at Moderate Temperatures	1152

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SA-675/SA-675M	Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties	1162
SA-688/SA-688M	Welded Austenitic Stainless Steel Feedwater Heater Tubes	1168
SA-691	Carbon and Alloy Steel Pipe, Electric-Fusion-Welded for High-Pressure Service at High Temperatures	1177
SA-693	Precipitation-Hardening Stainless and Heat-Resisting Steel Plate, Sheet, and Strip	1185
SA-695	Steel Bars, Carbon, Hot-Wrought, Special Quality, for Fluid Power Applications	1194
SA-696	Steel Bars, Carbon, Hot-Wrought or Cold-Finished, Special Quality, for Pressure Piping Components	1198
SA-703/SA-703M	Steel Castings, General Requirements, for Pressure-Containing Parts	1202
SA-705/SA-705M	Age-Hardening Stainless and Heat-Resisting Steel Forgings	1221
SA-723/SA-723M	Alloy Steel Forgings for High-Strength Pressure Component Application	1230
SA-724/SA-724M	Pressure Vessel Plates, Carbon Steel, Quenched and Tempered, for Welded Layered Pressure Vessels	1236
SA-727/SA-727M	Forgings, Carbon Steel, for Piping Components With Inherent Notch Toughness	1240
SA-731/SA-731M	Seamless, Welded Ferritic, and Martensitic Stainless Steel Pipe	1246
SA-736/SA-736M	Pressure Vessel Plates, Low-Carbon Age-Hardening Nickel-Copper-Chromium-Molybdenum-Columbium and Nickel-Copper-Manganese-Molybdenum-Columbium Alloy Steel	1252
SA-737/SA-737M	Pressure Vessel Plates, High-Strength, Low-Alloy Steel	1257
SA-738/SA-738M	Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel, for Moderate and Lower Temperature Service	1261
SA-739	Steel Bars, Alloy, Hot-Wrought, for Elevated Temperature or Pressure-Containing Parts, or Both	1267
SA-745/SA-745M	Ultrasonic Examination of Austenitic Steel Forgings	1270
SA-747/SA-747M	Precipitation Hardening Stainless Steel Castings	1277
SA-748/SA-748M	Statically Cast Chilled White Iron-Gray Iron Dual Metal Rolls for Pressure Vessel Use	1283
SA-751	Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products	1285
SA-765/SA-765M	Carbon Steel and Low-Alloy Steel Pressure Vessel Component Forgings With Mandatory Toughness Requirements	1291
SA-770/SA-770M	Through-Thickness Tension Testing of Steel Plates for Special Applications	1298
SA-781/SA-781M	Castings, Steel and Alloy, Common Requirements, for General Industrial Use	1306
SA-788	Steel Forgings, General Requirements	1324
SA-789/SA-789M	Seamless and Welded Ferritic/Austenitic Stainless Steel Tubing for General Service	1336
SA-790/SA-790M	Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe	1343
SA-803/SA-803M	Welded Ferritic Stainless Steel Feedwater Heater Tubes	1352
SA-812/SA-812M	Steel Sheet, High-Strength, Low-Alloy, Hot-Rolled, for Welded Layered Pressure Vessels	1362
SA-813/SA-813M	Single- or Double-Welded Austenitic Stainless Steel Pipe	1365
SA-814/SA-814M	Cold-Worked Welded Austenitic Stainless Steel Pipe	1374
SA-815/SA-815M	Wrought Ferritic, Ferritic/Austenitic, and Martensitic Stainless Steel Piping Fittings	1383
SA-832/SA-832M	Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum-Vanadium	1394
SA-834	Common Requirements for Iron Castings for General Industrial Use	1398
SA-836/SA-836M	Forgings, Titanium-Stabilized Carbon Steel, for Glass-Lined Piping and Pressure Vessel Service	1402
SA-841/SA-841M	Steel Plates for Pressure Vessels, Produced by the Thermo-Mechanical Control Process (TMCP)	1407
SA-905	Steel Wire, Pressure Vessel Winding	1413
SA-941	Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys	1418
SA-960	Common Requirements for Wrought Steel Piping Fittings	1425
SA-961	Common Requirements for Steel Flanges, Forged Fittings, Valves and Parts for Piping Applications	1436
SA-962/SA-962M	Common Requirements for Steel Fasteners or Fastener Materials, or Both, Intended for Use at Any Temperature from Cryogenic to the Creep Range	1446
SA-995	Castings, Austenitic-Ferritic (Duplex) Stainless Steel, for Pressure-Containing Parts	1456
SF-568	Carbon and Alloy Steel Externally Threaded Metric Fasteners	1461
SA/CSA-G40.21	Structural Quality Steels	1473
SA/EN 10028-2	Flat Products Made of Steels for Pressure Purposes	1474

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SA/JIS G3118 Carbon Steel Plates for Pressure Vessels for Intermediate and Moderate Temperature Service 1475

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