Practical Guide to

ASME II

Materials Index™

1997 CD-ROM Version

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ASME Section II
1997 Materials Index

(Covering 1995 ASME Section II With 1996 Addenda)

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DEDICATION

This work is dedicated to the many colleagues, past and present, who I have had the privilege to serve with on various ASME Boiler and Pressure Code Committees and who have been an inspiration to me for twenty-five years. And to my dear wife, Mary Jo, thank you for the time and encouragement to pursue this "labor of love", as Dr. G.V. Smith used to say. Thank you all.

Richard A. Moen
January 1996

PREFACE

The ASME Boiler and Pressure Vessel Code is a large compilation of rules and guidance covering numerous types of construction. Those rules pertain to various issues within each construction type encompassing design, materials selection and procurement, fabrication, inspection and testing, overpressure protection, and stamping. There are numerous other subsets of these issues, each having its own degree of complexity. Then there are simply those precautions noted throughout that should be considered. To the novice first-time user of the Code, this is an awesome task, trying to find all the rules and guidelines that apply to a given application. Even to the veteran user of the Code, it is surprising what one finds in other parts of the Code that can be of general use elsewhere.

I was a "novice" first-time user of the Code in the late 1960s and, like all others, was overwhelmed by the complexity, strange terminology, and shear dimension of the Code. As a metallurgical engineer, my primary interest was in materials but in a broad sense ranging from selection and specification to properties and environmental effects. And like the typical well organized engineer, I started making my own checklists, indexes, and cross references to ensure that my work would be done in the most efficient and proficient ways possible.

In 1969, I started what became a long association with the committees that write the Code. Affiliations have included: Task Groups on Materials Behavior, Physical Properties, Inspection of Reactor Internal Structures, and Environmental Effects; Subgroups on Strength of Ferrous Alloys and Materials, Fabrication, and Examination (SC III); Subcommittees on Specifications, Materials, and Nuclear Power; and the Main Committee of the ASME Boiler and Pressure Vessel Code. In the mid 1970s, my first materials index found its way into Code committee work. Its primary use was in achieving consistency in the use of nominal composition designations throughout the Code. The format of that index led to numerous improvements over the years. During this time, peers started to recognize the usefulness of the index, and it was during this time that they encouraged me to publish it so others might also benefit from its many useful features.

The first editions of *ASME Section II Practical Guide* concentrated primarily on the features of the original "Moen Index". Recognizing that materials support people for Code construction would benefit from additional guidance on materials issues, this 1996 Edition provides additional help in understanding broader aspects of the Code as well as focusing on the location of materials requirements and guidance within the various Code sections. It is my desire to make this the ultimate "primer" for anyone dealing with Code materials issues, benefiting everyone from the "novice" to the "veteran."

Richard A. Moen

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Chapter 1

INTRODUCTION

The Materials Index (Moen Index)

Historical Perspective

The "Moen Index" has evolved over a period of nearly twenty years, appearing in various forms. This latest format is keyed to the recently published Part D of Section II of the ASME Boiler and Pressure Vessel Code. As with earlier versions, the primary reason for developing such an index was to assist the infrequent user of the ASME Code with a better understanding of the identification of materials used in ASME Code construction.

In the mid 1970s, when the author was involved in ASME Code committee work associated with thermo-physical properties, it was noted that the four principle sections of the ASME Code (I, III, VIII, and IX) on occasion referred to materials in their individual stress tables by different nominal composition designations. Since there was a necessity at that time to tie thermo-physical properties to nominal compositions, there was first a need to identify and resolve nominal composition designation differences within the Code. That exercise resulted in the first version of the Moen Index.

Once the merits of such a materials index were recognized as a tool for maintaining consistency in nominal composition designations, there were logical "next steps" that included the addition of corresponding common trade names, ASME Code section usage, minimum specified tensile properties, and Unified Numbering System (UNS) numbers.

These first few editions of the Moen Index were updated yearly with significant changes every three to four years. Throughout these past few years, colleagues continuously encouraged the author to publish the Moen Index. Therefore this book was written.

Materials Index Development

The first step in developing the Materials Index is to list all specifications contained in Section II, Part A - Ferrous Specifications and Part B - Nonferrous Specifications, showing material grades, types, and/or classes within each specification. Heat treatment, product form, and size limits are also included. In some cases for a given material, separate entries are made as a function of size or heat treatment condition. Tensile strength requirements are also shown as ultimate tensile strength (UTS) or yield strength (YS). Values in ksi (1000 psi) are minimum values unless noted otherwise.

The second step is to go through each of the stress tables found in Section II, Part D and place a check (√) under each column heading whenever a particular material is found within the stress tables.

Within the Materials Index, the table headings are as follows:

Table 1A	Section I; Section III, Classes 2 and 3; and Section VIII, Division 1 - Maximum Allowable Stress Values for Ferrous Materials.
Table 1B	Section I; Section III, Classes 2 and 3; and Section VIII, Division 1 - Maximum Allowable Stress Values for Nonferrous Materials.
Table 2A	Section III, Class 1 and Section VIII, Division 2 - Design Stress Intensity Values for Ferrous Materials.
Table 2B	Section III, Class 1 and Section VIII, Division 2 - Design Stress Intensity Values for Nonferrous Materials.
Table 3	Section III, Classes 2 and 3 and Section VIII, Divisions 1 and 2 - Maximum Allowable Stress Values for Bolting Materials.
Table 4	Section III, Class 1 and Section VIII, Division 2 - Design Stress Intensity Values for Bolting Materials.

Section II, Part D contains tables of tensile strength, yield strength, thermal expansion, thermal conductivity, thermal diffusivity, and modulus of elasticity, but none of these are specific to particular ASME Code book sections. Thus, the Materials Index does not indicate ASME Code usage for these tables.

The third step is to go through Table QW/QB-422 of Section IX, checking whether the materials are assigned welding P-Numbers. If so, the column in the Index under QW/QB-422 is checked and the welding P-Numbers are listed under the column heading Weld No./P-Gr.

The last step is to ensure that nominal compositions are properly identified and uniformly applied throughout the specification listing. For those materials not yet described by Unified Numbering System numbers within the specifications, ASTM DS56E (Sixth Edition with 1994 update) is used to supplement and correct, if necessary, the ASME Code. Trade names are included whenever they are known and when the grade or type designation gives little clue as to the real identity. This is all collectively portrayed in Chapters 7 and 8 of this guide for ferrous and nonferrous materials, respectively.

The second part of the Materials Index serves those who have a nominal composition and simply need to know all of the specifications associated with that composition. The first portion of Chapter 6 is limited to ferrous materials, primarily because these materials are better known by nominal composition than by UNS number. The second portion lists nonferrous alloys by their UNS number and then lists the corresponding specifications for those unique materials. For the nonferrous materials, most users are more familiar with UNS designations than with nominal compositions. Also included in Chapter 6 are general requirements specifications applicable to products covered by specifications listed in Chapters 7 and 8.

Chapter 5 of the Materials Index contains an abbreviated cross index, primarily associating UNS numbers for 10 classes of alloys with their common designation (if it exists). Where specific names for steels do not exist, the Materials Index simply provides the applicable specifications.

Chapter 9 of the Materials Index lists the ASME Code material specification titles and designations found in ASME Section II Parts A and B. This information is first divided into ferrous and nonferrous materials, then is listed by product form, alloy group, and finally by specification number

sequence. Sometimes, knowing the title of a specified material designation can provide the user with valuable information to deal with the issue at hand.

Nominal Composition Designation

Since the original motivation for the Materials Index was to achieve some consistency in the nominal composition of ASME Code materials, it is appropriate at this point to explain how those compositions are derived. For ferrous alloys, usually the principle alloying ingredients other than iron are listed. Note that "usually" is underlined; that means there are cases where alloys have had a particular nominal composition for twenty-five years or more, which is not totally indicative of the actual composition and there is no compelling reason to change. In other cases, cast versions of a given wrought product may be assigned the same nominal composition as the wrought product, even though particular elements may differ by one to two percent from the nominal composition of the wrought product.

In the nickel base system of alloys, nominal compositions can be long and detailed due to the complexity of these alloys. Thus, liberty is taken in showing percentages of only the principle alloying elements, generally not for more than four elements. Throughout the Materials Index, it should be obvious that there is no absolute system for developing nominal compositions. It is mostly a case of following in the footsteps of those who initially came upon the idea and not deviating very far from that "system."

Index Revision

The 1996 Materials Index is based on the 1995 ASME Section II Code with 1995 Addenda. The ASME Code is revised yearly, thus the Materials Index, to be fully useful, will match the current ASME Code edition with the most recent addenda issued and will also be issued yearly.

Changes to the ASME Code may involve:

1. Addition or deletion of material grades or classes in specifications;

2. Addition or deletion of specifications/grades/classes to/from stress tables for a given ASME Code section; or

3. Changes in the minimum specified tensile properties.

These will be the primary reasons for revising the Materials Index. There may also be changes in welding P- Numbers by Section IX, or there may be revisions to UNS numbers.

Lastly, there will simply be editorial errors in this Index that creep in, no matter how extensive the review. Thus, the author cautions the user that there are no guarantees as to the degree of completeness or accuracy of the Materials Index. The Index is intended solely as an aide in better understanding the materials of ASME Code construction as they are depicted in Section II of the ASME Code. The identification of such errors or suggestions for improvements in format or style should be forwarded to the author in care of *CASTI* Publishing Inc.

Chapter 2

ORGANIZATION OF THE ASME BOILER & PRESSURE VESSEL CODE FROM A MATERIALS STANDPOINT

The "heart" of the *Practical Guide to ASME Section II - Materials Index* is the tabulation of ferrous and nonferrous materials specifications by Code section use. However, this Index is only part of the story with respect to Section II and Code materials in general. The focus of this guide is also on how Section II relates to the rest of the ASME Boiler and Pressure Vessel Code, how Section II - Part D is organized, and on some of the common metallurgical issues and terms encountered in the specifications conveyed in Section II, Parts A and B.

The word *Code* in this guide refers to the ASME Boiler and Pressure Vessel Code (see General Overview of the Code for a list of the Code Sections.) *Construction book committees* refers to SC I, SC III, SC IV, SC VIII, and SC X (where SC is the abbreviation for Subcommittee). *Service book committees* refers to SC II, SC V, and SC IX who provide service to all construction book committees.

Scope

Section II is an integral part of the 11 section ASME Boiler and Pressure Vessel Code, hereafter referred to simply as the Code. This chapter focuses on how Section II interacts with the rest of the Code, and other related Codes. Important features common to all or most Code sections are discussed. Presentations focus on the "materials person" who should be an integral part of any engineering task. This *materials person* may be an experienced metallurgical or materials engineer whose role is to provide expert guidance on materials issues, or it may simply be an engineer of another discipline who assumes the role of a materials specialist.

A Brief History of the Code

A series of tragedies in the late 1800s and early 1900s precipitated what would become the first set of steam boiler construction rules. During a 14 year period between 1889 and 1903, approximately 1,200 people were killed in 1,600 boiler explosions in the United States. First recognizing a way to halt this tragic loss of life was the Commonwealth of Massachusetts. In 1907, it enacted the first set of steam boiler construction rules, all of which were conveyed in just three pages. Four years later in 1911, New York and Ohio published similar boiler construction laws. By 1920, nine other states had followed suit.

Each state had developed slightly different rules, however. For a manufacturer who desired to market a standard boiler in all states, this presented a severe hardship. Recognizing this

unfavorable situation in 1911, the American Society for Mechanical Engineers Council appointed a committee to formulate standard specifications for the construction of steam boilers and other pressure vessels. The Council was also concerned about the care of boilers in service. The first published version of the ASME Code appeared in 1914, covering power and heating boilers. By 1937, nine sections had been issued covering procedures for all phases of fabrication, materials selection, maintenance, and inspection of pressure vessels.

The late 1940s brought about newer design methods and advances in materials technology. In the early 1950s, the Code committee completed a comprehensive review of stress tables. Later in that decade, demands for higher temperatures and pressures pushed the envelop into the regime where creep considerations became significant. Within a few years, particularly in the case of Grade 321 stainless steel, failures began to appear, indicating a need to reevaluate the bases for setting stresses. These events led to a renewed emphasis on materials testing. An important step was taken in 1966 with formation of the Metals Properties Council. This organization worked closely with the Code committee to improve the databases and the analytical processes used to set Code allowable stresses.

The problem of state-specific boiler codes was gradually rectified as states began to adopt the ASME Boiler and Pressure Vessel Code. Today, the Code has been adopted by nearly every state in America and all 10 provinces in Canada, and is now well on the way to become a truly international Code.

A more complete history of the development of rules for construction of boilers appears in a three part article in *Power Engineering*, Vol. 100, No. 2, February 1996 (pp 15 - 30). These articles provide further insight into the involvement of the American Boiler Manufacturers Association (ABMA), ASME, and the National Board of Boiler and Pressure Vessel Inspectors (NBBI).

Content of the 1995 Code Edition

Today's Code (the 1995 Edition, 1995 Addenda) is made up of the following sections:

Section	Title	No. Pages
I	Rules for Construction of Power Boilers	270
II	Part A - Ferrous Materials Specifications	1270
	Part B - Nonferrous Materials Specifications	910
	Part C - Specifications for Welding Rods, Electrodes and Filler Metals	608
	Part D - Properties	713
III	Division 1 - Rules for Construction of Nuclear Power Plant Components	1898
	Division 2 - Code for Concrete Reactor Vessels and Containments	389
IV	Rules for Construction of Heating Boilers	265
V	Nondestructive Examination	681
VI	Recommended Rules for the Care and Operation of Heating Boilers	102
VII	Recommended Guidelines for the Care of Power Boilers	157
VIII	Division 1 - Rules for the Construction of Pressure Vessels	677
	Division 2 - Alternative Rules for the Construction of Pressure Vessels	520
IX	Welding and Brazing Qualifications	259
XI	Rules for Inservice Inspection of Nuclear Power Plant Components	723

Section	Title (Continued)	No. Pages
	Code Cases for Boilers and Pressure Vessels (Nonnuclear)	389
	Code Cases for Nuclear Components	1081
	Total Pages:	**11,163**

This is quite a change from the three page Code that first appeared in 1914! This phenomenal growth has been driven mostly by technological advances in materials, testing, inspection, design and analysis methodology, fabrication, and overpressure protection as well as demands for rules covering new service conditions.

Sections II, V, and IX are "service sections" providing rules and guidance for both nonnuclear and nuclear construction. These sections constitute 4,441 pages or 46% of the 11,163 total pages in the Code. Rules for nonnuclear components (Sections I, IV, VI, VII, VIII, X, and their Code cases) involve 2,242 pages or 23%. The remainder of the Code covers nuclear construction (Sections III, XI, and Code cases) with a total of 4,091 pages or 31% of the Code. Section II alone, with 3,501 pages, represents 31% of the entire Code.

Constructing a component in accordance with Code rules requires, first, a basic decision on which category of rules apply.

General categories are:
- power boilers (fired),
- heating boilers,
- unfired pressure vessels,
- nuclear systems, or
- fiber-reinforced plastic pressure vessels.

One important issue to understand is that each category has unique materials requirements for that type of construction. Within each of the governing Code books are additional factors that must be addressed as the design, fabrication, testing, inspection, and installation processes progress. The following outlines show the organization of the various Code sections with particular emphasis on materials requirements. These outlines may serve as checklists or quick references for the materials specialist in Code construction.

Section I - Power Boilers

Part PG - General Requirements for Power Boilers and High Pressure, High Temperature Water Boilers
- General
- Materials
  - PG-5 General
  - PG-6 Plate
  - PG-7 Forgings
  - PG-8 Castings
  - PG-9 Pipes, Tubes and Pressure Containing Parts
  - PG-10 Material Identified with or Produced to a Specification Not Permitted by This Section, and Material Not Fully Identified
  - PG-11 Miscellaneous Pressure Parts
  - PG-12 Gage Glass Body and Connector Materials
  - PG-13 Stays
- Design
- Openings
- Boiler External Piping and Boiler Proper Connections
- Design and Application

Part PG - General Requirements for Power Boilers and High Pressure, High Temperature Water Boilers (Continued)
- Safety Valves and Safety Relief Valves
- Fabrication
  - PG-75 General
  - PG-76 Cutting Plates and Other Stock
  - PG-77 Plate Identification
  - PG-78 Repairs of Defects in Materials
  - PG-79 Tube Holes and Ends
  - PG-80 Permissible Out-of-Roundness of Cylindrical Shells
  - PG-81 Tolerance for Formed Heads
  - PG-82 Holes for Stays
- Inspection and Tests
- Certification by Stamping and Data Reports

Part PW - Boilers and Components Fabricated by Welding (meeting general requirements - Part PG)
- General
- Materials (PW-5)
- Design
- Fabrication
- Inspection and Tests

Part PWT - Watertube Boilers (meeting general requirements of Part PG)
- General
- Materials (PWT-5)
- Design

Part PFT - Firetube Boilers (meeting general requirements of Part PG)
- General
- Design
- Materials (PFT-5)
- Combustion Chambers and Furnaces
- Stayed Surfaces
- Doors and Openings
- Domes
- Setting
- Piping, Fittings, and Appliances

Part PMB - Miniature Boilers (meeting general requirements of Part PG)
- General
- Materials (PMB-5)
- Design

Part PEB - Electric Boilers (meeting general requirements of Part PG)
- General
- Materials (PEB-5)
- Design

Part PVG - Organic Fluid Vaporizers (meeting general requirements of Part PG)
- General
- Materials (PVG-5)
- Design

One segment of the Section I Appendices is entitled "Explanation of the Code Containing Matter Not Mandatory Unless Specifically Referred to in the Rules of the Code." Examples of those portions pertaining to materials follow.

- A-40: Strength of Materials
- A-75 through A-82: Approval of New Materials Under the ASME Boiler and Pressure Vessel Code (this will be discussed in more detail later in this chapter)
- A-100: Preheating
- A-300: Quality Control System
  - A-302.4 - Material Control
  - A-302.7 - Welding
  - A-302.9 - Heat Treatment

The above outline of Section I shows that materials requirements are provided in general terms applicable to all types of power boilers and then in specific terms for each type of construction covered by Section I. Allowable stresses for all material used in Section I construction are now found in Table 1 of Section II, Part D.

In this coverage of Section I and in the coverage of the other Code sections that follow, very little emphasis is placed on welding and fabrication, even though some consider these special processes within the general framework of materials.

Section II - Materials

As indicated previously, Section II is comprised of four parts, with the first three dealing with materials specifications, while the fourth and newest part deals with allowable stresses and materials properties. Since the next chapter of this book is devoted to Part D of Section II, it will not be addressed further in this chapter.

Part A of Section II contains specifications for ferrous alloys. Of the 160 specifications contained therein, 11 are general requirements for particular material/product form combinations, while eight cover specific testing and inspection requirements applicable to these ferrous alloys.

The Table of Contents in Section II, Part A first lists the specifications by product form and material type, as follows:

- Steel Pipe
- Steel Tubes
- Steel Flanges, Fittings, Valves, and Parts
- Steel Plates, Sheets, and Strip for Pressure Vessels
- Steel Bars
- Steel Bolting Materials
- Steel Billets and Forgings
- Steel Castings
- Corrosion-Resisting and Heat-Resisting Steels
- Wrought Iron, Cast Iron, and Malleable Iron

Next is a listing of the eight methods specifications, followed last by a numerically arranged listing of all 160 specifications applicable to ferrous material. For convenience, this Table of Contents is shown in its entirety in Chapter 9 of this Materials Index. There will be more details on materials specifications in a follow-on chapter of this guide.

Part B of Section II contains 136 specifications for nonferrous alloys, including alloys from the following base metal groups:

- Aluminum
- Cobalt (generally included with nickel-base alloys)
- Copper
- Nickel
- Titanium
- Zirconium

Like Part A of Section II, Part B's Table of Contents first lists specifications by alloy and product groupings as follows:

- Aluminum and Aluminum Alloys
- Copper and Copper Alloy Plate, Sheet, Strip and Rolled Bar
- Copper and Copper Alloy Rod, Bar, and Shapes
- Copper and Copper Alloy Pipe and Tubes
- Copper Alloy Castings
- Nickel and Nickel Alloy Plate, Sheet, and Strip
- Nickel and Nickel Alloy Rod, Bar, and Wire
- Nickel and Nickel Alloy Pipe and Tubes
- Nickel Alloy Castings
- Nickel and Nickel Alloy Fittings
- Titanium and Titanium Alloys
- Zirconium and Zirconium Alloys

Again, these listings are followed by a numerically arranged listing of all specifications related to nonferrous materials. Within the 136 specifications of Part B, there are eight general requirements specifications-- one applies to aluminum alloys, four apply to copper alloys, and three apply to nickel-base alloys. Also, within Chapter 9 of this guide is a reproduction of the specification listings from Section II, Part B.

Part C of Section II provides 31 specifications for welding rods, electrodes, and filler metals. Contrary to its title, Part C also contains specifications for brazing and braze welding materials. More details on these materials and Section IX in particular can be found in the *Practical Guide to ASME Section IX - Welding Qualifications* published by *CASTI* Publishing Inc.

Section III - Nuclear Components

The scope of this subchapter is limited to Division 1 of Section III, since Division 2 applies to concrete reactor vessels and containments. General requirements for both divisions are provided in Subsection NCA. Within this designation, the "N" ties it to Division 1, the "C" ties it to Division 2, and the "A" refers to the customary general requirements that precede most specific requirements. One of the most important provisions in this subsection, for the materials person, is NCA-1130 that states [these rules] "do not cover deterioration which may occur in service as a result of radiation effects, corrosion, erosion, or instability of the material. These effects shall be taken into account with a view to realizing the design or the specified life of components."
Although not specifically stated in these same words, similar limits are inferred in other sections of the Code. Additional general requirements for metallic materials are found in Paragraph NCA-1221, covering standard product forms and welding materials.

Division 1 of Section III is comprised of seven subsections as follows:

1. Subsection NB - Class 1 Components
2. Subsection NC - Class 2 Components
3. Subsection ND - Class 3 Components
4. Subsection NE - Class MC (metal containment) Components
5. Subsection NF - Supports
6. Subsection NG - Core Support Structures
7. Subsection NH - Class 1 Components in Elevated Temperature Service

Within each of these subsections are eight articles dealing with the following subjects:

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

In other words, Articles NB/NC/ND/NE/NF/NG/NH-2000 will always contain materials requirements expressed as a function of the type of construction being considered.

The subarticles within Article 2000 also tend to be consistent from one class of construction to the next. Using Class 1 as an example, the following are materials requirement subarticles:

NB-2100 General Requirements for Materials
NB-2200 Material Test Coupons and Specimens for Ferritic Steel Material
NB-2300 Fracture Toughness Requirements for Material
NB-2400 Welding Material
NB-2500 Examination and Repair
NB-2600 Material Manufacturers' Quality System Programs
NB-2700 Dimensional Standards

In addition to all of these materials requirements, others can be found in portions of other articles, particularly Article 3000 on design. For instance, the following design paragraphs for Class 1 construction contain important materials information.

NB-3121 Corrosion
NB-3122 Cladding
NB-3123 Welding
NB-3124 Environmental Effects

Subsections NB through NG involve the use of materials within temperature ranges where creep effects do not need to be considered. This results in a limit of 800°F for the high alloy steels and 700°F for all other materials. Some materials may be limited to lower temperatures because of metallurgical concerns, or simply because there are no practical needs for use above the listed temperature. Allowable stresses for these materials are found in Section II, Part D, Tables 1 through 4. Subsection NH, on the other hand, allows for construction of Class 1 components operating well into the creep range for a limited number of materials. Until the 1995 Addenda, these rules were

provided through several Codes cases, the most important of which being N47 (an outgrowth of old Code Case 1331). Allowable stresses for materials used in Subsection NH construction are found within Subsection NH, uniquely expressed as a function of time as well as temperature.

Section IV - Heating Boilers

The organization of Section IV is much like that of Section I with the first part providing general requirements and subsequent parts each covering particular types of Section IV construction. The following outline of Section IV shows where materials requirements can be found.

Part HG - General Requirements for All Materials of Construction
- Article 1 - Scope and Service Restrictions
- Article 2 - Materials Requirements
- Article 3 - Design
- Article 4 - Pressure Relieving Device
- Article 5 - Tests, Inspection, and Sampling
- Article 6 - Instruments, Fittings, and Controls
- Article 7 - Installation Requirements

Part HF - Requirements for Boilers Constructed of Wrought Materials
- Article 1 - General
- Article 2 - Materials Requirements
- Article 3 - Design Stresses and Minimum Thicknesses

Part HC - Requirements for Boilers Constructed of Cast Iron
- Article 1 - General
- Article 2 - Materials Requirements
- Article 3 - Design
- Article 4 - Tests
- Article 5 - Quality Control and Inspection

Part HLW - Requirements for Potable Water Heaters
- Article 1 - General
- Article 2 - Materials Requirements
- Article 3 - Design
- Article 4 - Design of Weldments
- Article 5 - Tests
- Article 6 - Inspection and Stamping
- Article 7 - Controls
- Article 8 - Installation Requirements

Permissible materials and their allowable design stresses are found within each part of Section IV, in the “300” articles (design).

There are five mandatory appendices within Section IV, as follows:

1. Preparation of Technical Inquiries to the Boiler and Pressure Vessel Committee
2. Codes, Standards and Specifications Referenced in Text
3. Adhesive Attachment of Nameplates to Casing
4. Alternative Specification for Plates and Bars in Lieu of SA-36 for Flat Plates and Bars
5. Vacuum Boilers

There are nine nonmandatory appendices, with only one, Appendix A, dealing directly with materials. That appendix has to do with approval of new materials and is similar to ones appearing in other Code sections.

Section V - Nondestructive Examination

Section V, like Sections II and IX, serves all other sections of the Code. Section V is organized into two Subsections: A - Nondestructive Methods of Examination and B - Documents Adopted by Section V.

The 13 articles of Subsection A are as follows:

1. General Requirements
2. Radiographic Examination
3. Radiographic Examination of Metallic Castings
4. Ultrasonic Examination Methods for Inservice Inspection
5. Ultrasonic Examination Methods for Materials and Fabrication
6. Liquid Penetrant Examination
7. Magnetic Particle Examination
8. Eddy Current Examination of Tubular Products
9. Visual Examination
10. Leak Testing
11. Acoustic Emission Examination of Fiber-Reinforced Plastic Vessels
12. Acoustic Emission Examination of Metallic Vessels During Pressure Testing
13. Continuous Acoustic Emission Monitoring

The remaining nine articles of Subsection B are NDE methods adopted as ASTM standards. These standards cover the various methods used within the 13 articles of Subsection A (above).

Section VI - Care and Operation of Heating Boilers

This section of the Code provides recommended rules for the care and operation of equipment (boilers) constructed in accordance with Section IV, Heating Boilers.

The following is a general outline of the contents of Section VI.

1. General
2. Types of Boilers
3. Accessories and Installation
4. Fuels
5. Fuel Burning Equipment and Fuel Burning Controls
6. Boiler Room Facilities
7. Operation, Maintenance, and Repair - Steam Boilers
8. Operation, Maintenance, and Repair - Hot Water Boilers and Hot Water Heating Boilers
9. Water Treatment

Within the nine parts of Section VI are numerous paragraphs of general interest to a materials person. This is practical metallurgy that could be applied elsewhere with sound engineering judgment.

Section VII - Care of Power Boilers

Section VII, *Recommended Guidelines for the Care of Power Boilers*, applies to Section I type construction, including the boiler itself and pipe connections up to and including the valve or valves required by Code. The nine subsections constituting Section VII are as follows:

- C1 - Fundamentals
- C2 - Boiler Operation
- C3 - Boiler Auxiliaries
- C4 - Appurtenances
- C5 - Instrumentation, Controls, and Interlocks
- C6 - Inspection
- C7 - Repairs, Alterations, and Maintenance
- C8 - Control of Internal Chemical Conditions
- C9 - Preventing Boiler Failures

Subsection C9, Article 300 deals with "Weakening of Structure," covering numerous subjects of keen interest to a materials person. The following are paragraphs worth reviewing for practical use elsewhere as well as for Section I construction.

- C9.330 Erosion
- C9.340 Internal Corrosion
- C9.350 External Corrosion
- C9.380 Failure of Supports
- C9.390 Mechanical Damage

Section VIII - Pressure Vessels

Section VIII, Division 1, is subdivided into three subsections - A, B, and C - along with mandatory and nonmandatory appendices. Subsection A contains general requirements while Subsection B provides rules for fabrication and Subsection C deals with classes of materials. An outline follows to reveal the general content of Division 1 with selected areas expanded to more clearly reveal materials related requirements.

Subsection A - General Requirements

Part UG - General Requirements for All Methods of Construction and All Materials

Materials (UG-4 through UG-15)

- UG-4 General
- UG-5 Plate
- UG-6 Forgings
- UG-7 Castings
- UG-8 Pipe and Tubes
- UG-9 Welding Materials
- UG-10 Material Produced With or Produced to a Specification Not Permitted by this Division and Material Not Fully Identified
- UG-11 Prefabricated or Preformed Pressure Parts
- UG-12 Bolts and Studs
- UG-13 Nuts and Washers
- UG-14 Rods and Bars
- UG-15 Product Specification

Part UG - General Requirements for All Methods of Construction and All Materials (Continued)
- Design (UG-16 through UG-35)
  - UG-18 Materials in Combination
  - UG-24 Castings
  - UG-25 Corrosion
- Openings and Reinforcements (UG-36 through UG-46)
- Braced and Stayed Surfaces (UG-47 through UG-50)
- Ligaments (UG-53 through UG-55)
- Fabrication (UG-75 through UG-85)
- Inspection and Tests (UG-90 through UG-103)
- Marking and Reports (UG-115 through UG-120)
- Pressure Relief Devices (UG-125 through UG-136)

Subsection B - Requirements Pertaining to Methods of Fabrication of Pressure Vessels

Part UW - Requirements for Pressure Vessels Fabricated by Welding
- General (UW-1 through UW-3)
- Materials (UW-5)
- Design (UW-8 through UW-20)
- Fabrication (UW-26 through UW-42)
- Inspection and Tests (UW-46 through UW-53)
- Marking and Reports (UW-60)
- Pressure Relief Devices (UW-65)

Part UF - Requirements for Pressure Vessels Fabricated by Forging
- General (UF-1)
- Materials (UF-5 through UF-7)
  - UF-5 General
  - UF-6 Forgings
  - UF-7 Forged Steel Rolls Used for Corrugating Paper Machinery
- Design (UF-12 through UF-25)
  - UF-25 Corrosion Allowance
- Fabrication (UF-26 through UF-43)
- Inspection and Tests (UF-45 through UF-55)
- Marking and Reports (UF-115)
- Pressure Relief Devices (UF-125)

Part UB - Requirements for Pressure Vessels Fabricated by Brazing
- General (UB-1 through UB-3)
- Materials (UB-5 through UB-7)
  - UB-5 General
  - UB-6 Brazing Filler Metals
  - UB-7 Fluxes and Atmosphere
- Design (UB-9 through UB-22)
  - UB-13 Corrosion
  - UB-15 Application of Brazing Filler Metal
- Fabrication (UB-30 through UB-37)
- Inspection and Tests (UB-40 through UB-44)
- Marking and Reports (UB-50)
- Pressure Relief Devices (UB-55)

Subsection C - Requirements Pertaining to Classes of Materials

Part UCS - Requirements for Pressure Vessels Constructed of Carbon and Low Alloy Steels
- Scope (UCS-1)
- Materials (UCS-5 through UCS-12)
  - UCS-5 General
  - UCS-6 Steel Plates
  - UCS-7 Steel Forgings
  - UCS-8 Steel Castings
  - UCS-9 Steel Pipe and Tubes
  - UCS-10 Bolt Materials
  - UCS-11 Nuts and Washers
  - UCS-12 Bars and Shapes
- Design (UCS-16 through UCS-57)
  - UCS-23 Maximum Allowable Stress Values
  - UCS-25 Corrosion Allowance
  - UCS-56 Requirements for Post Weld Heat Treatment
- Low Temperature Operation (UCS-65 through UCS-68)
- Fabrication (UCS-75)
- Marking and Reports (UCS-115)
- Pressure Relief Devices (UCS-125)
- Nonmandatory Appendix C5
  - UCS-151 Creep-Rupture of Carbon Steel

Part UNF - Requirements for Pressure Vessels Constructed of Nonferrous Materials
- General (UNF-1 through UNF-4)
- Materials (UNF-5 through UNF-15)
  - UNF-5 General
  - UNF-6 Nonferrous Plate
  - UNF-7 Forgings
  - UNF-8 Castings
  - UNF-12 Bolt Materials
  - UNF-13 Nuts and Washers
  - UNF-14 Rods, Bars, and Shapes
  - UNF-15 Other Materials
- Design (UNF-16 through UNF-65)
- Fabrication (UNF-75 through UNF-78)
- Inspection and Tests (UNF-90 through UNF-95)
- Marking and Reports (UNF-115)
- Pressure Relief Devices (UNF-125)
- Appendix NF - Characteristics of Nonferrous Materials (Informative and Nonmandatory)
  - NF-1 Purpose
  - NF-2 General
  - NF-3 Properties
  - NF-4 Magnetic Properties
  - NF-5 Elevated Temperature Effects
  - NF-6 Low Temperature Behavior
  - NF-7 Thermal Cutting
  - NF-8 Machining
  - NF-9 Gas Welding
  - NF-10 Metal Arc Welding
  - NF-11 Inert Gas Metal Arc Welding

Appendix NF - Characteristics of Nonferrous Materials (Informative and Nonmandatory) (Con't)
- NF-12 Resistance Welding
- NF-13 Corrosion
- NF-14 Special Comments (Aluminum, Nickel, Titanium or Zirconium)

Part UHA - Requirements for Pressure Vessels Constructed of High Alloy Steel
- General (UHA-1 through UHA-8)
- Materials (UHA-11 through UHA-13)
  - UHA-11 General
  - UHA-12 Bolt Materials
  - UHA-13 Nuts and Washers
- Design (UHA-20 through UHA-34)
- Fabrication (UHA-40 through UHA-42)
- Inspection and Tests (UHA-50 through UHA-52)
- Marking and Reports (UHA-60)
- Pressure Relief Devices (UHA-65)
- Appendix HA - Suggestions on the Selection and Treatment of Austenitic Chromium-Nickel and Ferritic and Martensitic High Chromium Steels (Informative and Nonmandatory)
  - UHA-100 General
  - UHA-101 Structure
  - UHA-102 Intergranular Corrosion
  - UHA-103 Stress Corrosion Cracking
  - UHA-104 Sigma Phase Embrittlement
  - UHA-105 Heat Treatment of Austenitic Chromium-Nickel Steels
  - UHA-107 Dissimilar Weld Metal
  - UHA-108 Fabrication
  - UHA-109 885°F Embrittlement

Part UCI - Requirements for Pressure Vessels Constructed of Cast Iron
- General (UCI-1 through UCI-3)
- Materials (UCI-5 and UCI-12)
  - UCI-5 General
  - UCI-12 Bolt Materials
- Design (UCI-16 through UCI-37)
- Fabrication (UCI-75 through UCI-78)
- Inspection and Tests (UCI-90 through UCI-101)
- Marking and Reports (UCI-115)
- Pressure Relief Devices (UCI-125)

Part UCL - Requirements for Welded Pressure Vessels Constructed of Materials With Corrosion Resistant Integral Cladding, Weld Metal Overlay Cladding, or with Applied Linings
- General (UCL-1 through UCL-3)
- Materials (UCL-10 through UCL-12)
  - UCL-10 General
  - UCL-11 Integral and Weld Metal Overlay Clad Material
  - UCL-12 Lining
- Design (UCL-20 through UCL-27)
- Fabrication (UCL-30 through UCL-46)
- Inspection and Tests (UCL-50)
- Marking and Reports (UCL-55)
- Pressure Relief Devices (UCL-60)

Part UCD - Requirements for Pressure Vessels Constructed of Cast Ductile Iron
- General (UCD-1 through UCD-3)
- Materials (UCD-5 and UCD-12)
  - UCD-5 General
  - UCD-12 Bolt Materials
- Design (UCD-16 through UCD-37)
- Fabrication (UCD-75 through UCD-78)
- Inspection and Tests (UCD-90, 99 and 101)
- Marking and Reports (UCD-115)
- Pressure Relief Devices (UCD-125)

Part UHT - Requirements for Pressure Vessels Constructed of Ferritic Steels with Tensile Properties Enhanced by Heat Treatment
- General (UHT-1)
- Materials (UHT-5 and UHT-6)
  - UHT-5 General
  - UHT-6 Test Requirements
- Design (UHT-16 through UHT-57)
- Fabrication (UHT-75 through UHT-86)
- Inspection and Tests (UHT-90)
- Marking and Reports (UHT-115)
- Pressure Relief Devices (UHT-125)

Part ULW - Requirements for Pressure Vessels Fabricated by Layered Construction
- Introduction (ULW-1 and ULW-2)
- Materials (ULW-5)
- Design (ULW-16 through ULW-26)
- Welding (ULW-31 through ULW-33)
- NDE of Welded Joints (ULW-50 through ULW-57)
- Fabrication (ULW-75 through ULW-78)
- Inspection and Tests (ULW-90)
- Marking and Reports (ULW-115)
- Pressure Relief Devices (ULW-125)

Part ULT - Alternate Rules for Pressure Vessels Constructed of Materials Having High Allowable Stresses at Low Temperature
- General (ULT-1 and ULT-2)
- Materials (ULT-5)
- Design (ULT-16 through ULT-57)
- Fabrication (ULT-75 through ULT-86)
- Inspection and Tests (ULT-90 through ULT-99)
- Marking and Reports (ULT-115)
- Pressure Relief Devices (ULT-25)

Tables. These tables identified as UCS-23, UNF-23, UHA-23, and UHT-23 list specifications/grades/classes of materials for which maximum allowable stresses in tension can be found in Section II, Part D, Subpart 1. Additional tables, with allowable stresses, can be found in the other parts of Section VIII, Division 1, usually within the design articles.

Mandatory Appendices (1 through 29) - Since none of these are focused specifically on materials issues, they will not be listed. The listing can be found on page 307 of Section VIII, Division 1.

Nonmandatory Appendices (A through EE)
- B - Approval of New Materials
- E - Suggested Good Practice Regarding Corrosion Allowance
- P - Basis for Establishing Allowable Stress Values

As should be obvious, Division 1 of Section VIII covers nine different types of construction in Subsection C, all categorized by material. Within each part is the same categorization of rules with Materials always appearing second, after General Requirements.

Several of the appendices were cited as containing "informative and nonmandatory information." To the materials person, this is often a valuable source of information for Section VIII construction, as well as for a variety of other types of work.

Section VIII, Division 2 provides alternate rules for the construction of pressure vessels. The organization of Division 2 is much simpler than just described above for Division 1 construction. The following is an outline of Division 2, again with an elaboration of the Materials Part:

Part AG General Requirements
Part AM Materials Requirements
Article M-1 General Requirements
AM-100 Materials Permitted
M-2 Special Requirements for Ferrous Materials
M-3 Special Requirements for Ferritic Steels with Tensile Properties Enhanced by Quenching and Tempering
M-4 Special Requirements for Nonferrous Materials
M-5 Special Requirements for Bolting
M-6 Material Design Data
Part AD Design Requirements
Part AF Fabrication Requirements
Part AR Pressure Relief Devices
Part AI Inspection and Radiography
Part AT Testing
Part AS Marking, Stamping, Reports, and Records

Mandatory Appendices (1 through 24)
1 - Basis for Establishing Design Stress Intensity Values

Nonmandatory Appendices (A through M)
F - Approval of New Materials
K - Selection and Treatment of High Alloy Steels

Later discussions will cover many of these subjects contained within the various mandatory and nonmandatory appendices, and it will be shown that many are identical (as they should be) from one section to the next.

Section IX - Welding and Brazing Qualifications

A "sister" publication, *Practical Guide to ASME Section IX - Welding Qualifications,* is available from *CASTI* Publishing Inc. for those needing detailed help in understanding and effectively using Section IX. The following outline view of Section IX is intended only for those desiring a cursory overview of its contents.

Part QW - Welding

Article I	Welding General Requirements
Article II	Welding Procedure Qualifications
Article III	Welding Performance Qualifications
Article IV	Welding Data
QW-420	Material Groupings (This contains Table QW-422 providing welding "P" numbers and "Group" numbers. These numbers are also used within the stress tables of Section II, Part D.)
QW-490	Definitions

Part QB - Brazing

Article XI	Brazing General Requirements
Article XII	Brazing Procedure Qualifications
Article XIII	Brazing Performance Qualifications
Article XIV	Brazing Data
QB-490	Definitions

Appendices

Table QW/QB-422 is now organized (1995 edition as compared to past editions) in much the same manner as Chapters 7 and 8 of this *Practical Guide to ASME Section II* - by specification. Appendix D of Section IX contains a listing of materials ordered by increasing "P" number. The preference for one type of listing over another depends on the individual user. With the advent of computers, both are easy to maintain consistent with one and other.

Section X - Fiber-Reinforced Plastic Pressure Vessels

Section X construction involves a totally different approach to materials than is required in all other Code construction. The general categorization of rules is much the same as in other Code sections, but the materials articles clearly show different concerns than are found in construction using metallic materials. The following is an outline of the contents of Section X.

Part RG	General Requirements
Part RM	Materials Requirements
RM-100	Laminate Materials
RM-110	Fiber System
RM-120	Resin System
RM-130	Class I Vessels: Minimum Required Mechanical Properties
RM-140	Use of Two or More Materials Specifications or Processes in Fabricating a Class I Vessel
RM-150	Mechanical Properties of Lamina for Class II Vessels
Part RD	Design Requirements
Part RF	Fabrication Requirements
Part RQ	Qualification Requirements
Part RR	Pressure Relief Devices
Part RT	Rules Governing Testing
Part RI	Inspection Requirements
Part RS	Marking, Stamping, Reports

Mandatory Appendices (1 through 5)

4 - Glossary of Terms Related to Fiber-Reinforced Plastics

Nonmandatory Appendices (AA through AE)

Section XI - Rules for Inservice Inspection of Nuclear Power Plant Components

Section XI provides rules for examination, testing, and inspection of components and systems and repair/replacement of nuclear power plant equipment. Rules are provided for two types of plants--Division 1 for light-water cooled plants and Division 3 for liquid-metal cooled plants.

Division 2 is reserved for gas-cooled plants, but it contains no rules at this time. Like Section III (described on page 10), subsections are each devoted to specific classes of construction.

Mandatory appendices in Section XI generally apply to inspection methodology and qualification of personnel and processes. The nonmandatory appendices contain a lot of information of potential use in other forms of construction. The following is a listing of selected contents of the Section XI nonmandatory appendices:

A - Analysis of Flaws
C - Evaluation of Flaws in Austenitic Piping
G - Fracture Toughness Criteria for Protection Against Failure
H - Evaluation of Flaws in Ferritic Piping
K - Assessment of Reactor Vessels with Low Upper Shelf Charpy Impact Energy Levels

Code Cases

Code cases are developed and published for a number of reasons. In a general sense, Code cases are required whenever existing Code rules do not cover a design, fabrication, materials, inspection, or testing situation desired for use by someone working with Code equipment. The reference Code section for each case is clearly shown in the title, inquiry, and reply. All cases pertaining to Sections III and XI are published in a book entitled *Code Cases--Nuclear Components*. Cases pertaining to all other Code construction are published in a book entitled *Code Cases--Boilers and Pressure Vessels*.

Code cases expire after three years unless their continued use is approved by the Code Committee or if that same Committee votes to annul the case. In most instances, provisions of cases eventually find their way into appropriate sections of the Code. Those Code cases pertaining to materials are identified within Chapters 7 and 8 of this guide.

Interpretations

Interpretations are <u>not</u> part of the Code, but are simply written replies prepared by the various Code Committees in response to questions posed by Code users. When the interpretation clarifies the intent of the Code, the Code is eventually changed to reflect what is provided by the interpretation. Interpretations for each section of the Code are published separately and included as part of the updating of the Code.

Common Introductory Portions of Code Sections

The first pages of each Code section are the same, beginning with a single page introduction to the section, addenda, interpretations, and Code cases. The material presented previously expanded upon that outline. Four additional common elements are described below.

Foreword

The Foreword as it appears in each Code section begins by stating that the current Boiler and Pressure Vessel Committee is a continuation of the original committee established in 1911 (as was discussed earlier in this chapter). A key sentence in the second paragraph reads: "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." The next important statement is "the Code is not a handbook and cannot replace education, experience, and the use of engineering judgment." Use of material in one nonmandatory appendix might be considered good engineering judgment in addressing an issue associated with another type of Code construction. This *Practical Guide to ASME Section II* will hopefully make it easier to find the many resources available within the Code.

The recent issue of computer usage is addressed by the following words in the fourth paragraph: "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 solely responsible for the application of those programs to their design." The Foreword continues on through 21 paragraphs, each containing important points of policy and understanding. The materials person is encouraged to read the Foreword and to pay particular attention to the nineteenth paragraph which contains a fairly lengthy discussion on use of material specifications.

Statement of Policy on the Use of Code Symbols and Code Authorization in Advertising

In one sentence, this policy simply states that organizations properly authorized by ASME to mark their items, components, or constructions with Code Symbols, may state that capability in their advertising literature.

Statement of Policy on the Use of ASME Marking to Identify Manufactured Items

This policy statement essentially states that use of "ASME," "ASME Standard," or any of the Code Symbols shall <u>not</u> be used unless <u>all</u> applicable provisions of the Code have been met.

Personnel

This portion of each Code section is very important in that it provides a list of resources to draw upon for further enlightenment on Code issues. The key to tapping these resources is either attending one of the regularly scheduled Code meetings or making direct contact with individuals. Direct contacts are facilitated by an ASME publication, AS-11 *Personnel of Codes, Standards, and Related Accreditation and Certification Committees.* This publication is updated yearly.

The Code Committee structure is made up of numerous subcommittees, subgroups, and working groups. The following is an organization chart for the entire Boiler and Pressure Vessel Code, as of the 1995 Addenda to the Code. This will be helpful for the materials person in determining where to go for action on a particular materials issue.

Main Committee - ASME Boiler and Pressure Vessel Code

<u>SC I - Subcommittee on Power Boilers</u>
- Subgroup on Piping
- Subgroup on Design
- Subgroup on Materials
- Subgroup on General Requirements
- Subgroup on Fabrication and Examination

SC II - Subcommittee on Materials
- Subgroup on International Materials Specifications
- Subgroup on Ferrous Alloys
- Subgroup on Nonferrous Alloys
- Subgroup on Strength, Ferrous Alloys
- Subgroup on Strength of Weldments
- Subgroup on Toughness
- Subgroup on External Pressure

SC III - Subcommittee on Nuclear Power
- Special Working Group on Editing and Review
- Subgroup on General Requirements
  - Working Group on Quality Assurance and Stamping
  - Working Group on Duties and Responsibilities
- Subgroup on Materials, Fabrication and Examination
- Subgroup on Design
  - Special Working Group on Dynamic Analysis
  - Special Working Group on Faulted Conditions
  - Working Group on Vessels
  - Working Group on Piping
  - Working Group on Pumps
  - Working Group on Valves
  - Working Group on Component Supports
  - Working Group on Core Support Structures
  - Working Group on FRP Pipe
  - Working Group on Administration
- Subgroup on Pressure Relief
- Subgroup on Elevated Temperature Construction
- Subgroup on Containment Systems for Spent Fuel and High Level Waste Transport Packagings
  - Working Group on General Requirements
  - Working Group on Material
  - Working Group on Design
  - Working Group on Fabrication and Examination

SC-3C - Joint ACI-ASME Committee on Concrete Components for Nuclear Service
- Subgroup on Materials, Construction and Examination
- Subgroup on Design

SC IV - Subcommittee on Heating Boilers
- Subgroup on Care and Operation of Heating Boilers
- Subgroup on Water Heaters
- Subgroup on Cast Iron Boilers
- Subgroup on Welded Boilers

SC V- Subcommittee on Nondestructive Examination
- Subgroup on Radiography
- Subgroup on Ultrasonics
- Subgroup on Acoustic Emission
- Subgroup on General Requirements and Surface Examination

SC VIII - Subcommittee on Pressure Vessels
- Special Working Group on Heat Transfer Equipment
- Special Working Group on High Pressure Vessels
- Special Working Group on Toughness
- Subgroup on General Requirements
- Subgroup on Materials
- Subgroup on Design
- Subgroup on Fabrication and Inspection
  - Working Group on Layered Vessels

SC IX - Subcommittee on Welding
- Subgroup on Materials
- Subgroup on General Requirements
- Subgroup on Procedure Qualification
- Subgroup on Performance Qualification
- Subgroup on Brazing

SC X - Subcommittee on Fiber-Reinforced Plastic Pressure Vessels

SC XI - Subcommittee on Nuclear Inservice Inspection
- Special Working Group on Plant Life Extension
- Special Working Group on Editing and Review
- Working Group on General Requirements
- Subgroup on Water-Cooled Systems
  - Working Group on Inspection of Systems and Components
  - Special Working Group on Low Temperature Heavy Water Reactors
  - Working Group on Pressure Testing
  - Working Group on Implementation of Risk Based Examination
  - Working Group on Concrete Containment
  - Working Group on Metal Containment
- Subgroup on Gas-Cooled Systems
- Subgroup on Liquid-Metal Cooled Systems
  - Working Group on Liquid-Metal Reactor Covers
- Subgroup on Evaluation Standards
  - Working Group on Operating Plant Criteria
  - Working Group on Flaw Evaluation
  - Working Group on Pipe Flaw Evaluation
- Subgroup on Nondestructive Examination
  - Working Group on Procedure Qualification and Volumetric Examination
  - Working Group on Personnel Qualification and Surface Visual and Eddy Current Examination
- Subgroup on Repairs, Replacements, and Modifications
  - Working Group on Welding and Special Repair Processes
  - Working Group on Design Reconciliation
  - Working Group on Responsibilities and Program Requirements
- Subgroup on Inservice Inspection of Core Support Structures

SC-SVR - Subcommittee on Safety Valve Requirements
- Subgroup on General Requirements
- Subgroup on Testing
- Subgroup on Design

SC-D - Subcommittee on Design
- Special Working Group on Bolted Flanged Joints
- Subgroup on Openings
- Subgroup on Design Analysis
- Subgroup on Elevated Temperature Design
- Subgroup on Fatigue Strength

SC-BPVA - Subcommittee on Boiler and Pressure Vessel Accreditation

SC-NA - Subcommittee on Nuclear Accreditation

The membership of these respective committees totals 1,428. Assuming that people are frequently members of an average of slightly over two committees, there are around 700 individuals involved in the volunteer ASME Boiler and Pressure Vessel Code committee work. These people meet four times a year to ensure that the Code is kept current with today's business demands and technological progress.

Common Appendices Involving Materials

As mentioned earlier in this Chapter, appendices exist in both mandatory and nonmandatory form. The following discusses appendices that are relevant to the supporting materials person.

Mandatory Preparation of Technical Inquiries

This mandatory appendix appears in all Code sections, but in some, it is in a slightly different format and entitled "Mandatory Submittal of Technical Inquiries." These latter versions typically appear in Sections V, VIII, and IX, with other sections using the "Preparation" version. The principle difference is that the "Submittal" version also speaks about requesting Code cases. The primary purpose of this appendix is to ensure that inquirers understand what the Code will provide and how they (the inquirers) must pose the question. For those versions of this appendix involving "Submittals," there is also similar guidance on requesting Code cases.

Approval of New Materials Under the ASME Boiler and Pressure Vessel Code

Each construction Code section (I, III, IV, VIII) contains a nonmandatory appendix dealing with the approval of new materials for Code uses. These appendices are identical in content and cover the following points.

- Code Policy
- Application
- Mechanical Properties
  - Time - independent
  - Time - dependent
  - Low temperature applications
  - Notch toughness
  - External pressure applications
  - Fatigue behavior
- Other Properties
  - Coefficient of thermal expansion
  - Thermal conductivity and diffusivity
  - Young's modulus
  - Shear modulus

Poisson's ratio
- Weldability
- Physical Changes
- Requests for Additional Data
- Code Cases

  This section is similar to that just discussed in Mandatory Preparation of Technical Inquiries regarding the request for Code cases in the "Submittal of Technical Inquiries."

Within the Mechanical Properties section are additional expectations on product form coverage, test temperature ranges, number of heats of material and test methods. Those who read and comply with these rules are generally very successful in obtaining quick approval for new materials. Anything less than full compliance slows the process substantially. Taking the time to personally walk through the request also helps immeasurably to ensure success.

Basis for Establishing Stress Values

Each construction section (I, III, IV, and VIII) defines how allowable stresses are determined. Establishing the allowable stress criteria is the responsibility of respective construction book committees. For Sections I, III, and VIII (Divisions 1 and 2), those criteria are now summarized in Appendices 1 and 2 of Section II, Part D. More discussion of those two appendices will follow in the next chapter of this *Practical Guide to ASME Section II*. Criteria for stresses used in Section IV are still found within Section IV.

Other Related Codes

The Subcommittee on Materials is responsible for providing allowable stresses and other properties of materials for other Codes, including:

- B16 Standardization of Valves, Flanges, Fittings, and Gaskets
- B31 Code for Pressure Piping, including:
  - B31.1 Power Piping, and
  - B31.3 Chemical Plant and Petroleum Refinery Piping

These Codes are organized somewhat differently than the Boiler and Pressure Vessel Code sections depicted in this chapter. The clearest way to see the difference is once again to look at an outline, using B31.1 as the example.

- Chapter I - Scope and Definitions
- Chapter II - Design
  - Part 1 - Conditions and Criteria
  - Part 2 - Pressure Design of Piping Components
  - Part 3 - Selection and Limitations of Piping Components
  - Part 4 - Selection and Limitations of Piping Joints
  - Part 5 - Expansion, Flexibility, and Supporting
  - Part 6 - Systems
- Chapter III - Materials (pages 61 - 63)
- Chapter IV - Dimensional Requirements
- Chapter V - Fabrication, Assembly, and Erection
- Chapter VI - Examination, Inspection, and Testing

- Appendices
  - Table A-1, Carbon Steel
  - Table A-2, Low and Intermediate Alloy Steel
  - Table A-3, Stainless Steels
- Appendices (Continued)
  - Table A-4, Nickel and High Nickel Alloys
  - Table A-5, Cast Iron
  - Table A-6, Copper and Copper Alloys
  - Table A-7, Aluminum and Aluminum Alloys
  - Table A-8, Temperatures 1,200°F and Above
  - Table A-9, Titanium and Titanium Alloys
  - Table B, Thermal Expansion Data
  - Table C-1, Modulus of Elasticity for Ferrous Material
  - Table C-2, Modulus of Elasticity for Nonferrous Material
  - VI - Approval of New Materials

Summary

The primary purpose in developing this overview of the entire ASME Boiler and Pressure Vessel Code was to assist the materials person with a clearer picture of where to locate requirements as well as informative information. This provides a good foundation for the next chapter, dealing with the contents and use of Section II, Part D.

CHAPTER 3

ORGANIZATION AND THE USE OF SECTION II, PART D

There is a near-symbiotic association between the "heart" of this *Practical Guide to ASME Section II* and Section II, Part D. Each has influenced the other as they progressed to their current forms. The evolution of both spanned a time period of nearly 20 years, which lends support to the adage that "good things take time." Unfortunately, the publication of Section II, Part D represented a somewhat controversial departure from an older, well established way of conveying allowable stresses and properties of Code materials. Some of the confusion surrounding use of this "new" approach is addressed by this chapter, and many of the questions will be answered and misunderstandings dispelled.

Scope

Section II, Part D is now the focal point for allowable stresses and properties for those materials permitted in Section I, III and VIII (Divisions 1 and 2) construction. This chapter delves into the development of Section II, Part D, its organization, use of the many stress and property tables, external pressure charts, associated appendices, and current efforts to adopt non-ASTM (foreign) specifications. It also provides additional useful information on materials behavior. As frequently suggested in Chapter 1, much of this information in Section II, Part D may be valuable in other engineering assignments. So, becoming comfortable with its organization and use is a MUST.

A Brief History of the Development of Section II, Part D

This author wrote a letter on October 5, 1979 to the Chairman of Subcommittee on Properties (as it was called at that time, before it was combined with the Subcommittee on Specifications to become the current Subcommittee on Materials), proposing that there be an "attempt to combine stress tables within a separate Code book". It was further suggested at that time that other minimum and nominal properties and other materials characteristics, that are independent of Code application, be included as well. The arguments cited were that it would be a "quality control system to ensure consistency" and that it would eliminate a lot of duplicate pages, common to numerous Code sections. This letter also recognized "how this approach could uncover minor (and perhaps major) discrepancies in stress listings". The gestation period for this idea was about five years, culminating in early 1985 with a move to resurrect a Task Group on Tabulation of Allowable Stresses and Materials Properties. The ambitious goal of publishing a new document in the 1986 Edition of the Code was obviously not met, but the wheels of motion were moving forward.

Michael Gold, current chairman of the Subcommittee on Materials, presented a paper at the 1995 ASME Pressure Vessel and Piping meeting, in Honolulu, Hawaii in June 1995, entitled "Section II,

Part D and Adoption of Foreign Materials". The balance of this historical recap uses portions of Mr. Gold's paper and is updated to cover the time since that paper was authored. Section II, Part D first appeared in the 1992 Edition of the Code, combining into one book, as suggested earlier, design stress values and materials property values previously published in Sections I, III, and VIII (Divisions 1 and 2). The stated purpose for publishing the information in a single volume for use with the respective sections was to ensure consistency of design values. This was essential since criteria used to develop the values and the data bases upon which values were based were identical.

The first version of Section II, Part D was nothing more than an editorial reformatting of information that existed in the four targeted Code sections. No attempts were made at that time to correct discrepancies that would now be painfully obvious. Over the next three years, concerted efforts were expended to eliminate the many inconsistencies that became evident not only in stress values, but in notes, nomenclature, and use temperatures. Corrections then allowed the merging of many stress lines, and that reduced the size of Section II, Part D.

The 1995 Edition of Section II, Part D was a "slimmed down" version with a new note system, further simplifying the stress tables. Also making the stress tables more user friendly was the numbering of lines to follow stress lines and associated information from one page to the next one, two, or three pages. Efforts will continue to further improve the quality of stresses and material properties as better data become available.

Structure of Section II, Part D

The Michael Gold paper cited earlier also provided an excellent description of the organizational structure of Section II, Part D. This write-up was based on "A Users Guide to BPV Section II Materials, Part D Properties: 1992 Addenda", written by G. M. Eisenberg. The following was taken verbatim from Mr. Gold's paper, with permission from ASME.

BASIC ORGANIZATION

The organization and structure of Section II, Part D, has been described thoroughly by Eisenberg (1992), in the *User Guide to BPV Section II, Materials, Part D Properties: 1992 Edition*, which was published as part of the 1992 Addenda update to Section II, Part D. Because that User Guide did not have page numbers, even current users of the Code may have lost track of it by now, so much of the information developed by Eisenberg has also been included here.

Section II, Part D, is divided into Subparts, followed by Appendices. These are described below.

Subpart 1: Stress Tables

Grouping by Criteria

The individual tables in Subpart 1 include values for materials, based on common stress criteria. For materials other than bolting, *Tables 1A (Ferrous) and Table 1B (Non-Ferrous)* contain maximum allowable stress values, based on the criteria that have been adopted for use in: Section I; Section III, Class 2 and 3; and Section VIII, Division 1. *Tables 2A (Ferrous) and 2B (Non-Ferrous)* contain design stress intensity values based on the criteria used for Section III, Class 1, and Section VIII, Division 2.

For bolting materials, *Table 3* contains allowable stress values based on the criteria used in: Section VIII, Division 1; Section VIII, Division 2, according to the rules of Appendix 3 of Division 2; and Section III, Class 2 and 3. *Table 4* contains design stress intensity values for bolting based on the criteria used for: Section VIII, Division 2; according to the rules of Appendices 4, 5, and 6, of Division 2; and those constructed according to the rules of Section III, Class 1. *Table U* contains tensile strength values for ferrous and non-ferrous materials, previously contained only in Section III. *Table Y-1* contains the yield strength values for ferrous and non-ferrous materials previously contained in Sections I, III, and VIII, Division 2. *Table Y-2* contains factors for limiting permanent strain for nickel, high nickel alloys, and high alloy steels from data previously contained in Sections III, and VIII, Division 2.

Ordering of Listing

The sorting order for materials, as they are listed in the tables, differs between Tables 1A and 1B. This difference persists in the other tables, as well, for ferrous and non-ferrous materials, respectively. In Tables 1A and 2A, and the portions of Tables 3, 4, U, and Y-1 containing ferrous materials, the underlying sorting sequence in order of priority, is: nominal composition, tensile strength S_T, yield strength S_Y, specification number, and grade or type. Two variables to this ordering are worth mentioning: There is no distinction made among the carbon steels on the basis of nominal compositions shown as C, C-Si, C-Mn, and C-Mn-Si. These were all treated as being identical carbon steels, with regard to nominal compositions, and were placed at the beginning of the table. The ordering of the carbon steels thus begins with the tensile strength as the primary discriminator. Further, the austenitic stainless steels, those with chromium contents between 16 and 25, were separated from the ferritic steels and placed after them.

In Tables 1B, 2B, and the portions of Tables 3, 4, U, and Y-1 containing the non-ferrous materials, the sorting priority is somewhat different: alloy/UNS number (alpha-numeric), tensile strength S_T, yield strength S_Y, class/condition/temper, and specification number. Nominal compositions are not included as a sorting priority for the non-ferrous materials. In fact, nominal compositions are not listed for the aluminum and copper alloys, because of all of the many different variations of nominal compositions available in different systems for these materials. For all non-ferrous materials, the primary ordering sequence is based on the more unique UNS numbers that have been assigned to each grade.

Other Information in Tables

In addition to providing columns for the materials and the criteria by which they are sorted, and, of course, the design values, other information is provided in the stress tables: This includes nominal composition (for the other non-ferrous materials), product form (e.g. tube, pipe, plate, etc.), specification number, type or grade, alloy designation or UNS number, class/condition/ temper, size/thickness, welding P number and group number, minimum tensile strength in ksi, minimum yield strength in ksi, and most importantly, the maximum temperature and applicability for each material in the Construction Codes appropriate for each table.

Applicability-Temperature Limit Columns

An example of the applicability/temperature limit column heading, is as follows.

NP = (Not Permitted)		
I	III	VIII-1
800	NP	1500

This entry indicates that, for this particular stress line, the values shown are appropriate for use in Section I Construction, up to a maximum temperature of 800°F, and are appropriate for use in Section VIII, Division 1 Construction, up to a maximum temperature of 1,500°F. The NP entry indicates that this stress line is not permitted for Section III Construction. The difference in temperatures of applicability between Section I and Section VIII, may have no technical basis. It is possible that no inquirer ever requested use of this material in Section I Construction, above 800°F. Many of these types of inconsistencies have been, and will continue to be eliminated in future Addenda. Further, the NP doesn't necessarily mean that this particular material would never be permitted in Section III Construction; it might mean that either no one has ever requested this material for use in Section III Construction, or that there is another stress line, with some differences, that has previously been approved for Section III Construction, and it would normally be found immediately above or below this particular line. Subcommittee II is working to eliminate such inconsistencies, and the new 1995 Edition has gone a long way in that direction.

External Pressure Charts and Notes

Other information included in the stress tables are the external pressure chart numbers, and their references. The Committee understands that there have been many inconsistencies in the referenced external pressure charts. The Committee is working diligently to eliminate these inconsistencies. This will probably be one of the major sources of changes in future Addenda to Section II, Part D.

The 1992 Edition and its three Addenda contained separate tables for notes, essentially as they originally appeared in the Construction Codes. The 1995 Edition merges all of these notes into a single set of notes applicable to each stress table. Unfortunately, those of you who have become familiar with a particular identification number for certain notes, will have to learn new numbers. However, we hope the new system is much more understandable for most users.

Subpart 2: Physical Properties Tables

There are four sets of Physical Properties Tables. Those in the first set of these are the nominal coefficients of thermal expansion, numbered *TE-1* through *TE-5*. These combine existing values from the 1989 Editions of Section III and Section VIII, Division 2. These tables cover ferrous materials, aluminum alloys, copper and copper alloys, high nickel alloys, and titanium and titanium alloys, respectively. The next table is *Table TCD*, which includes nominal coefficients of thermal conductivity and thermal diffusivity. The values in this table were also extracted from tables that existed in the 1989 Editions of Section III and Section VIII, Division 2. This table covers carbon and low alloy steels, high chromium steels, high alloys steels, high nickel alloys, aluminum alloys, and titanium alloys. The third set of tables is numbered *TM-1* through *TM-5*, and contains moduli of elasticity values. These were likewise combined from the existing values in the 1989 Editions of Section III and Section VIII, Division 2. They cover ferrous materials, aluminum alloys, copper and copper alloys, high nickel alloys, and un-alloyed titanium. The last group of tables, *Tables NF-1* and *NF-2*, covers

mechanical and physical properties of materials, and came from the 1989 Edition of Section VIII, Division 1. These tables cover Poisson's ratio, modulus of rigidity, density, melting range, and specific heat for a variety of non-ferrous materials.

Subpart 3: External Pressure Charts

External pressure charts previously were published in Sections I, II, VIII, Divisions 1 and 2. These were merged into Section II, Part D, and are grouped and numbered as follows: Geometric tables are designated G. Ferrous materials are subdivided as CS for carbon and low alloys steels; HT for heat treated steels; HA for high alloys steels; CI for cast irons; and CD for ductile irons. The non-ferrous material designations are: NFA for aluminum alloys; NFC for copper alloys; NFN for nickel alloys; NFT for titanium alloys; and NFZ for zirconium alloys.

Some charts have more temperature lines than the corresponding charts that were taken from other sections. The merged charts in Section II, Part D include all the temperature limits, as prescribed by the originating Code Sections. Some of the subtitles from the 1989 Edition listed more or different specifications than their counterpart charts in other sections, while the curves were identical. The intent is that the title of the table reflects the materials for which data was submitted that was used in establishing the table. The Committee, in its judgment, may have applied this table to more alloys and grades than represented by the originally submitted data. Thus, many materials may reference a particular pressure chart, even though those materials may not be named in the title of the charts.

Appendices

The appendices include the basis for establishing allowable stresses and design stress intensity values, the basis for establishing external pressure charts, how to prepare technical inquiries to the Boiler and Pressure Vessel Committee, SI units, and the policy of the ASME for approval of new materials.

Specific Features of Tables 1 and 2

Line Number

The line number is simply a user convenience added in the 1995 Edition of the Code to help find matching information for any given material on the second, third, and fourth pages associated with the first page. Obviously, there is no connection between Line 17 on pages 254 - 257 and Line 17 on pages 258 - 261, for example. As new lines of stresses are added or deleted, line numbers may change from one edition or addendum to the next.

Nominal Composition

Nominal compositions have been used within the Code to help define the general chemical makeup of materials. Nominal compositions are <u>not</u> to be confused with specified limits for chemical components of the alloy grade defined in specifications. In the mid 1970s, there was an effort to update the thermophysical properties used throughout the Code. A convenient way to group such properties was in accordance with nominal compositions. The problem at that time was that there was an inconsistent use of nominal composition designations in the Code. Thus, this author initiated

the first version of the Moen Index in an attempt to forge a more consistent use of nominal compositions in the Code.

There are no authoritative sources of nominal composition information. The material supplier may designate a nominal composition or others, generally within the various Code committees, may make the choice. Over the course of time, some general "rules of thumb" have evolved. For the family of carbon steels, the following approach is used:

Nominal Composition	Criteria
C Steel	Plain carbon steel (no silicon or manganese limits specified).
C-Si Steel	Carbon steel in which the specified silicon content average equals or exceeds 0.1%.
C-Mn Steel	Carbon steel in which the specified manganese content average equals or exceeds 1.0%.
C-Mn-Si Steel	Carbon steel in which both silicon and manganese limits shown above are met.
C-Mo Steel	Carbon steel with molybdenum added at the midpoint of the range specified.

With carbon steels and the other ferrous alloys (both low alloy and high alloy), the principle alloying ingredient iron is not shown in the nominal composition. The nominal composition for these other ferrous alloys usually contains the nominal values of the three most prevalent alloying elements (excluding iron), followed by indications of other minor alloying elements without numerical amounts indicated. Also, for most cast products, even though their specified chemistries may differ somewhat from their wrought counterparts in the Code, they will generally be assigned the same nominal composition as shown for the wrought form.

Aluminum and copper alloys no longer have nominal compositions shown within the Code. But they are still found throughout the *Practical Guide to ASME Section II*. If you are not familiar with the alloy numbering system used by the Aluminum Association or by the Copper Development Association, nominal compositions for aluminum and copper alloys can be very helpful.

For nickel base alloys, the nominal composition usually comes close to representing all significant alloying elements, including nickel. With some of the more complex alloys, the lesser specified amounts may be simply represented by an element listing, without an amount. Whole numbers are preferred, but some fractional amounts and even decimals are necessary with titanium and zirconium alloys.

Product Form

The listed product form describes the fabricated shape of the material. Some specifications may cover multiple product forms for a given alloy and their stress limits may vary. The "Notes", which will be discussed later, frequently indicate why stresses differ from one product form to the next for a given alloy.

Flat products listed in the stress tables include sheet, plate, and strip. The following are definitions for these product forms in one ferrous material specification.

- Plate is material $\geq 3/16$ in. thick and > 10 in. wide.
- Sheet is material $< 3/16$ in. thick and ≥ 24 in. wide.

- Strip is material < 3/16 in. thick and < 24 in. wide.

These definitions tend to be material dependent.

Tubular products include a variety of forms of pipes and tubes. Those listed in stress tables include the following:

Seamless pipe	Seamless tubes	Seamless extruded tubes
Welded pipe	Welded tubes	Seamless U-tubes
Cast and wrought pipe	Drawn seamless tubes	Seamless condenser tubes
Forged pipe	Condenser and heat exchanger tubes	Finned tubes

Other product forms listed in Code stress tables include forgings, die forgings, hard forgings, fittings, welded fittings, castings, bars, rod, shapes, billets, and wire.

Specification Number

These are ASME specifications containing the alloys for which allowable stresses are provided later in the stress tables. Tables 1A and 2A provide coverage for the SA specifications, representing ferrous or iron-based alloys. Materials containing at least 50% iron are considered ferrous materials. Materials with less than 50% iron are non-ferrous and are covered by SB specifications. Those specifications for nonferrous will be listed in Tables 1B and 2B.

For every rule, there are exceptions. A good example is SA-494 which contains several nickel-base alloys, and that SA specification is found in Section II, Part B - Specifications for Nonferrous Alloys. The message is simply to be aware that ferrous materials may show up in nonferrous specifications and vice versa. For additional information concerning ferrous and nonferrous metal definitions within ASTM and other standards, see Chapter 7 of *The Metals Black Book* - Ferrous Metals, published by *CASTI* Publishing Inc.

Type/Grade

Type or grade designation identifies a specific alloy within a specification for which chemical and strength requirements must be met. Frequently, within these designations, there are clues in the prefixes that indicate product form. The following are examples:

- "TP" is associated with high alloy stainless steels available as tubular products-- pipe or tubes
- "T" also indicates tubes in the low alloy Cr-Mo steels
- "F" indicates a forged alloy
- "C" indicates a cast alloy
- "CP" indicates centrifugally cast pipe
- "CF" indicates a cast austenitic stainless steel, coupled with additional numbers as follows:
  - CF3 is 304L stainless steel
  - CF8 is 304 stainless steel
  - CF3M is 316L stainless steel (M stands for Mo and 3 means 0.03% maximum carbon)
  - CF8M is 316 stainless steel
  - CF8C is columbium modified or 347 stainless steel
  - CF8T is titanium modified or 321 stainless steel
- "FP" indicates forged pipe
- "P" indicates pipe
- "B" generally indicates bolting.

Just when it all starts to make sense, one has to realize that there are numerous ways to designate alloy grades. For example, SA-671 Grade CB70 is not a cast bolt. But on the positive side, the "70" part of the grade designation, in this case, means that it has a minimum tensile strength of 70 ksi. Likewise, Grades 60, 65, and 70 within SA-515 and SA-516 equate to minimum tensile strengths.

The best way to understand the grade designation is to select a group of alloys that you work with most frequently, and use the various cross-indexes found in this *Practical Guide to ASME Section II* to develop an intimate familiarity with those alloy designations. Chapters 5 and 6 of this guide present key information arranged in a user-friendly format to help develop a better understanding of grade designations.

Alloy Designation/UNS No.

In nearly every alloy listing in the stress tables there are Unified Numbering System (UNS) numbers. Some of the carbon steels still do not have assigned numbers, nor do some of the newer materials now covered only by Code cases. These UNS numbers originated from a focused national effort beginning in the late 1960's. The first published listing of UNS numbers appeared in January 1975 as "SAE/ASTM Recommended Practice for Numbering Metals and Alloys". The most recent version, "Metals and Alloys in the Unified Numbering System", SAE HS-1086 February 1993/ASTM DS-56E, 6th Edition, contains a more detailed historical review, as well as a listing of people and organizations involved, and the recommended practice for numbering metals and alloys.

Chapter 5 of the *Practical Guide to ASME Section II* lists all of the UNS numbers referenced within the Code and provides nominal composition, grade, or specification, or various combinations of these identifiers.

Class/Condition/Temper

The easiest approach to describing the information under this column is to divide the discussions by alloy grouping. The first part will be directed to the ferrous alloys (appearing in Tables 1A and 2A), with the second part devoted to the nonferrous alloys found in Tables 1B and 2B.

Class/Condition/Temper for Ferrous Alloys

Many specifications for ferrous materials contain several strength levels for a given alloy grade, and unfortunately there is no standardized method for relating class to strength level. The following are two different approaches, as an example:

- SA-182 Grade F11
  - Class 1 (60 ksi UTS/30 ksi YS)
  - Class 2 (70 ksi UTS/40 ksi YS)
  - Class 3 (75 ksi UTS/45 ksi YS)

- SA-181 (C-Si Steel)
  - Cl.60 (60 ksi UTS/30 ksi YS)
  - Cl.70 (70 ksi UTS/36 ksi YS)

In SA-372, the class designation relates to yield strength rather than tensile strength. As an example, all Class 65 entries carry 105 - 130 ksi UTS and 65 ksi YS requirements. To further complicate matters, SA-649 uses class designations to differentiate chemistries and then uses grade designations to differentiate strength levels.

The following specifications for ferrous alloys contain class designations. The reason for listing them is to help the casual user of stress tables to be aware of this important piece of information.

SA-181	SA-372	SA-541
SA-182	SA-387	SA-542
SA-193	SA-453	SA-543
SA-234	SA-487	SA-563
SA-278	SA-508	SA-736
SA-320	SA-533	SA-748
SA-336	SA-537	SA-905
SA-350	SA-540	

Specification SA-479 Types 403 and 410 stainless steel have three conditions listed as follows:

- Condition 1 (70 ksi UTS/40 ksi YS)
- Condition 2 (110 ksi UTS/85 ksi YS)
- Condition 3 (130 ksi UTS/100 ksi YS)

Specification SA-564 contains a number of precipitation hardened alloys such as 17-4 PH, 15-5 PH, 13-8 Mo PH, etc., and they use the classic temper designations such as H1150, H1100, H1075, etc. Other alloys such as Type 201 stainless steel in SA-666 show a series of conditions ranging from annealed to full hard.

The last example for ferrous alloys is SA-403, a fittings specification. These products show the following in the Class/Condition/Temper column:

"WP" - fittings manufactured to the requirements of ANSI B16.9, B16.11, B16.28, or MSS Std. Practice SP-79

"WP-W" - fittings which contain welds where the fitting fabrication or construction welds have been radiographed

"WP-WX" - fittings which contain welds where all welds have been radiographed

"WP-WU" - fittings which contain welds where all welds have been ultrasonically inspected

"WP-S" - fittings manufactured from seamless product by a seamless method of manufacture

"CR" - fittings manufactured to the requirements of MSS-SP-43.

This is not an exhaustive review of all the possible entries under this column, but there are sufficient examples to convey an idea of the number of possibilities for ferrous alloys.

Class/Condition/Temper for Nonferrous Alloys

None of the specifications for nonferrous materials carry class designations. Aluminum and copper tend to use numerous temper designations for Code alloys, while nickel-base alloys tend to use a lot of "condition" entries. Titanium also tends to use similar condition statements. The following information is presented by major alloy grouping beginning with aluminum.

Aluminum Alloys

Aluminum and aluminum-based alloys covered in SB specifications have a variety of temper designations. The following will help to better understand those designations:

- "O" - Annealed
- "F" - As-fabricated
- "H" - Strain hardened (wrought products only). H designations are always followed by two or more digits.

  H1 applies to products that are strain hardened to obtain desired strength without supplementary thermal treatment. The digit(s) following H1 indicates the degree of strain hardening.

  H2 pertains to products that are strain hardened more than the desired final amount and are then reduced in strength to the desired level by partial annealing. The digit following the H2 indicates the degree of strain hardening remaining after the product has been partially annealed.

  H3 applies to products that are strain hardened and whose mechanical properties are stabilized by a low temperature thermal treatment or as a result of heat introduced during fabrication. The digit following the H3 indicates the degree of strain hardening remaining after stabilization.

- "T"- Solution heat treated - for alloys whose strength remains stable within a few weeks of heat treatment

  T1 cooled from an elevated temperature shaping process and naturally aged to a substantially stable condition

  T3 solution heat treated, cold worked, and naturally aged to a substantially stable condition

  T4 solution heat treated and naturally aged to a substantially stable condition

  T5 cooled from an elevated temperature shaping process and artificially aged

  T6 solution heat treated and artificially aged

  T7 solution treated and overaged or stabilized

For more information on temper designations for aluminum alloys, see Chapter 1 in The Metals Red Book - Nonferrous Metals, published by *CASTI* Publishing Inc.

Copper Alloys

Again, the *ASM Metals Handbook* provides a description for the temper designations used for copper alloys referenced in the Code. The following is a listing:

- Cold Worked Tempers

  H02 - 1/2 hard
  H55 - light drawn; light cold rolled
  H80 - hard drawn

- Cold Worked and Stress Relieved Tempers

  HR50 - drawn and stress relieved

- As-Manufactured Tempers

  M01 - as-sand cast
  M02 - as-centrifugal cast
  M07 - as-continuous cast
  M10 - as-hot forged and air cooled

- Annealed Tempers

  025 - hot rolled and annealed
  050 - light annealed
  060 - soft annealed
  061 - annealed

Nickel-Base Alloys

Nickel-base alloys use a series of general terms to describe the alloy condition or temper. A listing of the terms follows:

1. Annealed
2. Hot-rolled
3. Stress relieved
4. Hot-rolled/annealed
5. Hot worked
6. Solution annealed
7. Hot finished/annealed
8. Cold drawn/annealed
9. Hot finished
10. Welded/annealed
11. Solution treated
12. Annealed/hot finished
13. Cold worked

Within most specifications for nickel-base alloys, there will be a nonmandatory appendix entitled "Conditions and Finishes Normally Supplied." These are generally product form dependent with slight variations in the meaning of each "condition" term within the various product form specifications for any given alloy. None of the condition descriptions contain temperature or time

limits. These parameters are controlled by the material manufacturer to meet the specified strength and surface finish requirements.

Titanium Alloys

Titanium alloys generally show the word "annealed" in the Class/Condition/Temper column. In the associated specifications, the word "anneal" appears only as a footnote in the tables for tensile requirements. A typical note reads: "mechanical properties for conditions other than annealed ...." and may be established by agreement between the manufacturer and the purchaser. In SB-337 and -338, there are two versions of Grade 9 titanium-- one is annealed and the other is cold worked and stress relieved. For Code construction, only the annealed version is now included in Table 1B.

Zirconium Alloys

Zirconium alloys show nothing under the column heading Class/Condition/Temper.

Size/Thickness

This column entry is used whenever the specification contains a size restriction for products, or when there are strength requirements for a given type or grade of material that are tied to specific thickness ranges. These size/thickness restrictions will be found sporadically throughout Tables 1A (first page), 1B (second page), 2A (first page), and 2B (first page).

As discussed later under Notes, this is not the only place where size limits may be defined. Jumping ahead, notes in the stress tables beginning with "S" denote that an appropriate size requirement or limit applies.

P-Numbers/Group Numbers

The first pages of each four-page grouping in Tables 1A and 2A contain columns for P-Numbers and Group Numbers. Likewise, the second page of Table 1B and the first page of Table 2B, for each alloy entry, contain P-Number information. These P-Numbers and Group Numbers entries are based on information found in Table QW/QB-422 of Section IX. They were developed to associate similar base materials and thus reduce the number of welding procedure qualifications required. The Group Numbers within P-Numbers listings are for ferrous base metals which have specified impact test requirements. For more information about P-Numbers and Group Numbers see the Practical Guide to ASME Section IX - Welding Qualifications, published by *CASTI* Publishing Inc.

The general scheme used in assigning P-Numbers is as follows:

Base Metal	Welding P-Number
Steel and steel alloys	P-No. 1 through P-No. 11 including P-No. 5A, 5B and 5C
Aluminum and aluminum-base alloys	P-No. 21 through P-No. 25
Copper and copper-base alloys	P-No. 31 through P-No. 35
Nickel and nickel-base alloys	P-No. 41 through P-No. 47
Titanium and titanium-base alloys	P-No. 51 through P-No. 53
Zirconium and zirconium-base alloys	P-No. 61 through P-No. 62

Applicability and Maximum Temperature Limits

The information under this general heading is the "heart" of the stress limit tables and is always found on the second page of each alloy page set within the respective tables.

In Tables 1A and 1B, there are three options for applicability - Section I, Section III (Classes 2 and 3), or Section VIII, Division 1. First, if there is an *NP* entry, it means that the material described in that line, in terms of product form, specification, grade, class, and size limit is not permitted for the type of construction so marked. If there is a three or four digit number under one or more of the Code section subheadings, that denotes the material is suitable for service in that type of construction at temperatures in degrees Fahrenheit (°F) up to and including the indicated number.

Under the Section III subcolumn, there may appear values with additional information restricting the use to either supports (SPT) or Class 3 (Cl. 3). If there are no parenthetical restrictions, then the values apply to both Class 2 and Class 3 construction, in accordance with Section III Subsections NC and ND, respectively.

Tables 2A and 2B only have two subheadings under the applicability column-- Section III, Class 1 or Section VIII, Division 2. Again, some of the Section III listings may show a "SPT" notation, denoting that the material applies to construction in accordance with the rules of Section III, Subsection NF. None of the use temperatures shown in Tables 2A and 2B exceed 800°F since that is the maximum design temperature permitted in either Section III or Section VIII, Division 2.

Minimum Tensile and Yield Strengths

These columns are always located on the second page of each four page grouping within Tables 1A, 1B, 2A, and 2B. Entries simply represent what is specified within the mechanical requirements tables within each SA or SB Specification. However, the strengths listed for SA-178 Gr. A, SA-179, and SA-192 are assumed values based on notes in the specifications: "for purposes of design, the following tensile properties may be assumed ....". In other words, there are no specified tensile requirements for these three materials within their specifications.

External Pressure Charts

This column heading always appears on the second page of each four page set and contains an alpha-numeric entry denoting the applicable external pressure chart number. The actual charts are found in Subpart 3 of Section II, Part D in a 70 page section entitled "Charts and Tables for Determining Shell Thickness of Components Under External Pressure". The charts are organized and identified as follows:

- CS-1 through CS-6, representing carbon and low alloy steel
- HT-1 through HT-2, representing quenched and tempered steels
- HA-1 through HA-5, representing high alloy steels
- CI-1, representing cast iron
- CD-1, representing cast ductile iron
- NFA-1 through NFA-14, representing aluminum alloys (except NF-6 actually covers an aluminum bronze)
- NFC-1 through NFC-6, representing copper alloys
- NFN-1 through NFN-21, representing nickel alloys
- NFT-1 through NFT-3, representing titanium alloys
- NFZ-1 through NFZ-2, representing zirconium alloys

The bases for developing these charts will be discussed later.

Notes

Another extremely important column entry is the one headed "Notes." This column is always found on the second (right hand side) of each four page set. In the 1992 Code Edition, these notes had been extracted exactly as written from stress tables previously located in the respective book sections of the Code. When stresses were identical but the notes differed, there was an obstacle to merging the stress lines. Through engineering judgment and a lot of editorial work, many notes were combined allowing the merging of stress lines. A further improvement was achieved, obvious in the 1995 Edition, whereby notes were combined and further consolidated into logical groups. Thus, there are now the following types of notes appearing in the stress tables.

- GXX - general requirements/information
- HXX - heat treatment requirements/information
- SXX - size requirements/information
- WXX - welding requirements/information

Logic only goes so far here. Do not expect Note G21 of Table 1A to correspond with Note G21 in Tables 1B, 2A, or 2B. In other words, use only the note meanings that appear at the end of the particular table being used.

Upon closer study, it is obvious that some very significant information and even unique requirements are found in the notes, so they are to be read carefully.

Stress Limits

Within each four page segment of each stress table, stress limits are found beginning on the third page. For Tables 1A and 1B, stress limits continue on the fourth page because some permissible temperatures extend well beyond 800°F, perhaps as high as 1,650°F. Care should be used in extracting stress numbers, because some appear at 50°F intervals while others may be listed at 100°F intervals, at least to 600°F.

Generation of these stress limits is based on criteria found in Appendices 1 and 2 in the back of Section II, Part D. Actual application of these criteria will be discussed later.

Specific Features of Tables 3 and 4

Tables 3 and 4 provide stress values for bolting materials. They are nearly identical in format to that just described above for Tables 1A, 1B, 2A, and 2B, except they contain no columns for welding P Numbers or Group Numbers or External Pressure Chart numbers. The reason for this should be obvious-- these tables provide stress limits for bolting, which is not to be welded nor does it matter if it experiences external pressure.

Again, be sure to read applicable notes shown in the Notes column thoroughly, since they generally contain important additional limits and requirements.

Table U, Tensile Strength Values

Table U is entitled "Section III Tensile Strength Values, Su, for Ferrous and Nonferrous Materials". The table is made up of two page sets, with the first page describing the material and the second page providing the tensile strength values as a function of temperature. The first page is organized in the same manner as the first pages of Tables 3 and 4, except Table U also contains a column labelled "Min. Tensile Str., ksi". The number appearing in this column should always be the same as the first tensile strength values shown on the second page at the temperature -20 to 100°F.

Going through Table U, the first materials listed are the nonferrous materials (copper, then nickel alloys) followed by the ferrous materials (carbon steels, low alloy steels, then high alloy steels). Development of the actual numbers will be discussed later.

Some may wonder why Section III is the only section that uses this information. That is because only Section III design rules require that such information be used in establishing certain design limits. However, this same information, and like information not currently included in Table U, is needed to develop stress limits appearing in Tables 1 through 4 for all Section I, III and VIII construction. And, once again, there are important notes that are tied to specific materials.

Table Y-1, Yield Strength Values

Table Y-1 provides yield strength values for materials used in three types of Code construction - Section I, Section III, and Section VIII, Division 2. The table is organized in four page segments with the first two pages, like Tables 1 through 4, devoted to describing the material. The next two pages provide yield strength values at temperatures as high as 1,000°F. In this table, unlike Table U, ferrous materials are listed first followed by the nonferrous materials. Stress values found in Tables 1 through 4 are based on these published values, as well as on similar values on other materials not included in Table Y-1. Development of the actual numbers will be discussed later.

Table Y-2, Factors for Limiting Permanent Strain

Table Y-2 is the last table in Subpart 1 of Section II, Part D. It is entitled "Factors for Limiting Permanent Strain in Nickel, High Nickel Alloys, and High Alloy Steels". The table contains factors which, when applied to yield strength values shown in Table Y-1, give yield strength limits that will result in lower limits of permanent strain.

Subpart 2, Physical Properties Tables

The following is an organizational depiction of the makeup of Subpart 2:

Table Number	Table Contents
TE-1	Thermal expansion for ferrous alloys
TE-2	Thermal expansion for aluminum alloys
TE-3	Thermal expansion for copper and copper-base alloys
TE-4	Thermal expansion for high nickel alloys
TE-5	Thermal expansion for titanium and titanium alloys
TCD	Thermal conductivity and thermal diffusivity for ferrous and nonferrous alloys
TM-1	Modulus of elasticity of ferrous materials
TM-2	Modulus of elasticity of aluminum and aluminum alloys

Table Number	Table Contents
TM-3	Modulus of elasticity of copper and copper alloys
TM-4	Modulus of elasticity of high nickel alloys
TM-5	Modulus of elasticity of titanium alloys
NF-1	Poisson's ratio and modulus of rigidity
NF-2	Density, approximate melting range and specific heat

The contents of these tables originated in Sections III and VIII. When Section II, Part D was assembled, these physical properties tables were merged to the extent possible or brought in as-is, as was done particularly with Tables NF-1 and NF-2.

Most of the physical property values for ferrous materials resulted from an extensive and systematic reassessment of available data in the late 1970s. That work was led by this author using the expert services of the late Dr. Y. S. Touloukian and Dr. C. Y. Ho at Purdue University's Center for Information and Numerical Data Analysis and Synthesis (CINDAS). Properties provided by CINDAS included thermal diffusivity, thermal conductivity, specific heat, and thermal expansion for about 80 different ferrous alloy compositions. Following this work, the Code also reevaluated similar property data for other materials, filling in, to the extent possible, blanks for some alloys and extending temperature coverage for other alloys.

More information on the upgrading of physical property information in the Code can be found in the book *Pressure Vessel and Piping Technology - A Decade of Progress - 1985*, ASME, pages 529 to 542, "Thermophysical Properties" by M. F. Marchbanks, R. A. Moen and C. Y. Ho.

Subpart 3, Charts and Tables for External Pressure Applications

The organization of this subpart was previously discussed to some extent in this chapter (External Pressure Charts). The first 33 pages of Subpart 3 depict the charts and the next 35 pages provide the corresponding tabular values for the charts. Appendix 3 of Section II, Part D, entitled "Basis for Establishing External Pressure Charts" provides the bases as well as the background and theory behind their development.

Section II, Part D Appendices

The six appendices currently in the 1995 Edition of Section II, Part D are as follows:

Appendix No.	Content
1	Basis for Establishing Stress Values in Tables 1A and 1B
2	Basis for Establishing Design Stress Intensity Values for Tables 2A, 2B, 3, and 4
3	Basis for Establishing External Pressure Charts
4	Preparation of Technical Inquiries to the Boiler and Pressure Vessel Committee
5	Guideline on the Approval of New Materials Under the ASME Boiler and Pressure Vessel Code
6	Metallurgical Phenomena

Appendices 1, 2, and 3 basically provide the "recipes" for deriving stress limits that are found in Tables 1, 2, 3, and 4 and Subpart 3. Those bases, coupled with the type (quantity and quality) of data prescribed in Appendix 5 allow the analysts to generate the stress values, as a function of

temperature and any other limiting parameters. Most of the analytical work in setting stresses is now done under the auspices of the Materials Properties Council as directed by the Subcommittee on Materials.

Appendix 6 is the newest addition to Section II, Part D, first appearing in the 1995 Edition. To a materials person, this should prove to be quite informative. The appendix is organized as follows:

- 6-100 General
- 6-200 Creep-Rupture Properties of Carbon Steels
- 6-300 High Alloy and Stainless Steels
  - 6-310 Structure
  - 6-320 Intergranular Corrosion
  - 6-330 Stress Corrosion Cracking
  - 6-340 Sigma Phase Embrittlement
  - 6-350 Heat Treatment of Austenitic Chromium-Nickel Steels
  - 6-360 885^{o}F Embrittlement
- 6-400 Nonferrous Alloys
  - 6-410 Magnetic Properties
  - 6-420 Elevated Temperature Effects
  - 6-430 Low Temperature Behavior
  - 6-440 Corrosion
  - 6-450 Special Comments
    - 6-451 Aluminum
    - 6-452 Nickel
    - 6-453 Titanium or Zirconium

This information was extracted from the various construction Code books for consolidation into one book, much like what was done with the stress values and mechanical and physical properties. Now it will be much easier to maintain one consistent informative position on a given subject and to update the entries as newer information emerges or as it becomes apparent that additional subjects or materials need to be addressed.

Many of the original paragraphs containing the information now found in Appendix 6 are still found in their original locations in the construction Code books. With Appendix 6 now a reality, those paragraphs can now be deleted form the respective Code books.

Summary

This chapter has been devoted to the organization and use of Section II, Part D of the Code. There have been frustrations in its development and in its use, but it is slowly evolving into the useful book that was originally intended. Like the rest of the Code, it contains a wealth of information that can be helpful in a multitude of possible applications.

Chapter 4

EVOLUTION, ORGANIZATION AND USE OF ASME MATERIALS SPECIFICATIONS

This chapter is intended for users who are new to materials specifications or to comprehensive collections such Section II, Parts A, B, and C of the *ASME Boiler and Pressure Vessel Code*. It includes basic information on how the Code specifications were developed and how they should be used.

Scope

ASME Code specifications cover ferrous, nonferrous, and weld filler materials. This chapter concentrates on the ferrous and nonferrous materials covered by specifications in Parts A and B, respectively, of Section II. Welding filler metals are already covered in a companion book, *The Metals Blue Book, Vol. 3 Welding Filler Metals*, and to a lesser extent in the recently published *Practical Guide to ASME Section IX - Welding Qualifications*, both published by *CASTI* Publishing Inc.

Evolution of ASME Specifications.

ASME materials specifications are currently based on ASTM materials specifications that have been reviewed and approved by the various Code committees as being suitable for Code construction. Suitability is generally determined by a set of chemical composition requirements and well defined mechanical property requirements. When such specifications are not suitable, there is obvious pressure for ASTM to make the necessary changes to make their standards more acceptable. This close association between ASTM and the ASME Code has been going on since the 1920s or about 75 years. An article by Michael Gold in the January 1996 issue of *ASTM Standardization News*, entitled "ASTM and ASME: Partners in Materials Specifications" expounds on the role of ASTM standards for metals in the ASME Boiler and Pressure Vessel Code. The article covers very clearly the exhaustive review and approval process required by both organizations.

The Foreword to the various Code sections also contains information relative to the evolution of ASME materials specifications. Excerpts follow:

> "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."

The words "other recognized national or international organizations" (in the context of standards that might be adopted as ASME specifications) in the above excerpt are recent additions to the Foreword. They reflect a recent policy decision by the ASME Code Committee to remove impediments to greater use of the ASME Code overseas.

Organization of Parts A and B of Section II

The organization of Parts A and B of Section II has already been defined in Chapter 1.

Organization of Typical Specifications

In dealing with a well established set of national standards, the first expectation would be that a common, consistent format would be used in all material specifications. Unfortunately, that is not the case. Nearly every ASME specification (which is based on an ASTM specification) has a slightly different format. So, rather than attempt to describe some hypothetical ideal common specification format, discussions will center around the more common features. Since almost all start with a scope statement, reference documents, and ordering information, the ensuing discussion covers those subjects first and then touches on other subjects, not necessarily in the order they appear in any particular specification. A review of both Parts A and B of Section II suggest that this approach will apply equally to both ferrous and nonferrous material specifications.

Scope

The scope statement contains very important information, generally dealing with application intentions or limits not fully conveyed in the title of the specification. ASME SA-620 provides a good example.

> Title: Specification for Steel, Sheet, Carbon, Drawing Quality, Special Killed, Cold-Rolled
>
> Scope: This specification covers cold-rolled carbon steel sheet of drawing quality, special killed, in coils or cut lengths.
>
> This material is intended for fabricating identified parts where particularly severe drawing or forming may be involved or essential freedom from aging is required.

The second sentence of this scope statement defines quite clearly where material of this type should be used.

One more example is SA-540, a bolting specification:

> Title: Specification for Alloy - Steel Bolting Materials for Special Applications
>
> Scope: Para 1.1 - This specification covers regular and special quality alloy steel bolting materials which may be used for nuclear and other special applications.

> Bolting materials as used in this specification cover rolled or forged bars, rotary pierced or extruded seamless tubes, forged bars, or forged hollows from forged or rolled bar segments to be manufactured into bolts, studs, washers, and nuts.
>
> Para. 1.2 - Several grades of steel are covered. The grade and class shall be specified by the purchaser.
>
> Para. 1.3 - Supplementary requirements of an optional nature are provided for use when special quality is desired. These supplementary requirements call for additional tests to be made and when desired shall be so stated in the order, together with the acceptance limits required.

There are two more paragraphs (1.4 and 1.5) with units (SI); in other specifications, such information might be found as footnotes. Paragraphs 1.2 and 1.3, in other specifications, might be found under Ordering Information (which will be discussed later). Paragraph 1.1 is the real "meat" of the scope statement, defining further where such material is typically used and how it can be manufactured. In this particular specification, there is paragraph 4, Manufacture, but that only defines the steel-making process.

In summary, there is a tremendous amount of application information in these scope statements and they should be read carefully and often until the serious materials person has the more frequently used ones almost memorized.

Reference Documents

"Reference Documents", almost without exception, is the second paragraph heading of any ferrous or nonferrous material specification. The first documents generally listed are the ASTM standards, including ones for the material from which this product form might be made, the general requirements specifications that apply (in addition to the requirements within the subject specification), and any applicable testing method specifications.

There may be other standards listed from ASME, ANSI, SAE, ASNT, MSS, AWS, API, AIAG, etc. When there are general requirements specifications listed in the Reference Documents paragraph, there is generally specific reference to the specification one or more times in other paragraphs.

General Requirements and Ordering Information

Some specifications cover this information in a single paragraph while others separate the information into two paragraphs, with some variation in which is presented first.

The General Requirements mostly emphasize that material furnished shall conform to applicable requirements of the appropriate general requirements specification. In many specifications for nonferrous materials, this paragraph will be missing and may be replaced by a paragraph on Terminology (which will be discussed later).

The Ordering Information is that part of the specification where the user spells out precisely to the manufacturer what is truly desired. When the material received is not what is desired, the fault is usually traceable to improperly defined Ordering Information. Before discussing specifics, some specifications will say ".... the specification shall include ...." while others will say ".... this specification should include the following ....". The trend is to gradually change all specification wording to "should" since some inspectors were rejecting material when one or more of the items listed in a particular Ordering Information paragraph were not defined.

The principle issues defined under Ordering Information typically include:

- Quantity (feet, meters, weight, number of lengths or pieces, etc.)
- Name of material (seamless tubes, carbon steel, pipe, bolts, studs, etc.)
- Grade (and class or UNS No.) as generally defined in tables of chemical and tensile requirements
- Manufacture (hot finished, cold finished, open hearth, vacuum induction melted, etc.)
- Size (thickness, outside diameter, width)
- Length (specific or random)
- Temper
- Type of edge (slit, sheared, sawed, square corners, etc.)
- Surface finish
- Heat treatment
- Restricted chemistry
- Special tests
- Marking restrictions
- Packaging preferences

The list could go on, but only selected ones of these items appear in each specification. However, the user can more rigorously specify what is needed as long as the specifications do not result in a product that can no longer be certified as meeting the minimum requirements of the specification.

Usually within the Ordering Information there is an opportunity to define special requirements and any supplementary requirements. The possible supplementary requirements will be found either at the end of the specification or within the companion general requirements specification.

Terminology

Some product specifications (particularly the ones for nonferrous materials) contain this paragraph, whereas it may also appear in the general requirements specification covering one or more individual product/material specifications. If one were to compile all of these sections into a single glossary, it would provide a fairly complete description of every term needed to write a "perfect" order for material. The intent here is only to draw attention to the fact that such information is scattered throughout Parts A and B of Section II.

Manufacture

The term "Process" may be used in some specifications in place of "Manufacture". Information contained in these paragraphs ranges from how the material is originally made to specifics such as "the tubes shall be made by electric-resistance welding", or "the tubes shall be made by the seamless process and shall be cold drawn". Some specifications may be more lenient and simply say "products covered by this specification shall be produced by the hot extrusion method or by similar methods at the option of the producer, provided that the resulting products comply with the requirements in this specification".

Heat Treatment

Specific heat treatments, as a function of alloy grade, may be defined in this paragraph, or the information may appear in a separate heat treatment table or combined with mechanical test requirements in those tables (as in SA-564, for example). In other specifications such as SA-672, heat treatment requirements are found in the Materials and Manufacture paragraph.

Other Provisions

It would be a very large task to summarize each of the possible specification paragraphs. Suffice it to say that each of the following will contain significant information and may appear in one or more specifications:

- Chemical Composition
- Cast or Heat Analysis
- Product Analysis
- Mechanical Properties (tensile, bend, flattening, etc.)
- Sampling
- Pretreatment
- Workmanship, Finish and Appearance
- Repair
- Inspection
- Rejection
- Certification
- Product Marking
- Reports

Typical possible Supplementary Requirements would include:

- Macroetch Test
- Product Analysis
- Tension Test
- Magnetic Particle Examination
- Liquid Penetrant Examination
- Hydrostatic Test
- Repair Welding
- Heat Treatment Details
- Material for Optimum Resistance to Stress Corrosion Cracking
- Special Filler Metal
- Hardness Tests
- Subsize Impact Specimens
- Vacuum Treatment
- Strain Age Test
- Restricted Unspecified Elements
- Weldability, etc.

This list could go on. The point is that there are numerous options available to get the exact material needed for an application. It is much cheaper to spend a little more in the procurement phase and avoid significant operational costs later than trying to live with something that was not quite right.

Chapter 5

CODE ALLOYS BY UNS NUMBERS

- AXXXXX Aluminum-base alloys
- CXXXXX Copper-base alloys
- FXXXXX Cast iron alloys
- GXXXXX AISI and SAE carbon and alloys steels
- HXXXXX AISI and SAE H-steels
- JXXXXX Cast steels
- KXXXXX Misc. steel and ferrous alloys
- NXXXXX Nickel-base alloys
- RXXXXX Special metals and alloys
- SXXXXX Heat and corrosion resistant steels

Note: The following pages are arranged by UNS sections and by increasing number. This portion matches UNS numbers with nominal composition and alloy grade or specification.

ALUMINUM-BASE ALLOYS BY UNS No.		
UNS No.	**Nominal Composition**	**Grade**
A02040	Al - Cu	Alloy 204
A03560	Al - Si - Mg	Alloy 356; old SG70A
A24430	Al - Si	Alloy 443; old S5A
A83003	---	Alclad 3003
A86061	---	Alclad 6061
A91060	99.60 Al	1060
A91100	99.0 Al - Cu	1100
A92014	Al - 4 Cu - Si - Mn	2014
A92024	Al - 4 Cu - Mg	2024
A93003	Al - Mn - Cu	3003
A93004	Al - Mn - Mg	3004
A95052	Al - 2.5 Mg	5052
A95083	Al - 4.4 Mg - Mn	5083
A95086	Al - 4.0 Mg - Mn	5086
A95154	Al - 3.5 Mg	5154
A95254	Al - 3.5 Mg	5254
A95454	Al - 2.7 Mg - Mn	5454
A95456	Al - 5.1 Mg - Mn	5456
A95652	A1 - 2.5 Mg	5652
A96061	Al - Mg - Si - Cu	6061
A96063	Al - Mg - Si	6063

COPPER-BASE ALLOYS BY UNS No.		
UNS No.	**Nominal Composition**	**Grade**
C10200	99.95 Cu	OF Cu
C10300	99.35 Cu	OFXLP
C10400	99.95 Cu + Ag	OFS Cu
C10500	99.95 Cu + Ag	OFS Cu
C10700	99.95 Cu + Ag	OFS Cu
C10800	99.95 Cu	OF Low P Cu (OFLP)
C11000	99.90 Cu	ETP Cu
C12000	99.90 Cu + P	DLP Cu
C12200	99.9 Cu + P	DHP Cu
C12300	99.90 Cu + Ag & P	DPS Cu
C12500	99.88 Cu	FRTP Cu
C14200	99.40 Cu + As & P	DPA Cu
C19200	98.7 Cu + Fe + P	Phosphorized 1% Fe
C19400	97.4 Cu + Fe	Cu-Fe alloy
C23000	85 Cu + 15 Zn	Red brass
C28000	60 Cu - 40 Zn	Muntz metal
C36500	60 Cu - 39 Zn - Pb	Leaded Muntz metal, uninhibited
C36600	60 Cu - 39 Zn - Pb - As	Leaded Muntz metal, arsenical
C36700	60 Cu - 39 Zn - Pb - Sb	Leaded Muntz metal, antimonial
C36800	60 Cu - 39 Zn - Pb - P	Leaded Muntz metal, phosphorized
C37700	60 Cu - 37 Zn - 2 Pb	Forging brass
C44300	71 Cu - 28 Zn - Sn - As	Admiralty metal B (arsenical)
C44400	71 Cu - 28 Zn - Sn - Sb	Admiralty metal C (antimonial)
C44500	71 Cu - 28 Zn - Sn - P	Admiralty metal D (phosphorized)
C46400	60 Cu - 39 Zn - Sn	Naval brass, uninhibited
C46500	60 Cu - 39 Zn - Sn - As	Naval brass, arsenical

COPPER-BASE ALLOYS BY UNS No. (Continued)		
UNS No.	**Nominal Composition**	**Grade**
C46600	60 Cu - 39 Zn - Sn - Sb	Naval brass, antimonial
C46700	60 Cu - 39 Zn - Sn - P	Naval brass, phosphorized
C60800	95 Cu - 5 Al	Aluminum bronze
C61000	92 Cu - 8 Al	Aluminum bronze C
C61400	91 Cu - 7 Al - 3 Fe	Aluminum bronze D or 3
C62300	86 Cu - 10 Al - 3 Fe	Aluminum bronze 2
C63000	85 Cu - 10 Al - Ni	Aluminum-nickel bronze 2
C64200	91 Cu - 7 Al - 2 Si	Aluminum bronze 1
C65100	98.5 Cu - 1.5 Si	Copper silicon alloy B
C65500	97 Cu - 3 Si	High silicon bronze alloy A
C66100	94 Cu - 3 Si - P	Copper-silicon alloy D
C68700	78 Cu - 20 Zn - 2 Al	Aluminum brass B
C70400	95 Cu - 5 Ni	95 - 5 copper nickel
C70600	90 Cu - 10 Ni	90 - 10 copper nickel
C71000	80 Cu - 20 Ni	80 - 20 copper nickel
C71500	70 Cu - 30 Ni	70 - 30 copper nickel
C71640	66 Cu - 30 Ni - 2 Fe - 2 Mn	Copper-nickel
C72200	80 Cu - 16 Ni - Mn - Zn - Cr	Copper-nickel
C83600	85 Cu - 5 Sn - 5 Zn - 5 Pb	Alloy 85 or 85-5-5-5
C84400	81 Cu - 9 Zn - 7 Pb - 3 Sn	Leaded, semi-red brass
C90300	87 Cu - 8 Sn - 4 Zn	Tin bronze
C92200	88 Cu - Sn - Zn - Pb	Alloy 2A or valve bronze
C93700	80 Cu - 10 Sn - 9 Pb	Cast high leaded tin bronze
C95200	88 Cu - 9 Al - 3 Fe	Aluminum bronze 9A
C95400	85 Cu - 11 Al - 4 Fe	Aluminum bronze 9C
C96200	87.5 Cu - 10 Ni - Fe - Mn	Alloy A
C97600	65 Cu - 20 Ni - 6 Zn - Pb - Sn	Cast nickel-silver

CAST IRONS BY UNS No.		
UNS No.	**Nominal Composition**	**Specification - Grade/Class**
F11401	Cast iron	SA-278 Class 20
F11701	Cast iron	SA-278 Class 25
F12101	Cast iron	SA-278 Class 30
F12401	Cast iron	SA-278 Class 35
F12803	Cast iron	SA-278 Class 40
F13102	Cast iron	SA-278 Class 45
F13502	Cast iron	SA-278 Class 50
F13802	Cast iron	SA-278 Class 55
F14102	Cast iron	SA-278 Class 60
F22200	Malleable iron	SA-47 Grade 32510
F32800	Nodular iron	SA-395
F34100	Nodular iron	SA-476
F43010	Austenitic-ductile iron (22 Ni - 4 Mn - Si)	SA-571 Type D-2M

AISI AND SAE CARBON AND ALLOY STEELS BY UNS No.		
UNS No.	**Nominal Composition**	**Specification - Grade/Class**
G10180	C steel	SA-311, Grade 1018
G10350	C steel	SA-311, Grade 1035
G10450	C steel	SA-311, Grade 1045
G10500	C steel	SA-311, Grade 1050
G11170	C-Mn steel	SA-311, Grade 1117
G11370	C-Mn steel	SA-311, Grade 1137
G11410	C-Mn steel	SA-311, Grade 1141
G11440	C-Mn steel	SA-311, Grade 1144
G15410	C-Mn steel	SA-311, Grade 1541
G40370	C - ¼ Mo	SA-320 Grades L7A, L71, SA-574 Grade 4037
G40420	C - ¼ Mo	SA-194 Grade 7, SA-574 Grade 4042
G41350	1 Cr - ⅕ Mo	SA-372 Grade F
G41370	1 Cr - ⅕ Mo	SA-320 Grades L7B, L72 SA-574 Grade 4137, SA-372 Grade J
G41400	1 Cr - ⅕ Mo	SA-193 Grades B7, B7M, SA-194 Grades 7, 7M, SA-320 Grades L7, L7M, SA-574 Grade 4140
G41420	1 Cr - ⅕ Mo	SA-574 Grade 4142
G41450	1 Cr - ⅕ Mo	SA-574 Grade 4145
G43400	1¾ Ni - ¾ Cr - ¼ Mo	SA-574 Grade 4340, SA-320 Grade L43
G87400	½ Ni - ½ Cr - ¼ Mo	SA-320 Grades L7C and L73, SA-574 Grade 8740

AISI AND SAE H-STEELS BY UNS No.		
UNS No.	**Nominal Composition**	**Specification - Grade/Class**
H41420	1 Cr - 1 Mn - ¼ Mo	SA-540 Grade B22
H43400	2 Ni - ¾ Cr - ¼ Mo	SA-540 Grade B23

CAST STEELS BY UNS No.		
UNS No.	**Nominal Composition**	**Specification - Grade/Class**
J02502	C - Si Steel	SA-216 Grade WCA
J02503	C - Mn - Si Steel	SA-216 Grade WCC
J02504	C - Si Steel	SA-352 Grade LCA, SA-660 Grade WCA
J02505	C - Mn - Si Steel	SA-352 Grade LCC, SA-660 Grade WCC
J03002	C - Si Steel	SA-216 Grade WCB
J03003	C - Si Steel	SA-352 Grade LCB, SA-660 Grade WCB
J11522	C - ½ Mo - Si	SA-426 Grade CP15
J11547	½ Cr - ½ Mo	SA-426 Grade CP2
J11562	1 Cr - ½ Mo	SA-426 Grade CP12
J11872	1¼ Cr - ½ Mo	SA-217 Grade WC11
J12072	1¼ Cr - ½ Mo	SA-217 Grade WC6, SA-426 Grade CP11
J12082	1 Ni - ½ Cr - ½ Mo	SA-217 Grade WC4, SA-487 Grades 11A and 11B
J12084	Ni - Cr - Mo - V	SA-487 Grade 7A
J12521	C - ½ Mo	SA-426 Grade CP-1
J12524	C - ½ Mo	SA-217 Grade WC1, SA-352 Grade LC1
J13002	Mn - V	SA-487 Grades 1A, 1B and 1C
J13005	Mn - ¼ Mo - V	SA-487 Grades 2A, 2B and 2C
J13047	½ Ni - ½ Cr - ¼ Mo - V	SA-487 Grades 4A, 4B, 4C, 4D and 4E
J13080	Ni - Mo	SA-487 Grades 13A and 13B
J13345	1 Cr - ⅕ Mo	SA-487 Grades 9A, 9B, 9C, 9D and 9E
J13855	Mn - Ni - Cr - Mo	SA-487 Grades 6A and 6B

CAST STEELS BY UNS No. (Continued)		
UNS No.	**Nominal Composition**	**Specification - Grade/Class**
J15580	Ni - Mo	SA-487 Grade 14A
J21890	2¼ Cr - 1Mo	SA-217 Grade WC9, SA-426 Grade CP22
J22000	¾ Ni - 1 Mo - ¾ Cr	SA-217 Grade WC5, SA-487 Grades 12A and 12B
J22091	2¼ Cr - 1 Mo	SA-487 Grades 8A, 8B and 8C
J22500	2½ Ni	SA-352 Grade LC2
J23015	1½ Ni - ¾ Cr - ¼ Mo	SA-487 Grades 10A and 10B
J31545	3 Cr - 1 Mo	SA-426 Grade CP21
J31550	3½ Ni	SA-352 Grade LC3
J41500	4½ Ni	SA-352 Grade LC4
J42045	5 Cr - ½ Mo	SA-217 Grade C5, SA-426 Grade CP5
J42215	Ni - Cr - Mo	SA-352 Grade LC2-1
J51545	5 Cr - ½ Mo - Si	SA-426 Grade CP5b
J82090	9 Cr - 1 Mo	SA-217 Grade C12, SA-426 Grade CP9
J91150	13 Cr	SA-217 Grade CA15, SA-426 Grade CPCA15, SA487 Grades CA15A and CA15B
J91151	13 Cr - Mo	SA-487 Grade CA15M-A
J91171	13 Cr	SA-487 Grades CA15C and CA15D
J91540	13 Cr - 4 Ni - .7 Mo	SA-352 Grade CA6NM, SA-487 Grade CA6NM-A
J92180	16 Cr - 4 Ni - 3 Cu	SA-747 Grade CB7Cu-1
J92500	18 Cr - 8 Ni	SA-351 Grades CF3 and CF3A, SA-451 Grades CPF3 and CPF3A
J92590	19 Cr - 9 Ni - ½ Mo	SA-351 Grade CF10
J92600	18 Cr - 8 Ni	SA-351 Grades CF8 and CF8A, SA-451 Grades CPF8 and CPF8A
J92700	16 Cr - 12 Ni - 2 Mo - N	SA-351 Grade CF3MN
J92710	18 Cr - 10 Ni - Cb	SA-351 Grade CF8C, SA-451 Grade CPF8C
J92800	16 Cr - 12 Ni - 2 Mo	SA-351 Grades CF3M and CF3MA, SA-451 Grade CPF3M
J92900	16 Cr - 12 Ni - 2 Mo	SA-351 Grade CF8M, SA-451 Grade CPF8M
J92971	16 Cr - 14 Ni - 2 Mo	SA-351 Grade CF10MC
J93000	19 Cr - 10 Ni - 3 Mo	SA-351 Grade CG8M
J93254	20 Cr - 18 Ni - 6 Mo-Cu-N	SA-351 Grade CK3MCuN
J93345	24 Cr - 10 Ni - 3 Mo - N	SA-351 Grade CE8MN
J93370	25 Cr - 5 Ni - 3 Cu - 2 Mo	SA-351 Grade CD4MCu
J93400	25 Cr - 12 Ni	SA-351 Grade CH8, SA-451 Grade CPH8
J93401	24 Cr - 13 Ni - ½ Mo	SA-351 Grade CH10, SA-451 Grade CPH10
J93402	25 Cr - 12 Ni	SA-351 Grade CH20, SA-451 Grade CPH20
J93790	22 Cr - 13 Ni - 5 Mn	SA-351 Grade CG6MMN
J93880	25 Cr - 7½ Ni - 3½ Mo-N-Cu-W	SA-351 Grade CD3MWCuN
J94202	25 Cr - 20 Ni	SA-351 Grade Grade CK20, SA-451 Grade CPK20
J94203	25 Cr - 20 Ni - ½ Mo	SA-351 Grade HK30
J94204	25 Cr - 20 Ni - ½ Mo	SA-351 Grade HK40
N08603*	15 Cr - 35 Ni - ½ Mo	SA-351 Grade HT30
N08007**	29 Ni - 20 Cr - 3 Cu - 2 Mo	SA-351 Grade CN7M

* Formerly J94603. ** Formerly J95150.

MISCELLANEOUS STEELS AND FERROUS ALLOYS BY UNS No.		
UNS No.	**Nominal Composition**	**Specification - Grade/Class**
K00040	C Steel	SA-620
K01200	C Steel	SA-178 Grade A, SA-179
K01201	C - Si Steel	SA-192, SA-226
K01501	C Steel	SA-414 Grade A
K01503	C Steel	SA-194 Grade 1
K01700	C Steel	SA-285 Grade A, SA-672 Grade A45

MISCELLANEOUS STEELS AND FERROUS ALLOYS BY UNS No. (Continued)		
UNS No.	**Nominal Composition**	**Specification - Grade/Class**
K01701	C - Mn - Si Steel	SA-662 Grade A
K01800	C - Si Steel	SA-516 Grade 55, SA-672 Grade C55
K01807	C Steel	SA-214, SA-556 Grade A2, SA-557 Grade A2
K02001	C - Si Steel	SA-672 Grade B55
K02007	C - Mn - Si Steel	SA-662 Grade C
K02100	C - Mn - Si Steel	SA-516 Grade 60, SA-671 Grade CC60, SA-672 Grade C60
K02104	C - Mn - Si Steel	SA-524 Grades I and II
K02200	C Steel	SA-285 Grade B, SA-672 Grade A50
K02201	C Steel	SA-414 Grade B
K02202	C - Mn - Si Steel	SA-671 Grade CE55, SA-672 Grade E55
K02203	C - Mn - Si Steel	SA-662 Grade B
K02401	C - Mn - Si Steel	SA-283 Grade C, SA-515 Grade 60, SA-671 Grade CB60, SA-672 Grade B60
K02402	C - Mn - Si Steel	SA-671 Grade CE60, SA-672 Grade E60
K02403	C - Mn - Si Steel	SA-516 Grade 65, SA-617 Grade CC65, SA-672 Grade C65
K02501	C - Si Steel	SA-106 Grade A, SA-369 Grade FPA
K02502	C - Si Steel	SA-216 Grade WCA
K02503	C Steel	SA-216 Grade WCC, SA-414 Grade C
K02504	C Steel	SA-53 Types S and E, Grade A
K02505	C - Mn Steel	SA-414 Grade D
K02506	C - Mn - Si Steel	SA-727
K02600	C - Mn - Si Steel	SA-36
K02700	C - Mn - Si Steel	SA-516 Grade 70, SA-671 Grade CC70, SA-672 Grade C70
K02702	C Steel	SA-283 Grade D
K02704	C - Mn Steel	SA-414 Grade E
K02706	C Steel	SA-325 Type 1
K02707	C - Si Steel	SA-210 Grade A1, SA-556 Grade B2
K02800	C - Mn - Si Steel	SA-515 Grade 65, SA-671 Grade CB65, SA-672 Grade B65
K02801	C Steel	SA-285 Grade C, SA-671 Grade CA55, SA-672 Grade A55
K02803	C - Mn - Si Steel	SA-299, SA-671 Grade CK75, SA-672 Grade N75, SA-691 Grade CMS75
K02900	C - Mn - Si Steel	SA-612
K03002	C - Si Steel	SA-216 Grade WCB, SA-372 Grade A
K03005	C - Mn Steel	SA-53 Types S and E, Grade B
K03006	C - Si Steel	SA-106 Grade B, SA-234 Grade WPB, SA-369 Grade FPB
K03006	C - Mn - Si Steel	SA-333 Grade 6, SA-334 Grade 6, SA-556 Grade C2
K03007	C - Steel	SA-557 Grade B2
K03008	C - Mn Steel	SA-333 Grade 1, SA-334 Grade 1
K03009	C - Mn - Si Steel	SA-350 Grade LF1
K03011	C - Mn - Si Steel	SA-350 Grade LF2
K03017	C - Si Steel	SA-266 Grade 4
K03046	C - Mn Steel	SA-765 Grade I
K03047	C - Mn - Si Steel	SA-765 Grade II
K03101	C - Si Steel	SA-515 Grade 70, SA-671 Grade CB70, SA-672 Grade B70
K03102	C - Mn Steel	SA-414 Grade F
K03103	C - Mn Steel	SA-414 Grade G
K03200	C - Mn - Si Steel	SA-696 Grades B and C
K03300	C - Mn Steel	SA-455
K03501	C - Mn - Si Steel	SA-210 Grade C
K03501	C - Si Steel	SA-106 Grade C, SA-234 Grade WPC
K03502	C - Si Steel	SA-181 Classes 60 and 70
K03503	C Steel	SA-178 Grade C
K03504	C - Si Steel	SA-105, SA-695 Type B Grades 35 and 40

MISCELLANEOUS STEELS AND FERROUS ALLOYS BY UNS No. (Continued)		
UNS No.	**Nominal Composition**	**Specification - Grade/Class**
K03505	C - Si Steel	SA-557 Grade C2
K03506	C - Si Steel	SA-266 Grades 1 and 2, SA-541 Grade 1
K03800	C Steel	SA-563 Grade DH
K04001	C - Mn - Si Steel	SA-372 Grade B
K04002	C Steel	SA-194 Grades 2, 2H and 2HM
K04100	C Steel	SA-354 Grades BC and BD
K04200	C Steel	SA-449
K04801	C - Mn - Si Steel	SA-372 Grade C
K05001	C - Si Steel	SA-266 Grade 3, SA-649 Class 2
K05801	C Steel	SA-563 Grade D
K05802	C Steel	SA-563 Grades O, A, B and C
K11224	C - Mn - Ti Steel	SA-562
K11267	¾ Cr - ¾ Ni - Cu - Al	SA-333 Grade 4
K11422	C - ½ Mo	SA-209 Grade T1b, SA-250 Grade T1b
K11500	C Steel	SA-587
K11511	1¼ Mn - ¼ Mo - B	SA-517 Grade C
K11522	C - ½ Mo	SA-209 Grade T1, SA-250 Grade T1, SA-335 Grade P1, SA-369 Grade FP1
K11535	¾ Cr - ½ Ni - Cu	SA-423 Grade 1
K11540	¾ Ni - ½ Cu - Mo	SA-423 Grade 2
K11547	½ Cr - ½ Mo	SA-213 Grade T2, SA-250 Grade T2, SA-335 Grade P2, SA-369 Grade FP2
K11562	1 Cr - ½ Mo	SA-182 Grade F12 Class 1, SA-213 Grade T12, SA-250 Grade T12, SA-335 Grade P12, SA-369 Grade FP12
K11564	1 Cr - ½ Mo	SA-182 Grade F12 Class 2, SA-336 Grade F12
K11572	1¼ Cr - ½ Mo - Si	SA-182 Grade F11 Classes 2 and 3, SA-336 Grade F11, Classes 2 and 3, SA-541 Grade 11
K11576	¾ Ni - ½ Cr - ½ Mo - V	SA-517 Grade F, SA-592 Grade F
K11578	1½ Si - ½ Mo	SA-335 Grade P15
K11597	1¼ Cr - ½ Mo - Si	SA-182 Grade F11 Class 1, SA-199 Grade T11, SA-213 Grade T11, SA-250 Grade T11, SA-335 Grade P11, SA-336 Grade F11 Class 1, SA-369 Grade FP11
K11625	C - ½ Mo	SA-517 Grade J
K11630	½ Cr - ⅕ Mo - V	SA-517 Grade B
K11646	1¼ Mn-¼ Mo-½ Ni-½ Cr-V-B	SA-517 Grade H
K11683	½ Mn - ½ Mo - 1¼ Ni - B	SA-517 Grade M
K11695	1¾ Cr - ½ Mo - Ti	SA-592 Grade E
K11742	½ Cr - 1¼ Mn - Si	SA-202 Grade A
K11757	1 Cr - ½ Mo	SA-387 Grade 12, SA-691 Grade 1 CR
K11789	1¼ Cr - ½ Mo - Si	SA-387 Grade 11, SA-691 Grade 1¼ CR
K11797	1¼ Cr - ½ Mo	SA-739 Grade B11
K11800	C - Mn - Si - V	SA-541 Grade 1C
K11820	C - ½ Mo	SA-204 Grade A, SA-672 Grade L65, SA-691 Grade CM65
K11831	C - Mn - Si Steel	SA-724 Grade A
K11856	½ Cr - ¼ Mo - Si	SA-517 Grade A, SA-592 Grade A
K11900	C Steel	SA-325 Type 2
K12001	C - Mn - Si (Cb)	SA-737 Grade B, SA-738 Grade B, SA-812 Grades 65 and 80
K12020	C - ½ Mo	SA-204 Grade B, SA-672 Grade L70, SA-691 Grade CM70
K12021	Mn - ½ Mo	SA-302 Grade A, SA-672 Grade H75
K12022	Mn - ½ Mo	SA-302 Grade B, SA-672 Grade H80
K12023	C - ½ Mo	SA-209 Grade T1a, SA-250 Grade T1a

MISCELLANEOUS STEELS AND FERROUS ALLOYS BY UNS No. (Continued)		
UNS No.	**Nominal Composition**	**Specification - Grade/Class**
K12031	C - Mn - Si Steel	SA-724 Grade B
K12033	Cr - Ni - Cu	SA-325 Type 3C, SA-563 Grade C3-C
K12037	C - Mn - Si Steel	SA-724-Grade C
K12039	Mn - ½ Mo - ½ Ni	SA-302 Grade C, SA-672 Grade H80
K12042	¾ Ni - ½ Mo - Cr - V	SA-508 Grade 3
K12045	½ Ni - ½ Mo - V	SA-541 Grade 3
K12047	1 Cr - V	SA-213 Grade T17
K12054	Mn - ½ Mo - ¾ Ni	SA-302 Grade D, SA-672 Grade H80
K12059	Cr - Ni - Cu	SA-325 Type 3D, SA-563 Grade C3-D
K12062	1 Cr - ½ Mo	SA-234 Grade WP12, Class 1
K12122	½ Cr - ½ Mo	SA-182 Grade F2
K12143	½ Cr - ½ Mo	SA-387 Grade 2, SA-691 Grade ½ CR
K12202	C - Mn - Si (V)	SA-350 Grade LF6, SA-737 Grade C
K12238	Cr - Ni - Cu	SA-325 Type 3F, SA-563 Grade C3-F
K12254	Cr - Ni - Cu	SA-325 Type 3E, SA-563 Grade C3-E
K12320	C - ½ Mo	SA-204 Grade C, SA-672 Grade L75, SA-691 Grade CM75
K12437	C-Mn-Si Steel	SA-537 Classes 1 and 2, SA-671 Grades CD70 and CD80, SA-672 Grades D70 and D80, SA-691 Grades CMSH70 and CMSH80
K12447	C - Mn - Si Steel	SA-738 Grade A
K12520	C - ½ Mo	SA-336 Grade F1
K12521	Mn - ½ Mo	SA-533 Grade A, SA-672 Grades J80, J90 and J100
K12524	Mn - ½ Ni - V	SA-225 Grade C
K12529	Mn - ½ Mo - ¼ Ni	SA-553 Grade D, SA-672 Grades J80, J90 and J100
K12539	Mn - ½ Mo - ½ Ni	SA-553 Grade B, SA-672 Grades J80, J90 and J100
K12542	½ Cr - 1¼ Mn - Si	SA-202 Grade B
K12554	Mn - ½ Mo - ¾ Ni	SA-533 Grade C, SA-672 Grades J80, J90 and J100
K12765	¾ Ni - ½ Mo - ⅓ Cr - V	SA-541 Grade 2
K12766	¾ Ni - ½ Mo - ⅓ Cr - V	SA-508 Grade 2
K12821	C - ½ Mo	SA-234 Grade WP1
K12822	C - ½ Mo	SA-182 Grade F1
K13047	1 Cr - ¼ Mo	SA-372 Grade E, SA-649 Class 3
K13049	½ Cr - ⅕ Mo	SA-372 Grade G
K13050	1½ Ni	SA-350 Grade LF5
K13502	C - Si Steel	SA-508 Grades 1 and 1A
K13547	½ Cr - ⅕ Mo	SA-372 Grade H
K13548	1 Cr - ⅕ Mo	SA-372 Grade J
K13643	Cr - Ni - Cu	SA-325 Type 3A, SA-563 Grade C3-A
K13650	Low alloy steel	SA-563 Grade DH3
K14072	1 Cr - ½ Mo - V	SA-193 Grade B16, SA-437 Grade B4D
K14073	1 Cr - ½ Mo - V	SA-540 Grade B21
K14247	1 Cr - ½ Mo	SA-649 Class 1A
K14358	Cr - Ni - Cu	SA-325 Type 3B, SA-563 Grade C3-B
K14508	Mn - ¼ Mo	SA-372 Grade D
K14510	C - ¼ Mo	SA-194 Grade 4
K20747	Ni - Cu - Cr - Mo - Cb	SA-736 Grade A
K21390	2¼ Cr - 1 Mo	SA-541 Grade 22, SA-739 Grade B22
K21590	2¼ Cr - 1 Mo	SA-182 Grade F22 Classes 1 and 3, SA-199 Grade T22, SA-213 Grade T22, SA-234 Gr WP22 Class 1, SA-250 Grade T22, SA-335 Grade P22, SA-336 Grade F22, Classes 1 and 3, SA-369 Grade FP22, SA-387 Grades 22 and 22L, SA-508 Grade 22, SA-542 Types A and B, SA-691 Grade 2¼ CR

MISCELLANEOUS STEELS AND FERROUS ALLOYS BY UNS No. (Continued)		
UNS No.	**Nominal Composition**	**Specification - Grade/Class**
K21604	1¾ Cr - ½ Mo - Ti	SA-517 Grade E
K21650	1¼ Ni - 1 Cr - ½ Mo	SA-517 Grade P
K21703	2½ Ni	SA-203 Grade A
K21903	2½ Ni	SA-333 Grade 7, SA-334 Grade 7
K22035	2 Ni - 1 Cu	SA-182 Grade FR, SA-234 WPR, SA-333 Grade 9, SA-334 Grade 9, SA-420 Grade WPL9
K22036	2 Ni - 1 Cu	SA-350 Gr LF9
K22103	2½ Ni	SA-203 Gr B
K22375	3½ Ni - 1¾ Cr - ½ Mo - V	SA-508 Grade 4N
K23550	2 Ni - 1½ Cr - ¼ Mo - V	SA-723 Grade 1
K24040	2 Ni - ¾ Cr - ¼ Mo	SA-649 Class 1B
K24055	1¾ Ni - ¾ Cr - Mo	SA-372 Grade L
K24064	2 Ni - ¾ Cr - ⅓ Mo	SA-540 Grade B24
K24070	2 Ni - ¾ Cr - ⅓ Mo - V	SA-540 Grade B24V
K31509	2½ Cr - ½ Mo - ¾ Si	SA-199 Grade T4
K31545	3 Cr - 1 Mo	SA-182 Grade F21, SA-199 Gr T21, SA-213 Grade T21, SA-335 Grade P21, SA-336 Grade F21 Classes 1 and 3, SA-369 Grade FP21, SA-387 Grade 21, SA-691 Grade 3 CR
K31718	3½ Ni	SA-203 Grade D
K31820	2½ Ni - 1½ Cr - Mo	SA-372 Grade K
K31830	3 Cr - 1 Mo - ¼ V	SA-182 Grade F3V, SA-508 Grade 3V, SA-541 Grade 3V, SA-832, SA-336 Grade F3V, SA-542 Type C
K31835	2¼ Cr - 1 Mo - V - Cb	SA-336 Grade F3VCb, SA-508 Grade 3VCb, SA-541 Grade 3VCb
K31918	3½ Ni	SA-333 Grade 3, SA-334 Grade 3
K32018	3½ Ni	SA-203 Grade E
K32025	3½ Ni	SA-350 Grade LF3
K32026	3½ Ni	SA-765 Grade III
K34035	2¾ Ni - 1½ Cr - ½ Mo - V	SA-723 Grade 2
K41245	5 Cr - ½ Mo - Ti	SA-213 Grade T5c, SA-335 Grade P5c
K41545	5 Cr - ½ Mo	SA-182 Grade F5, SA-199 Grade T5, SA-213 Grade T5, SA-234 WP5, SA-335 Grade P5, SA-336 Grade F5, SA-369 Grade FP5, SA-387 Grade 5, SA-691 Grade 5 CR
K41583	5 Ni - ¼ Mo	SA-645
K42339	3 Ni - 1¾ Cr - ½ Mo	SA-543 Type B
K42343	3½ Ni - 1¾ Cr - ½ Mo - V	SA-541 Grade 4N
K42348	3½ Ni - 1¾ Cr - ½ Mo - V	SA-541 Grade 5
K42365	C Steel	SA-508 Grade 5
K42544	5 Cr - ½ Mo	SA-182 Grade F5a, SA-336 Grade F5A
K44045	4 Ni - 1½ Cr - ½ Mo - V	SA-723 Grade 3
K51545	5 Cr - ½ Mo - Si	SA-213 Grade T5b, SA-335 Grade P5b
K71340	8 Ni	SA-522 Type II, SA-553 Type II
K81340	9 Ni	SA-333 Grade 8, SA-334 Grade 8, SA-353/9Ni, SA-420 Grade WPL8, SA-522 Type I, SA-553 Type I
K90941	9 Cr - 1 Mo	SA-182 Grade F9, SA-234 Grade WP9, SA-369 Grade FP9, SA-387 Grade 9
K91352	12 Cr - 1 Mo - V - W	SA-437 Grades B4B and B4C
S50300*	7 Cr - ½ Mo	SA-387 Grade 7
S50400**	9 Cr - 1 Mo	SA-199 Grade T9, SA-213 Grade T9, SA-335 Grade P9, SA-336 Grade F9

* Formerly K61595.

** Formerly K81590.

NICKEL BASE ALLOYS BY UNS No.		
UNS No.	**Nominal Composition**	**Common Designation**
N02100	95 Ni	CZ100
N02200	99.0 Ni	200, Ni
N02201	99.0 Ni - Low C	201, Low C Ni
N04020	65 Ni - 29 Cr	M-35-2
N04400	67 Ni - 30 Cu	400, Ni - Cu
N04405	67 Ni - 30 Cu - S	405, Ni - Cu
N06002	47 Ni - 22 Cr - 9 Mo - 18 Fe	X or Ni - Cr - Mo - Fe
N06007	47 Ni - 22 Cr - 19 Fe - 6 Mo	G or Ni - Cr - Fe - Mo - Cu
N06022	57 Ni - 13 Mo - 21 Cr	C-22
N06025	62 Ni - 25 Cr - 10 Fe - Al	Nicrofer 6025 HT
N06030	40 Ni - 29 Cr - 15 Fe - 5 Mo - Cu	G-30
N06040	68 Ni - 16 Cr - 11 Fe	CY-40
N06045	46 Ni - 27 Cr - 23 Fe - 2.75 Si	VDM Alloy 45TM or Nicrofer 45
N06059	59 Ni - 23 Cr - 16 Mo - Fe - Al	VDM-59
N06060	57 Ni - 20 Cr - 13 Mo - 6 Fe - Ti - Cu	SM 2060
N06110	51 Ni - 31 Cr - 10 Mo	Ni - Cr - Mo - W
N06230	53 Ni - 22 Cr - 14 W - Co - Fe - Mo	Haynes 230
N06250	52 Ni - 21 Cr - 13 Fe - 11 Mo	SM 2050
N06255	49 Ni - 24 Cr - 14 Fe - 7 Mo	SM 2550
N06455	61 Ni - 16 Mo - 16 Cr	C-4 or Ni - Mo - Cr - Low C
N06600	72 Ni - 15 Cr - 8 Fe	600 or Ni - Cr - Fe
N06601	60 Ni - 23 Cr - 12 Fe - Al	601
N06617	45 Ni - 22 Cr - 12 Co - 9 Mo	617
N06625	60 Ni - 22 Cr - 9 Mo - 3.5 Cb	625 or Ni - Cr - Mo - Cb
N06686	50 Ni - 25 Cr - 15 Fe - 6 Mo - Ti	686
N06690	58 Ni - 29 Cr - 9 Fe	690
N06975	49 Ni - 25 Cr - 18 Fe - 6 Mo	G-2 or Ni - Cr - Fe - Mo - Cu
N06985	47 Ni - 22 Cr - 20 Fe - 7 Mo	G-3 or Ni - Cr - Fe - Mo - Cu
N07001	53 Ni - 20 Cr - 14 Co - 4 Mo	Grade 685 or Waspaloy
N07080	70 Ni - 19 Cr - Fe - Ti - Al	Grade 80A, Nitronic 80A
N07252	51 Ni - 19 Cr - 10 Mo - 10 Co	Grade 689, M-252
N07500	50 Ni - 17 Cr - 17 Co - Mo - Fe	Grade 684, Udimet 500
N07718	53 Ni - 19 Cr - 19 Fe - Cb - Mo	718
N07725	57 Ni - 21 Cr - 8 Mo - 3 Cb	725
N07750	70 Ni - 16 Cr - 7 Fe - Ti - Al	Grade 688, X-750
N07752	70 Ni - 16 Cr - 7 Fe - Ti - Cb	
N08007	29 Ni - 20 Cr - 3 Cu - 2 Mo	CN7M
N08020	35 Ni - 35 Fe - 20 Cr - Cb	20 Cb - 3 or Cr - Ni - Fe - Mo - Cu - Cb
N08024	37 Ni - 33 Fe - 24 Cr - 4 Mo	20 Mo - 4
N08026	35 Ni - 30 Fe - 24 Cr - 6 Mo - 3 Cu	20 Mo - 6 or Cr - Ni - Fe - Mo - Cu
N08028	31 Ni - 31 Fe - 29 Cr - Mo	Sanicro 28
N08031	31 Ni - 31 Fe - 27 Cr - 7 Mo	Alloy 31
N08135	36 Ni - 35 Fe - 22 Cr - 4 Mo	SM 2035
N08221	41 Ni - 28 Fe - 21 Cr - 6 Mo	---
N08320	26 Ni - 43 Fe - 22 Cr - 5 Mo	20 Mod. or Ni - Fe - Cr - Mo
N08330	35 Ni - 19 Cr - 1¼ Si	RA-330 or Ni - Fe - Cr - Si
N08332	35 Ni - 19 Cr - 1¼ Si	RA-330TX or Ni - Fe - Cr - Si
N08366	46 Fe - 24 Ni - 21 Cr - 6 Mo	AL6X
N08367	46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	AL6XN
N08535	33 Ni - 36 Fe - 25 Cr - 3 Mo	
N08603	35 Ni - 15 Cr - ½ Mo	HT 30 (formerly J94603)

NICKEL BASE ALLOYS BY UNS No. (Continued)		
UNS No.	**Nominal Composition**	**Common Designation**
N08700	25 Ni - 47 Fe - 21 Cr - 5 Mo	JS-700 or Ni - Fe - Cr - Mo - Cb
N08800	33 Ni - 42 Fe - 21 Cr	800 or Ni - Fe - Cr
N08801	32 Ni - 45 Fe - 20.5 Cr - Ti	801
N08810	33 Ni - 42 Fe - 21 Cr	800H or Ni - Fe - Cr
N08811	33 Ni - 42 Fe - 21 Cr - Al - Ti	800HT
N08825	42 Ni - 21.5 Cr - 5 Mo - 2.3 Cu	825 or Ni - Fe - Cr - Mo - Cu
N08904	44 Fe - 25 Ni - 21 Cr - Mo	904L, AL4X, 2RK65
N08925	25 Ni - 20 Cr - 6 Mo - Cu - N	VDM 1925
N08926	28 Ni - 39 Fe - 16 Cr - 4 Cu	25-6 Mo
N08932	25 Ni - 25 Cr - 5.5 Mo	Creusot Loire UR-5B8
N09925	42 Ni - 22 Fe - 21 Cr - Mo - Ti - Cu	925
N09926	27 Ni - 39 Fe - 16 Cr - Cu - Mo - Ti	926
N10001	62 Ni - 28 Mo - 5 Fe	B or Ni - Mo
N10002	56 Ni - 17 Mo - 16 Cr - 6 Fe - V	C
N10003	70 Ni - 16 Mo - 7 Cr - 5 Fe	N or Ni - Mo - Cr - Fe
N10276	54 Ni - 16 Mo - 15 Cr	C-276 or Ni - Mo - Cr Low C
N10629	62 Ni - 28 Mo - 4 Fe - 1Cu	
N10665	65 Ni - 28 Mo - 2 Fe	B-2 or Ni - Mo
N10675	64 Ni - 29.5 Mo - 2 Cr - 2 Fe - Mn - W	B-3
N12160	29 Ni - 30 Co - 28 Cr - 2.75 Si	HR 160
N30002	53 Ni - 17 Mo - 16 Cr - 6 Fe - 5 W	CW-12MW (Cast C)
N30012	62 Ni - 28 Mo - 5 Fe	N-12MV (Cast B)

SPECIAL METALS BY UNS No.		
UNS No.	**Nominal Composition**	**Grade or Common Name**
R30556	21 Ni - 30 Fe - 22 Cr - 18 Co - 3 Mo - 3 W	Haynes 556
R31233	Co - 26 Cr - 9 Ni - 5 Mo - 3 Fe - 2 W	---
R50250	Ti, unalloyed	Grade 1
R50400	Ti, unalloyed	Grade 2 or C-2
R50550	Ti, unalloyed	Grade 3 or C-3
R50700	Ti, unalloyed	Grade 4
R52250	Ti - 0.2 Pd	Grade 11
R52252	Ti - 0.06 Pd	Grade 17
R52400	Ti - 0.2 Pd	Grade 7
R52402	Ti - 0.06 Pd	Grade 16
R53400	Ti - 0.3 Mo - 0.8 Ni	Grade 12
R53413	Ti - 0.5 Ni - Ru	Grade 13
R53414	Ti - 0.5 Ni - Ru	Grade 14
R53415	Ti - 0.5 Ni - Ru	Grade 15
R54520	Ti - 5 Al - 2.5 Sn	Grade 6
R56320	Ti - 3 Al - 2.5 V	Grade 9
R56322	Ti - 3 Al - 2.5 V - 0.05 Pd	Grade 18
R56400	Ti - 6 Al - 4 V	Grade 5
R58645	Ti - 8 V - 6 Cr - Mo - Zr - Al - Pb	Grade 20 or Beta C
R60702	99.2 Zr	Grade 702
R60704	97.5 Zr	Grade 704
R60705	95.5 Zr - Cb	Grade 705
R60706	95.5 Zr + Cb	Grade 706

HEAT AND CORROSION RESISTANT STEELS BY UNS No.		
UNS No.	**Nominal Composition**	**Type or Grade/Name**
(S01815)	See S30600	See S30600
S13800	13 Cr - 8 Ni - 2 Mo	13-8 Mo PH or XM-13
S15500	15 Cr - 5 Ni - 3 Cu	15-5PH or XM-12
S15700	15 Cr - 7 Ni - 2.5 Mo - 1 Al	15-7 Mo PH or 632
S16800	16 Cr - 8 Ni - 2 Mo	16-8-2
S17400	17 Cr - 4 Ni - 4 Cu	17-4 PH or 630
S17600	17 Cr - 7 Ni - Al - Ti	Stainless W or 635
S17700	17 Cr - 7 Ni - 1 Al	17-7PH or 631
S20100	17 Cr - 4 Ni - 6 Mn	201
S20103	17 Cr - 4 Ni - 7 Mn	201L
S20153	17 Cr - 4 Ni - 7 Mn - N	201 LN
S20161	16½ Cr - 5 Ni - 5 Mn - 3½ Si	Gall Tough
S20200	18 Cr - 5 Ni - 9 Mn	202
S20400	16 Cr - 2 Ni- 8 Mn - N	Nitronic 30
S20500	17 Cr - 1½ Ni - 15 Mn	205
S20904	21 Cr - 6 Ni - 9 Mo	21-6-9 LC
S20910	22 Cr - 13 Ni - 5 Mn	8R, Nitronic 50, JS-50, 22-13-5 or XM-19
S21400	18 Cr - 15 Mn - N	XM-31
S21500	15 Cr - 10 Ni - 6 Mn	Esshete 1250
S21600	19 Cr - 8 Mn - 6 Ni - Mo/N	XM-17
S21603	19 Cr - 8 Mn - 6 Ni - Mo/N	XM-18
S21800	18 Cr - 8 Ni - 4 Si - N	85 or Nitronic 60
S21900	20 Cr - 9 Mn - 7 Ni - N	XM-10
S21904	21 Cr - 6 Ni - 9 Mn	Nitronic 40 or 21-6-9LC or XM-11
S24000	18 Cr - 3 Ni - 12 Mn	18-3 Mn, JS33, Nitronic 33 or XM-29
S30100	17 Cr - 7 Ni	301
S30200	18 Cr - 8 Ni	302
S30300	18 Cr - 8 Ni - S	8F or 303 S
S30323	18 Cr - 8 Ni - Se	8F or 303 Se
S30400	18 Cr - 8 Ni	8 or 304
S30403	18 Cr - 8 Ni	304L
S30409	18 Cr - 8 Ni	304H
S30415	18 Cr - 9 Ni- N - Ce	153MA
S30451	18 Cr - 8 Ni - N	8N or 304N
S30452	18 Cr - 8 Ni - N	XM-21
S30453	18 Cr - 8 Ni - N	8LN or 304LN
S30500	18 Cr - 11 Ni	8P or 305
S30600	18 Cr - 15 Ni - 4 Si	1815LC Si or 18-15 (formerly S01815)
S30601	18 Cr - 17 Ni - 5.3 Si	18-17LC
S30615	18 Cr - 15 Ni - 3.7 Si	RA85H
S30815	21 Cr - 11 Ni - N	253MA or F45
S30880	20 Cr - 10 Ni	ER308
S30900	23 Cr - 12 Ni	309
S30908	23 Cr - 12 Ni - S	309S
S30909	23 Cr - 12 Ni	309H
S30940	23 Cr - 12 Ni - Cb	309 Cb
S30941	23 Cr - 12 Ni - Cb	309H Cb
S31000	25 Cr - 20 Ni	310
S31008	25 Cr - 20 Ni - S	310S
S31009	25 Cr - 20 Ni	310H
S31040	25 Cr - 20 Ni - Cb	310 Cb

HEAT AND CORROSION RESISTANT STEELS BY UNS No. (Continued)		
UNS No.	**Nominal Composition**	**Type or Grade/Name**
S31041	25 Cr - 20 Ni - Cb	310H Cb
S31042	25 Cr - 20 Ni - Cb - N	310H CbN
S31050	25 Cr - 20 Ni - 2 Mo	310 Mo LN
S31200	25 Cr - 6 Ni - Mo - N	312, 44LN or F50
S31254	20 Cr - 18 Ni - 6 Mo	254 SMO or F44
S31260	25 Cr - 6 Ni - 3 Mo - N	DP-3
S31272	15 Cr - 15 Ni - Mo - Ti	---
S31500	18 Cr - 5 Ni - 3 Mo - N	3RE60
S31600	16 Cr - 12 Ni - 2 Mo	8M or 316
S31603	16 Cr - 12 Ni - 2 Mo	3M or 316L
S31609	16 Cr - 12 Ni - 2 Mo	316H
S31635	16 Cr - 12 Ni - 2 Mo - Ti	316 Ti
S31640	16 Cr - 12 Ni - 2 Mo - Cb	316 Cb
S31651	16 Cr - 12 Ni - 2 Mo - N	8MN or 316N
S31653	16 Cr - 12 Ni - 2 Mo - N	8MLN or 316LN
S31700	18 Cr - 13 Ni - 3 Mo	317
S31703	18 Cr - 13 Ni - 3 Mo	317L
S31725	19 Cr - 15 Ni - 4 Mo	317LM
S31726	19 Cr - 15½ Ni - 4 Mo	317L4
S31753	18 Cr - 13 Ni - 3 Mo - N	317LN
S31803	22 Cr - 5 Ni - 3 Mo - N	2205
S32100	18 Cr - 10 Ni - Ti	8T or 321
S32109	18 Cr - 10 Ni - Ti	321H
S32304	23 Cr - 4 Ni - Mo - Cu	2304
S32550	25 Cr - 5 Ni - 3 Cu - 2 Mo - N	Ferralium 255
S32615	18 Cr - 20 Ni - 5.5 Si	Alloy SX
S32654	24 Cr - 22 Ni - 7.5 Mo	654 SMO
S32740	25 Cr - 7 Ni - 3 Mo - 2 W - Cu - N	---
S32750	25 Cr - 7 Ni - 4 Mo - N	SAF 2507
S32760	25 Cr - 7 Ni - 3 Mo - Cu - W	Zeron 100
S32803	28 Cr - 3 Ni - 2 Mo - Cb	Cronifer 2803 Mo
S32900	26 Cr - 4 Ni - Mo	329
S32950	26 Cr - 4 Ni - Mo - N	7 Mo Plus
S33100	20 Ni - 8 Cr	F10
S33228	27 Cr - 32 Ni - Cb	Nicrofer 3228 NbCe or Alloy AC66
S34565	24 Cr - 17 Ni - 6 Mn - 4.5 Mo - N	4565S
S34700	18 Cr - 10 Ni - Cb	8C or 347
S34709	18 Cr - 10 Ni - Cb	347H
S34751	18 Cr - 11 Ni - Cb - N	347N
S34800	18 Cr - 10 Ni - Cb	348
S34809	18 Cr - 10 Ni - Cb	348H
S35000	16 Cr - 4 Ni - 3 Mo	AM-350
S35315	25 Cr - 35 Ni - N - Ce	353MA
S35500	15 Cr - 4 Ni - 3 Mo	AM-355 or 634
S36200	14 Cr - 6 Ni - Ti	Almar 362 or XM-9
S38100	18 Cr - 18 Ni - 2 Si	XM-15 or 18-18-2
S39240	23 Cr - 4 Ni - Mo - Cu	Uranus 50
S39274	25 Cr - 7 Ni - 3 Mo - 2 W - N	DP3W
S39277	25 Cr - 7 Ni - 3½ Mo - Cu - W - N	AF918
S40300	12 Cr	403
S40500	12 Cr - 1 Al	405

HEAT AND CORROSION RESISTANT STEELS BY UNS No. (Continued)		
UNS No.	**Nominal Composition**	**Type or Grade/Name**
S40800	12 Cr - Ti	408
S40900	11 Cr - Ti	409
S40945	11 Cr - Cb - Ti	---
S41000	13 Cr	6, 6X or 410
S41008	13 Cr	410S
S41026	13 Cr - ½ Mo	F6b
S41040	12½ Cr - Cb	XM-30
S41045	12½ Cr - Cb	---
S41050	11½ Cr - 1 Ni	E4
S41400	12½ Cr - 2 Ni - Si	414
S41500	13 Cr - 4½ Ni - Mo	F6NM
S41600	13 Cr	6F(S), 416 w/S or No. 5F
S41623	13 Cr	6F(Se) or 416 w/Se
S42900	15 Cr	429
S43000	17 Cr	430
S43035	17 Cr - Ti	XM-8 or 439
S43036	18 Cr - Ti - Cb	430 Ti
S43100	16 Cr - 2 Ni	431
S44300	21 Cr - 1 Cu	443
S44400	18 Cr - 2 Mo	444 or 18-2
S44401	18 Cr - 2 Mo - N	---
S44600	27 Cr	446
S44626	27 Cr - 1 Mo - Ti	XM-33
S44627	27 Cr - 1 Mo	XM-27 Cb or E-Brite
S44635	25 Cr - 4 Ni - 4 Mo - Ti	25-4-4
S44660	26 Cr - 3 Ni - 3 Mo	SC-1 or 26-3-3
S44700	29 Cr - 4 Mo	447 or 29-4
S44735	29 Cr - 4 Mo - Ti	29-4C
S44800	29 Cr - 4 Mo - 2 Ni	448 or 29-4-2
S45000	15 Cr - 6 Ni - Cu - Mo	Custom 450 or XM-25
S45500	12 Cr - 8 Ni - Cu - Ti	Custom 455 or XM-16
S45503	11 Cr - 8 Ni - Cu - Ti	---
S46800	19 Cr - Ti - Cb - N	---
S50100	5 Cr - ½ Mo	5 or 501
S50300	7 Cr - ½Mo	(formerly K61595)
S50400	9 Cr - 1 Mo	(formerly K81590)
S50460	9 Cr - 1 Mo - V	Grade 91
S63198	19 Cr - 9 Ni - Mo - W	19-9DL
S66220	26 Ni - 14 Cr - Mo - Ti	Discalloy
S66286	25 Ni - 15 Cr - 2 Ti	A-286
S66545	26 Ni - 14 Cr - Mo - Ti	W545

Chapter 6

CODE SPECIFICATIONS BY NOMINAL COMPOSITION & BY COMMON NAME

ASME General Requirements Specifications

- Carbon Steels
- Clad Steels
- Cast Irons
- Low Alloy Steels

  C - Mo steels
  ½ Cr - 1¾ Cr steels
  1¾ Cr - 3 Cr steels
  5 Cr - 9 Cr steels
  Mn, Mn - Mo, and Si steels
  Nickel steels

- High Alloy Steels

  By increasing chromium content
  Ni - Cr steels

- Aluminum Alloys (by increasing UNS No.)
- Copper Alloys (by increasing UNS No.)
- Nickel Alloys (by increasing UNS No.)
- Special Alloys (by increasing UNS No.)
- Common Names & Trade Names

Abbreviation Note: ASME Material Specifications that are enclosed in brackets and are followed by the letters CC indicate a Code Case material, e.g. (SA-387 CC).

UNS Numbers with round brackets, e.g. (R53400), infers that the particular alloy is not listed in the Metals & Alloys in the Unified Numbering System, but rather the nominal composition of this alloy most closely resembles the UNS Number within the bracket, and is given only for convenience.

ASME GENERAL REQUIREMENTS SPECIFICATIONS

PRODUCT REQUIREMENTS	
Ferrous	
Rolled products	SA-6
Plates	SA-20
Bars	SA-29
Tubes	SA-450
Plate, sheet, strip	SA-480
Wrought steel products	SA-484
Pipe	SA-530
Castings	SA-703
Castings, general industrial use	SA-781
Forgings	SA-788
Iron castings, general industrial use	SA-834
Non Ferrous	
Plate, strip and bar (Cu)	SB-248
Rod, bar and shapes (Cu)	SB-249
Tubes (Cu)	SB-251
Ni and Ni alloy seamless and welded tube	SB-751
Ni and Ni alloy seamless and welded pipe	SB-775
Castings (Cu)	SB-824
Ni and Ni alloy seamless pipe and tube	SB-829
METHODS REQUIREMENTS	
Ferrous	
Mag. particle exam. - forgings	SA-275
Mechanical testing	SA-370
UT exam. - forgings	SA-388
UT (straight beam) exam - plates	SA-435
UT (angle beam) exam. - plates	SA-577
UT (straight beam) exam. - plates	SA-578
UT exam. - castings	SA-609
UT exam. - SS forgings	SA-745
Tension testing - steel plates	SA-770
Chemical analysis of steel products	SA-751
Non Ferrous	
UT inspection - Al plate	SB-548
SPECIAL NUCLEAR REQUIREMENTS	
(All deleted via 86A addenda)	

CARBON STEELS BY NOMINAL COMPOSITION					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
C Steel	SA-53	Type S Grade A	K02504	---	Pipe, welded and seamless
C Steel	SA-53	Type E Grade A	K02504	---	Pipe, welded and seamless
C Steel	SA-53	Type F	---	---	Pipe, welded and seamless
C Steel	SA-134	---	---	---	Pipe, welded
C Steel	SA-135	A	---	---	Pipe, welded
C Steel	SA-178	A	K01200	---	Tubes, welded
C Steel	SA-178	C	K03503	---	Tubes, welded
C Steel	SA-179	---	K01200	---	Tubes, seamless
C Steel	SA-194	1	K01503	---	Nuts
C Steel	SA-194	2, 2H, 2HM	K04002	---	Nuts
C Steel	SA-214	---	K01807	---	Tubes, welded
C Steel	SA-283	A, B, C	K02401	---	Plates
C Steel	SA-283	D	K02702	---	Plates
C Steel	SA-285	A	K01700	---	Plates
C Steel	SA-285	B	K02200	---	Plates
C Steel	SA-285	C	K02801	---	Plates
C Steel	SA-307	A, B and C	---	---	Threaded fasteners
C Steel	SA-311	1018, Cl. A	G10180	1018 Steel	Bars, stress-relieved, cold drawn
C Steel	SA-311	1035, Cl. A	G10350	1035 Steel	Bars, stress-relieved, cold drawn
C Steel	SA-311	1045, Cl. A & B	G10450	1045 Steel	Bars, stress-relieved, cold drawn
C Steel	SA-311	1050, Cl. A & B	G10500	1050 Steel	Bars, stress-relieved, cold drawn
C Steel	SA-325	Type 1	K02706	---	Bolting
C Steel	SA-354	BC and BD	K04100	---	Bolting
C Steel	SA-414	A	K01501	---	Sheet
C Steel	SA-414	B	K02201	---	Sheet
C Steel	SA-414	C	K02503	---	Sheet
C Steel	SA-449	---	K04200	---	Bolts and studs
C Steel	SA-556	A2	K01807	---	Tubes, seamless
C Steel	SA-557	A2	K01807	---	Tubes, welded
C Steel	SA-557	B2	K03007	---	Tubes, welded
C Steel	SA-563	O, A, B, C	K05802	---	Nuts
C Steel	SA-563	D	K05801	---	Nuts
C Steel	SA-563	DH	K03800	---	Nuts
C Steel	SA-587	---	K11500	---	Pipe, welded
C Steel	SA-620	---	K00040	---	Sheet, CR for drawing

CARBON STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
C Steel	SA-671	CA55	K02801	---	Pipe, welded
C Steel	SA-672	A45	K01700	---	Pipe, welded
C Steel	SA-672	A50	K02200	---	Pipe, welded
C Steel	SA-672	A55	K02801	---	Pipe, welded
C Steel	SA-675	45 thru 90	---	---	Bars and shapes
C - Si Steel	SA-105	---	K03504	---	Flanges, fittings, etc.
C - Si Steel	SA-106	A	K02501	---	Pipe, seamless
C - Si Steel	SA-106	B	K03006	---	Pipe, seamless
C - Si Steel	SA-106	C	K03501	---	Pipe, seamless
C - Si Steel	SA-181	60 and 70	K03502	---	Flanges, fittings, etc.
C - Si Steel	SA-192	---	K01201	---	Tubes, seamless
C - Si Steel	SA-210	A-1	K02707	---	Tubes, seamless
C - Si Steel	SA-216	WCA	J02502	---	Castings
C - Si Steel	SA-216	WCB	J03002	---	Castings
C - Si Steel	SA-226	---	K01201	---	Tubes, welded
C - Si Steel	SA-234	WCB	K03006	---	Fittings
C - Si Steel	SA-234	WPC	K03501	---	Fittings
C - Si Steel	SA-266	1 and 2	K03506	---	Forgings
C - Si Steel	SA-266	3	K05001	---	Forgings
C - Si Steel	SA-352	LCA	J02504	---	Castings
C - Si Steel	SA-352	LCB	J03003	---	Castings
C - Si Steel	SA-369	FPA	K02501	---	Pipe, forged/bored
C - Si Steel	SA-372	A	K03002	---	Forgings
C - Si Steel	SA-508	1	K13502	---	Forgings
C - Si Steel	SA-515	60	K02401	---	Plates
C - Si Steel	SA-515	65	K02800	---	Plates
C - Si Steel	SA-515	70	K03101	---	Plates
C - Si Steel	SA-516	55	K01800	---	Plates
C - Si Steel	SA-541	1	K03506	---	Forgings
C - Si Steel	SA-556	B2	K02707	---	Tubes, seamless
C - Si Steel	SA-557	C2	K03505	---	Tubes, welded
C - Si Steel	SA-649	2	K05001	---	Forged rolls
C - Si Steel	SA-649	4	---	---	Forged rolls
C - Si Steel	SA-660	WCA	J02504	---	Pipe, centrifugal cast
C - Si Steel	SA-660	WCB	J03003	---	Pipe, centrifugal cast

CARBON STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
C - Si Steel	SA-671	CB60	K02401	---	Pipe, welded
C - Si Steel	SA-671	CB65	K02800	---	Pipe, welded
C - Si Steel	SA-671	CB70	K03101	---	Pipe, welded
C - Si Steel	SA-672	B55	K02001	---	Pipe, welded
C - Si Steel	SA-672	B60	K02401	---	Pipe, welded
C - Si Steel	SA-672	B65	K02800	---	Pipe, welded
C - Si Steel	SA-672	B70	K03101	---	Pipe, welded
C - Si Steel	SA-672	C55	K01800	---	Wire
C - Si Steel	SA-905	1 and 2	---	---	Wire, cold rolled
C - Mn Steel	SA-53	Type S, Grade B	K03005	---	Pipe, welded
C - Mn Steel	SA-53	Type E, Grade B	K03005	---	Pipe, seamless and welded
C - Mn Steel	SA-135	B	---	---	Pipe, welded
C - Mn Steel	SA-311	1117, Cl. A	G11170	1117 steel	Bars, stress-relieved, cold drawn
C - Mn Steel	SA-311	1137, Cl. A	G11370	1137 steel	Bars, stress-relieved, cold drawn
C - Mn Steel	SA-311	1141, Cl. A & B	G11410	1141 steel	Bars, stress-relieved, cold drawn
C - Mn Steel	SA-311	1144, Cl. A & B	G11440	1144 steel	Bars, stress-relieved, cold drawn
C - Mn Steel	SA-311	1541, Cl. A & B	G15410	1541 steel	Bars, stress-relieved, cold drawn
C - Mn Steel	SA-333	1	K03008	---	Pipe, seamless and welded
C - Mn Steel	SA-334	1	K03008	---	Tubes, welded
C - Mn Steel	SA-414	D	K02505	---	Sheet
C - Mn Steel	SA-414	E	K02704	---	Sheet
C - Mn Steel	SA-414	F	K03102	---	Sheet
C - Mn Steel	SA-414	G	K03103	---	Sheet
C - Mn Steel	SA-455	---	K03300	---	Plates
C - Mn Steel	SA-765	I	K03046	---	Forgings
C - Mn - Si Steel	SA-36	---	K02600	---	Structural
C - Mn - Si Steel	SA-178	D	---	---	Tubes, welded
C - Mn - Si Steel	SA-210	C	K03501	---	Tubes, seamless
C - Mn - Si Steel	SA-216	WCC	J02503	---	Castings
C - Mn - Si Steel	SA-266	Grade 4	K03017	---	Forgings
C - Mn - Si Steel	SA-299	---	K02803	---	Plates
C - Mn - Si Steel	SA-333	6	K03006	---	Pipe, seamless and welded
C - Mn - Si Steel	SA-334	6	K03006	---	Tubes, welded
C - Mn - Si Steel	SA-350	LF1	K03009	---	Forgings
C - Mn - Si Steel	SA-350	LF2	K03011	---	Forgings

CARBON STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
C - Mn - Si Steel	SA-352	LCC	J02505	---	Castings
C - Mn - Si Steel	SA-369	FPB	K03006	---	Pipe, forged/bored
C - Mn - Si Steel	SA-372	Grade B	K04001	---	Forgings
C - Mn - Si Steel	SA-372	Grade C	K04801	---	Forgings
C - Mn - Si Steel	SA-420	WPL6	---	---	Fittings, welded
C - Mn - Si Steel	SA-508	Grade 1A	K13502	---	Forgings
C - Mn - Si Steel	SA-516	60	K02100	---	Plates
C - Mn - Si Steel	SA-516	65	K02403	---	Plates
C - Mn - Si Steel	SA-516	70	K02700	---	Plates
C - Mn - Si Steel	SA-524	I and II	K02104	---	Pipe, seamless
C - Mn - Si Steel	SA-537	1, 2 and 3	K12437	---	Plates
C - Mn - Si Steel	SA-541	1A	---	---	Forgings
C - Mn - Si Steel	SA-556	C2	K03006	---	Tubes, seamless
C - Mn - Si Steel	SA-612	---	K02900	---	Plates
C - Mn - Si Steel	SA-660	WCC	J02505	---	Pipe, centrifugal cast
C - Mn - Si Steel	SA-662	A	K01701	---	Plates
C - Mn - Si Steel	SA-662	B	K02203	---	Plates
C - Mn - Si Steel	SA-662	C	K02007	---	Plates
C - Mn - Si Steel	SA-671	CC60	K02100	---	Pipe, welded
C - Mn - Si Steel	SA-671	CC65	K02403	---	Pipe, welded
C - Mn - Si Steel	SA-671	CC70	K02700	---	Pipe, welded
C - Mn - Si Steel	SA-671	CD70	K12437	---	Pipe, welded
C - Mn - Si Steel	SA-671	CD80	K12437	---	Pipe, welded
C - Mn - Si Steel	SA-671	CE55	K02202	---	Pipe, welded
C - Mn - Si Steel	SA-671	CE60	K02402	---	Pipe, welded
C - Mn - Si Steel	SA-671	CK75	K02803	---	Pipe, welded
C - Mn - Si Steel	SA-672	C60	K02100	---	Pipe, welded
C - Mn - Si Steel	SA-672	C65	K02403	---	Pipe, welded
C - Mn - Si Steel	SA-672	C70	K02700	---	Pipe, welded
C - Mn - Si Steel	SA-672	D70	K12437	---	Pipe, welded
C - Mn - Si Steel	SA-672	D80	K12437	---	Pipe, welded
C - Mn - Si Steel	SA-672	E55	K02202	---	Pipe, welded
C - Mn - Si Steel	SA-672	E60	K02402	---	Pipe, welded
C - Mn - Si Steel	SA-672	N75	K02803	---	Pipe, welded
C - Mn - Si Steel	SA-691	CMSH-70	K12437	---	Pipe, welded

CARBON STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
C - Mn - Si Steel	SA-691	CMS-75	K02803	---	Pipe, welded
C - Mn - Si Steel	SA-691	CMSH-80	K12437	---	Pipe, welded
C - Mn - Si Steel	SA-695	Type B Grade 35	K03504	---	Bars
C - Mn - Si Steel	SA-695	Type B Grade 40	K03504	---	Bars
C - Mn - Si Steel	SA-696	B and C	K03200	---	Bars
C - Mn - Si Steel	SA-724	A	K11831	---	Plates
C - Mn - Si Steel	SA-724	B	K12031	---	Plates
C - Mn - Si Steel	SA-724	C	K12037	---	Plates
C - Mn - Si Steel	SA-727	---	K02506	---	Forgings
C - Mn - Si Steel	SA-738	A	K12447	---	Plates
C - Mn - Si Steel	SA-738	B	K12001	---	Plates
C - Mn - Si Steel	SA-738	C	---	---	Plates
C - Mn - Si Steel	SA-765	II	K03047	---	Forgings
C - Mn - Si Steel	SA-765	IV	---	---	Forgings
Low C - Boron Steel	SA-320	L1	---	---	Bolting
C - Mn - Si -V	SA-541	Grade 1C	K11800	---	Forgings
C - Mn - Ti	SA-562	---	K11224	---	Plates
C - Mn - Si (Cb)	SA-737	B	K12001	---	Plates
C - Mn - Si (V)	SA-737	C	K12202	---	Plates
C - Mn - Cb	SA-812	65	K12001	---	Sheet
C - Mn - Si - Cb	SA-812	80	K12001	---	Sheet
C - Mn - Si (+X)	SA-333	10	---	---	Plate, seamless and welded
C - Mn - Si (+X)	SA-841	---	---	TMCP steel	Plate
C - Si - Ti	SA-836	---	---	---	Forgings, fittings, etc.
C - Mn - Si - V - N	SA-350	LF6, Classes 1 and 2	---	---	Forgings
Low C - Mn - Ni	SA-487	16A	---	---	Castings

CLAD STEELS BY NOMINAL COMPOSITION					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
Cr - clad steel	SA-263	---	---	---	Plate, sheet, strip
Cr - Ni clad steel	SA-264	---	---	---	Plate, sheet, strip
Ni - clad steel	SA-265	---	---	---	Plate
C - Mn - Si/Ni - Cr - Mo	SA-649	Class 5	---	---	Forged correlated rolls

CAST IRONS BY NOMINAL COMPOSITION					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
---	SA-47	32510	F22200	Malleable iron	Castings
---	SA-278	20	F11401	Gray iron	Castings
---	SA-278	25	F11701	Gray iron	Castings
---	SA-278	30	F12101	Gray iron	Castings
---	SA-278	35	F12401	Gray iron	Castings
---	SA-278	40	F12803	Gray iron	Castings
---	SA-278	45	F13102	Gray iron	Castings
---	SA-278	50	F13502	Gray iron	Castings
---	SA-278	55	F13802	Gray iron	Castings
---	SA-278	60	F14102	Gray iron	Castings
3 C - 3 Si	SA-395	---	F32800	Modular iron	Castings
3 C - 3 Si	SA-476	---	F34100	Ductile or nodular iron	Castings
---	SA-667	---	---	White/gray cast iron	Castings
---	SA-748	20 - 35	---	Dual metal or white/gray cast iron	Castings

LOW ALLOY STEELS BY NOMINAL COMPOSITION (C - Mo)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
C - ¼ Mo	SA-194	4	K14510	---	Nuts
C - ¼ Mo	SA-320	L7A	G40370	4037	Bolting
C - ¼ Mo	SA-320	L71	G40370	4037	Bolting
C - ¼ Mo	SA-574	4037	G40370	---	Screws, socket head
C - ¼ Mo	SA-574	4042	G40420	---	Screws, socket head
C - ½ Mo	SA-182	F1	K12822	---	Flanges, fittings, etc.
C - ½ Mo	SA-204	A	K11820	---	Plates
C - ½ Mo	SA-204	B	K12020	---	Plates
C - ½ Mo	SA-204	C	K12320	---	Plates
C - ½ Mo	SA-209	T1	K11522	---	Tubes, seamless
C - ½ Mo	SA-209	T1a	K12023	---	Tubes, seamless
C - ½ Mo	SA-209	T1b	K11422	---	Tubes, seamless
C - ½ Mo	SA-217	WC1	J12524	---	Castings
C - ½ Mo	SA-234	WP1	K12821	---	Fittings
C - ½ Mo	SA-250	T1	K11522	---	Tubes, welded
C - ½ Mo	SA-250	T1a	K12023	---	Tubes, welded

LOW ALLOY STEELS BY NOMINAL COMPOSITION (C - Mo) (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
C - ½ Mo	SA-250	T1b	K11422	---	Tubes, welded
C - ½ Mo	SA-335	P1	K11522	---	Pipe, seamless
C - ½ Mo	SA-336	F1	K12520	---	Forgings
C - ½ Mo	SA-352	LC1	J12522	---	Castings
C - ½ Mo	SA-369	FP1	K11522	---	Pipe, forged/bored
C - ½ Mo	SA-426	CP1	J12521	---	Pipe, centrifugal cast
C - ½ Mo	SA-517	J	K11625	---	Plates
C - ½ Mo	SA-671	CJ109	---	---	Pipe, welded
C - ½ Mo	SA-672	L65	K11820	---	Pipe, welded
C - ½ Mo	SA-672	L70	K12020	---	Pipe, welded
C - ½ Mo	SA-672	L75	K12320	---	Pipe, welded
C - ½ Mo	SA-691	CM65	K11820	---	Pipe, welded
C - ½ Mo	SA-691	CM70	K12020	---	Pipe, welded
C - ½ Mo	SA-691	CM75	K12320	---	Pipe, welded
C - ½ Mo - Si	SA-426	CP15	J11522	---	Pipe, centrifugal cast

LOW ALLOY STEELS BY NOMINAL COMPOSITION (½ Cr - 1¾ Cr)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
½ Cr - ⅕ Mo - V	SA-517	B	K11630	---	Plates
½ Cr - ⅕ Mo - V	SA-671	CJ102	---	---	Pipe, welded
½ Cr - ¼ Mo - Si	SA-517	A	K11856	---	Plates
½ Cr - ¼ Mo - Si	SA-592	A	K11856	---	Fittings
½ Cr - ¼ Mo - Si	SA-671	CJ101	---	---	Pipe, welded
½ Cr - ½ Mo	SA-182	F2	K12122	---	Flanges, fittings, etc.
½ Cr - ½ Mo	SA-213	T2	K11547	---	Tubes, seamless
½ Cr - ½ Mo	SA-250	T2	---	---	Tubes, welded
½ Cr - ½ Mo	SA-335	P2	K11547	---	Pipe, seamless
½ Cr - ½ Mo	SA-369	FP2	K11547	---	Pipe, forged/bored
½ Cr - ½ Mo	SA-387	2	K12143	---	Plates
½ Cr - ½ Mo	SA-426	CP2	J11547	---	Pipe, centrifugal cast
½ Cr - ½ Mo	SA-691	½ CR	K12143	---	Pipe, welded
½ Cr - ½ Ni - ¼ Mo	SA-320	L7C	G87400	8740	Bolting

LOW ALLOY STEELS BY NOMINAL COMPOSITION (½ Cr - 1¾ Cr) (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
½ Cr - ½ Ni - ¼ Mo	SA-320	L73	G87400	8740	Bolting
½ Cr - 1¼ Mn - Si	SA-202	A	K11742	---	Plates
½ Cr - 1¼ Mn - Si	SA-202	B	K12542	---	Plates
¾ Cr	SA-574	5137M/51B37M	---	---	Screws, socket head
¾ Cr - ½ Ni - Cu	SA-423	1	K11535	---	Tubes, seamless and welded
¾ Cr - ¾ Ni - Cu - Al	SA-333	4	K11267	---	Pipe, seamless and welded
1 Cr - ⅕ Mo	SA-193	B7 and B7M	G41400, G41420, G41450	4140, 4142 and 4145	Bolting
1 Cr - ⅕ Mo	SA-194	7	G41400, G41420, G41450	4140, 4142 and 4145	Nuts
1 Cr - ⅕ Mo	SA-194	7M	G41400, G41420, G41450	4140, 4142 and 4145	Nuts
1 Cr - ⅕ Mo	SA-320	L7	G41400, G41420, G41450	4140, 4142 and 4145	Bolting
1 Cr - ⅕ Mo	SA-320	L7M	G41400, G41420, G41450	4140, 4142 and 4145	Bolting
1 Cr - ⅕ Mo	SA-320	L7B	G41370	4137	Bolting
1 Cr - ⅕ Mo	SA-320	L70	---	4140, 4142 and 4145	Bolting
1 Cr - ⅕ Mo	SA-320	L72	G41370	4137	Bolting
1 Cr - ⅕ Mo	SA-372	Grade E	K13047	---	Forgings
1 Cr - ⅕ Mo	SA-372	Grade F	K13548	---	Forgings
1 Cr - ⅕ Mo	SA-372	Grade G	K13049	---	Forgings
1 Cr - ⅕ Mo	SA-372	Grade H	K13547	---	Forgings
1 Cr - ⅕ Mo	SA-372	Grade J	K13548	---	Forgings
1 Cr - ⅕ Mo	SA-372	Grade J, Cl. 110	G41370	---	Forgings
1 Cr - ⅕ Mo	SA-487	9 (A - E)	J13345	---	Castings
1 Cr - ⅕ Mo	SA-574	4137	G41370	---	Screws, socket head
1 Cr - ⅕ Mo	SA-574	4140	G41400	---	Screws, socket head
1 Cr - ⅕ Mo	SA-574	4142	G41420	---	Screws, socket head

LOW ALLOY STEELS BY NOMINAL COMPOSITION (½ Cr - 1¾ Cr) (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
1 Cr - ⅕ Mo	SA-574	4145	G41450	---	Screws, socket head
1 Cr - ⅕ Mo - Ti	SA-671	CJ104	---	---	Pipe, welded
1 Cr - ¼ Mo	SA-649	3	K13047	---	Forged rolls
Cr - Ni steel (low alloy steel)	SA-325	Type 3-A	K13643	---	Bolting
Cr - Ni steel (low alloy steel)	SA-325	Type 3-B	K14358	---	Bolting
Cr - Ni steel (low alloy steel)	SA-325	Type 3-C	K12033	---	Bolting
Cr - Ni steel (low alloy steel)	SA-325	Type 3-D	K12059	---	Bolting
Cr - Ni steel (low alloy steel)	SA-325	Type 3-E	K12254	---	Bolting
Cr - Ni steel (low alloy steel)	SA-325	Type 3-F	K12238	---	Bolting
Cr - Ni steel (low alloy steel)	SA-563	C3-A	K13643	---	Nuts
Cr - Ni steel (low alloy steel)	SA-563	C3-B	K14358	---	Nuts
Cr - Ni steel (low alloy steel)	SA-563	C3-C	K12033	---	Nuts
Cr - Ni steel (low alloy steel)	SA-563	C3-D	K12059	---	Nuts
Cr - Ni steel (low alloy steel)	SA-563	C3-E	K12254	---	Nuts
Cr - Ni steel (low alloy steel)	SA-563	C3-F	K12238	---	Nuts
Cr - Ni steel (low alloy steel)	SA-563	C3-N	---	---	Nuts
Cr - Ni steel (low alloy steel)	SA-563	DH3	K13650	---	Nuts
Cr - V steel	SA-232	---	---	---	Wire
1 Cr - ½ Mo	SA-182	F12 Class 2	K11564	---	Flanges, fittings, etc.
1 Cr - ½ Mo	SA-182	F12 Class 1	K11562	---	Flanges, fittings, etc.
1 Cr - ½ Mo	SA-213	T12	K11562	---	Tubes, seamless
1 Cr - ½ Mo	SA-234	WP12	K12062	---	Fittings
1 Cr - ½ Mo	SA-250	T12	---	---	Tubes, welded
1 Cr - ½ Mo	SA-335	P12	K11562	---	Pipe, seamless
1 Cr - ½ Mo	SA-336	F12	K11564	---	Forgings
1 Cr - ½ Mo	SA-369	FP12	K11562	---	Pipe, forged/bored
1 Cr - ½ Mo	SA-387	12	K11757	---	Plates
1 Cr - ½ Mo	SA-426	CP12	J11562	---	Pipe, centrifugal cast
1 Cr - ½ Mo	SA-649	1A	K14247	---	Forged rolls
1 Cr - ½ Mo	SA-691	1CR	K11757	---	Pipe, welded
1 Cr - ½ Mo - V	SA-193	B16	K14072	---	Bolting
1 Cr - ½ Mo - V	SA-194	16	K14072	---	Nuts
1 Cr - ½ Mo - V	SA-437	B4D	K14072	---	Bolting
1 Cr - ½ Mo - V	SA-540	B21	K14073	---	Bolting

LOW ALLOY STEELS BY NOMINAL COMPOSITION (½ Cr - 1¾ Cr) (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
1 Cr - V	SA-213	T17	K12047	---	Tubes, seamless
1 Cr - 1 Mn - ¼ Mo	SA-540	B22	---	4142H	Bolting
1¼ Cr - ½ Mo	SA-217	WC6	J12072	---	Castings
1¼ Cr - ½ Mo	SA-217	WC11	J11872	---	Castings
1¼ Cr - ½ Mo	SA-426	CP11	J12072	---	Pipe, centrifugal cast
1¼ Cr - ½ Mo	SA-739	B11	K11797	---	Bars
1¼ Cr - ½ Mo - Si	SA-182	F11 Class 2	K11572	---	Flanges, fittings, etc.
1¼ Cr - ½ Mo - Si	SA-182	F11 Class 3	K11572	---	Flanges, fittings, etc.
1¼ Cr - ½ Mo - Si	SA-182	F11 Class 1	K11597	---	Flanges, fittings, etc.
1¼ Cr - ½ Mo - Si	SA-199	T11	K11597	---	Tubes, seamless
1¼ Cr - ½ Mo - Si	SA-213	T11	K11597	---	Tubes, seamless
1¼ Cr - ½ Mo - Si	SA-234	WP11	---	---	Fittings
1¼ Cr - ½ Mo - Si	SA-250	T11	---	---	Tubes, welded
1¼ Cr - ½ Mo - Si	SA-335	P11	K11597	---	Pipe, seamless
1¼ Cr - ½ Mo - Si	SA-336	F11, Class 2	K11572	---	Forgings
1¼ Cr - ½ Mo - Si	SA-336	F11, Class 3	K11572	---	Forgings
1¼ Cr - ½ Mo - Si	SA-336	F11, Class 1	---	---	Forgings
1¼ Cr - ½ Mo - Si	SA-369	FP11	K11597	---	Pipe, forged/bored
1¼ Cr - ½ Mo - Si	SA-387	11	K11789	---	Plates
1¼ Cr - ½ Mo - Si	SA-541	11, Class 4	K11572	---	Forgings
1¼ Cr - ½ Mo - Si	SA-691	1¼ CR	K11789	---	Pipe,welded
1¾ Cr - ½ Mo - Cu	SA-592	E	K11695	---	Forged fittings

LOW ALLOY STEELS BY NOMINAL COMPOSITION (1¾ Cr - 3 Cr)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
1¾ Cr - ½ Mo - Ti	SA-517	E	K21604	---	Plates
1¾ Cr - ½ Mo - Ti	SA-671	CJ105	---	---	Pipe, welded
2¼ Cr - 1 Mo	SA-182	F22, Classes 1 & 3	K21590	---	Flanges, fittings, etc.
2¼ Cr - 1 Mo	SA-199	T22	K21590	---	Tubes, seamless
2¼ Cr - 1 Mo	SA-213	T22	K21590	---	Tubes, seamless
2¼ Cr - 1 Mo	SA-217	WC9	J21890	---	Castings
2¼ Cr - 1 Mo	SA-234	WP22	K21590	---	Fittings
2¼ Cr - 1 Mo	SA-250	T22	---	---	Tubes, welded

LOW ALLOY STEELS BY NOMINAL COMPOSITION (1¾ Cr - 3 Cr) (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
2¼ Cr - 1 Mo	SA-335	P22	K21590	---	Pipe, seamless
2¼ Cr - 1 Mo	SA-336	F22, Classes 1 & 3	K21590	---	Forgings
2¼ Cr - 1 Mo	SA-369	FP22	K21590	---	Pipe, forged/bored
2¼ Cr - 1 Mo	SA-387	22 and 22L	K21590	---	Plates
2¼ Cr - 1 Mo	SA-426	CP22	J21890	---	Pipe, centrifugal cast
2¼ Cr - 1 Mo	SA-487	8 (A - C)	J22091	---	Castings
2¼ Cr - 1 Mo	SA-508	22 Class 3	K21590	---	Forgings
2¼ Cr - 1 Mo	SA-541	22 Classes 3, 4, 5	K21390	---	Forgings
2¼ Cr - 1 Mo	SA-542	A and B	K21590	---	Plates
2¼ Cr - 1 Mo	SA-691	2¼ CR	K21590	---	Pipe, welded
2¼ Cr - 1 Mo	SA-739	B22	K21590	---	Bars
2¼ Cr - 1 Mo - V - Cb	SA-336	F3VCb	K31835	---	Forgings
2¼ Cr - 1 Mo - V - Cb	SA-508	3VCb	K31835	---	Forgings
2¼ Cr - 1 Mo - V - Cb	SA-541	3VCb	K31835	---	Forgings
2¼ Cr - 1 Mo - ¼ V	SA-182	F22V	K31835	---	Flanges, fittings, etc.
2¼ Cr - 1 Mo - ¼ V	SA-336	F22V	---	---	Forgings
2¼ Cr - 1 Mo - ¼ V	SA-541	22V	---	---	Forgings
2¼ Cr - 1 Mo - ¼ V	SA-542	Type D	---	22V	Plates
2¼ Cr - 1 Mo - ¼ V	SA-832	22V	---	---	Plates
2¼ Cr - 1.6 W - V - Cb	(SA-213 CC)			---	Tubes, seamless
2½ Cr - ½ Mo - ¾ Si	SA-199	T4	K31509	---	Tubes, seamless
3 Cr - 1 Mo	SA-182	F21	K31545	---	Flanges, fittings, etc.
3 Cr - 1 Mo	SA-199	T21	K31545	---	Tubes, seamless
3 Cr - 1 Mo	SA-213	T21	K31545	---	Tubes, seamless
3 Cr - 1 Mo	SA-335	P21	K31545	---	Pipe, seamless
3 Cr - 1 Mo	SA-336	F21 Classes 1 & 3	K31545	---	Forgings
3 Cr - 1 Mo	SA-369	FP21	K31545	---	Pipe, forged/bored
3 Cr - 1 Mo	SA-387	21 and 21L	K31545	---	Plates
3 Cr - 1 Mo	SA-426	CP21	J31545	---	Pipe, centrifugal cast
3 Cr - 1 Mo	SA-691	3CR	K31545	---	Pipe, welded
3 Cr - 1 Mo - ¼ V	SA-542	C	K31830	---	Plates
3 Cr - 1 Mo - ¼ V	SA-182	F3V	K31830	---	Flanges, fittings, etc.
3 Cr - 1 Mo - ¼ V	SA-336	F3V	---	---	Forgings
3 Cr - 1 Mo - ¼ V	(SA-387 CC)	3V	---	---	Plates
3 Cr - 1 Mo - ¼ V	SA-508	3V	K31830	---	Forgings

LOW ALLOY STEELS BY NOMINAL COMPOSITION (1¾ Cr - 3 Cr) (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
3 Cr - 1 Mo - ¼ V	SA-541	3V	K31830	---	Forgings
3 Cr - 1 Mo - ¼ V	(SA-542 CC)	---	---	---	---
3 Cr - 1 Mo - ¼ V	SA-543	Type E, Classes 1-4a	---	---	Plates
3 Cr - 1 Mo - ¼ V	SA-832	21V	---	---	Plates
3 Cr - 1 Mo - ¼ V	SA-832	23V	---	---	Plates

LOW ALLOY STEEL BY NOMINAL COMPOSITION (5 Cr - 9 Cr)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
5 Cr - ½ Mo	SA-182	F5	K41545	---	Flanges, fittings, etc.
5 Cr - ½ Mo	SA-182	F5a	K42544	---	Flanges, fittings, etc.
5 Cr - ½ Mo	SA-193	B5	S50100	AISI Type 501	Bolting
5 Cr - ½ Mo	SA-194	3	S50100	---	Nuts
5 Cr - ½ Mo	SA-199	T5	K41545	---	Tubes, seamless
5 Cr - ½ Mo	SA-213	T5	K41545	---	Tubes, seamless
5 Cr - ½ Mo	SA-217	C5	J42045	---	Castings
5 Cr - ½ Mo	SA- 234	WP5	K41545	---	Fittings
5 Cr - ½ Mo	SA-335	P5	K41545	---	Pipe, seamless
5 Cr - ½ Mo	SA-336	F5	K41545	---	Forgings
5 Cr - ½ Mo	SA-336	F5A	K42544	---	Forgings
5 Cr - ½ Mo	SA-369	FP5	K41545	---	Pipe, forged/bored
5 Cr - ½ Mo	SA-387	5	K41545	---	Plates
5 Cr - ½ Mo	SA-426	CP5	---	---	Pipe, centrifugal cast
5 Cr - ½ Mo	SA-691	5CR	K41545	---	Pipe, welded
5 Cr - ½ Mo - Si	SA-213	T5b	K51545	---	Tubes, seamless
5 Cr - ½ Mo - Si	SA-335	P5b	K51545	---	Pipe, seamless
5 Cr - ½ Mo - Si	SA-426	CP5b	J51545	---	Pipe, centrifugal cast
5 Cr - ½ Mo - Ti	SA-213	T5c	K41245	---	Tubes, seamless
5 Cr - ½ Mo - Ti	SA-335	P5c	K41245	---	Pipes, seamless
7 Cr - ½ Mo	SA-234	WP7	---	---	Fittings
9 Cr - 1 Mo	SA-182	F9	K90941	---	Flanges, fittings, etc.
9 Cr - 1 Mo	SA-199	T9	S50400	---	Tubes, seamless
9 Cr - 1 Mo	SA-213	T9	S50400	---	Tubes, seamless
9 Cr - 1 Mo	SA-217	C12	J82090	---	Castings

LOW ALLOY STEEL BY NOMINAL COMPOSITION (5 Cr - 9 Cr) (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
9 Cr - 1 Mo	SA-234	WP9	K90941	---	Fittings
9 Cr - 1 Mo	SA-335	P9	S50400	---	Pipe, seamless
9 Cr - 1 Mo	SA-336	F9	S50400	---	Forgings
9 Cr - 1 Mo	SA-369	FP9	K90941	---	Pipe, forged/bored
9 Cr - 1 Mo	SA-387	9	S50400	---	Plates
9 Cr - 1 Mo	SA-426	CP9	J82090	---	Pipe, centrifugal cast
9 Cr - 1 Mo	SA-691	9CR	---	---	Pipe, welded
9 Cr - 1 Mo - V	SA-182	F91	---	---	Flanges, fittings, etc.
9 Cr - 1 Mo - V	SA-199	T91	---	---	Tubes, seamless
9 Cr - 1 Mo - V	SA-213	T91	---	---	Tubes, seamless
9 Cr - 1 Mo - V	SA-234	WP91	---	---	Fittings
9 Cr - 1 Mo - V	SA-335	P91	---	---	Pipe, seamless
9 Cr - 1 Mo - V	SA-336	F91	---	---	Forgings
9 Cr - 1 Mo - V	SA-369	FP91	---	---	Pipe, forged/bored
9 Cr - 1 Mo - V	SA-387	91	S50460	---	Plates
9 Cr - 1 Mo - V	(SA-217 CC)	---	---	---	Castings
9 Cr - 1 Mo - V	(SA-426 CC)	---	---	---	Pipe, centrifugal cast
9 Cr - 2 W	(SA-213 CC)	---	---	---	Tubes, seamless
9 Cr - 2 W	(SA-335 CC)	---	---	---	Pipe, seamless

LOW ALLOY STEELS BY NOMINAL COMPOSITION (Mn, Mn - Mo, and Si Steels)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
½ Mn - ½ Mo - 1¼ Ni - B	SA-517	M	K11683	---	Plate
½ Mn - ½ Mo - 1¼ Ni - B	SA-671	CJ112	K11683	---	Pipe, welded
Mn - ¼ Mo	SA-372	D	K14508	---	Forgings
Mn - ¼ Mo - V	SA-487	2 (A-C)	J13005	---	Castings
Mn - ½ Mo	SA-302	A	K12021	---	Plates
Mn - ½ Mo	SA-302	B	K12022	---	Plates
Mn - ½ Mo	SA-533	A	K12521	---	Plates
Mn - ½ Mo	SA-671	CP65 and CP75	---	---	Pipe, welded
Mn - ½ Mo	SA-672	H75	K12021	---	Pipe, welded
Mn - ½ Mo	SA-672	H80	K12022	---	Pipe, welded
Mn - ½ Mo	SA-672	J80	K12521	---	Pipe, welded

LOW ALLOY STEELS BY NOMINAL COMPOSITION (Mn, Mn - Mo, and Si Steels) (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
Mn - ½ Mo	SA-672	J90	K12521	---	Pipe, welded
Mn - ½ Mo	SA-672	J100	K12521	---	Pipe, welded
Mn - ½ Mo - ¼ Ni	SA-533	D	K12529	---	Plates
Mn - ½ Mo - ¼ Ni	SA-672	J80	K12529	---	Pipe,welded
Mn - ½ Mo - ¼ Ni	SA-672	J90	K12529	---	Pipe, welded
Mn - ½ Mo - ¼ Ni	SA-672	J100	K12529	---	Pipe, welded
Mn - ½ Mo - ½ Ni	SA-302	C	K12039	---	Plates
Mn - ½ Mo - ½ Ni	SA-533	B	K12539	---	Plates
Mn - ½ Mo - ½ Ni	SA-672	H80	K12039	---	Pipe, welded
Mn - ½ Mo - ½ Ni	SA-672	J80	K12539	---	Pipe, welded
Mn - ½ Mo - ½ Ni	SA-672	J90	K12539	---	Pipe, welded
Mn - ½ Mo - ½ Ni	SA-672	J100	K12539	---	Pipe, welded
Mn - ½ Mo - ¾ Ni	SA-302	D	K12054	---	Plates
Mn - ½ Mo - ¾ Ni	SA-533	C	K12554	---	Plates
Mn - ½ Mo - ¾ Ni	SA-672	H80	K12054	---	Pipe, welded
Mn - ½ Mo - ¾ Ni	SA-672	J80	K12554	---	Pipe, welded
Mn - ½ Mo - ¾ Ni	SA-672	J90	K12554	---	Pipe, welded
Mn - ½ Mo - ¾ Ni	SA-672	J100	K12554	---	Pipe, welded
Mn - V	SA-487	1 (A-C)	J13002	---	Castings
Mn - Ni - Cr - Mo	SA-487	6 (A-B)	J13855	---	Castings
Mn - ½ Ni - V	SA-225	C	K12524	---	Plates
Mn - ½ Ni - V	SA-225	D	---	---	Plates
1¼ Mn - ¼ Mo - B	SA-517	C	K11511	---	Plates
1¼ Mn-¼ Mo-½ Ni-½ Cr-V-B	SA-517	H	K11646	---	Plates
1¼ Mn - ½ Mo - B	SA-517	K	---	---	Plates
1¼ Mn-½ Mo-1¼ Ni-1¼ Cr-V	SA-517	Q	---	---	Plates
1¼ Mn - ¼ Mo - Ti - Cb	SA-517	S	---	---	Plates
1¼ Mn - ½ Mo - V - B	SA-517	T	---	---	Plates
1¼ Mn - ¼ Mo - B	SA-671	CJ103	---	---	Pipe, welded
1¼ Mn-¼ Mo-½ Ni-½ Cr-V-B	SA-671	CJ108	---	---	Pipe, welded
1¼ Mn - ½ Mo - B	SA-671	CJ111	---	---	Pipe, welded
Low C - Mn - Ni	SA-487	16A	---	---	Castings
½ Si - ½ Mo	SA-335	P15	K11578	---	Pipe, seamless

LOW ALLOY STEELS BY NOMINAL COMPOSITION (Nickel Steels)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
Ni - Cr - Mo	SA-487	11 (A-B)	J12082	---	Castings
Ni - Cr - Mo	SA-487	12 (A-B)	J22000	---	Castings
Ni - Cr - Mo - V	SA-487	7A	J12084	---	Castings
Ni - Mo	SA-487	13 (A and B)	J13080	---	Castings
Ni - Mo	SA-487	14A	---	---	Castings
Ni - Cu - Cr - Mo - Cb	SA-736	A	---	---	Plates
Ni - Cu - Mo - Mn - Cb	SA-736	C	---	---	Plates
½ Ni - ½ Mo - V	SA-541	3 Classes 1 and 2	K12045	---	Forgings
½ Ni - ½ Cr - ¼ Mo	SA-574	8740	G87400	---	Screws, socket heads
½ Ni - ½ Cr - ¼ Mo - V	SA-487	4 (A-E)	J13047	---	Castings
¾ Ni - ½ Mo - ⅓ Cr - V	SA-508	2 Classes 1 and 2	K12766	---	Forgings
¾ Ni - ½ Mo - ⅓ Cr - V	SA-541	2 Classes 1 and 2	K12765	---	Forgings
¾ Ni - ½ Cr - ½ Mo - V	SA-517	F	K11576	---	Plates
¾ Ni - ½ Cr - ½ Mo - V	SA-592	F	K11576	---	Fittings
¾ Ni - ½ Cr - ½ Mo - V	SA-671	CJ106	---	---	Pipe, welded
¾ Ni - ½ Cu - Mo	SA-423	2	K11540	---	Tubes, seamless and welded
¾ Ni - 1 Cu - ¾ Cr	SA-350	LF787, Classes 2 and 3	---	---	Forgings
¾ Ni - ½ Mo - Cr - V	SA-508	3 Classes 1 and 2	K12042	---	Forgings
¾ Ni - 1 Mo - ¾ Cr	SA-217	WC5	J22000	---	Castings
1 Ni - ½ Cr - ½ Mo	SA-217	WC4	J12082	---	Castings
1¼ Ni - 1 Cr - ½ Mo	SA-517	P	K21650	---	Plates
1¼ Ni - 1 Cr - ½ Mo	SA-671	CJ113	---	---	Pipe, welded
1½ Ni ¾ Cr - ¼ Mo	SA-487	10 (A and B)	J23015	---	Castings
1½ Ni	SA-350	LF5, Classes 1 and 2	K13050	---	Forgings
1¾ Ni - ¾ Cr - ¼Mo	SA-320	L43	G43400	4340	Bolting
1¾ Ni - ¾ Cr - ¼ Mo	SA-574	4340	G43400	---	Screws, socket head
1¾ Ni - ¾ Cr - Mo	SA-372	Grade L	K24055	---	Forgings
2 Ni - ¾ Cr - ¼ Mo	SA-540	B23	---	E4340H	Bolting
2 Ni - ¾ Cr - ¼ Mo	SA-649	1B	K24040	---	Forged rolls
2 Ni - ¾ Cr - ⅓ Mo	SA-540	B24	K24064	4340 Mod.	Bolting
2 Ni -¾ Cr - ⅓ Mo - V	SA-540	B24V	K24070	4340V Mod.	Bolting
2 Ni - 1 Cu	SA-182	FR	K22035	---	Flanges, fittings, etc.
2 Ni - 1 Cu	SA-234	WPR	K22035	---	Fittings
2 Ni - 1 Cu	SA-333	9	K22035	---	Pipe, seamless and welded

LOW ALLOY STEELS BY NOMINAL COMPOSITION (Nickel Steels) (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
2 Ni - 1 Cu	SA-334	9	K22035	---	Tubes, welded
2 Ni - 1 Cu	SA-350	LF9	K22036	---	Forgings
2 Ni - 1 Cu	SA-420	WPL9	K22035	---	Fittings
2 Ni - 1½ Cr - ¼ Mo - V	SA-723	1	K23550	---	Forgings
2½ Ni	SA-203	A	K21703	---	Plates
2½ Ni	SA-203	B	K22103	---	Plates
2½ Ni	SA-333	7	K21903	---	Pipe, seamless and welded
2½ Ni	SA-334	7	K21903	---	Tubes, seamless and welded
2½ Ni	SA-352	LC2	J22500	---	Castings
2½ Ni	SA-671	CF65 and CF70	---	---	Pipe, welded
2½ Ni - 1½ Cr - Mo	SA-372	Grade K	K31820	---	Forgings
2¾ Ni - 1½ Cr - ½ Mo	SA-543	C	---	---	Plates
2¾ Ni - 1½ Cr - ½ Mo - V	SA-723	2	K34035	---	Forgings
3 Ni - 1½ Cr - ½ Mo	SA-352	LC2-1	J42215	---	Castings
3 Ni - 1¾ Cr - ½ Mo	SA-543	B	K42339	---	Plates
3 Ni - 1¾ Cr - ½ Mo	SA-372	Grade M	---	---	Forgings
3½ Ni	SA-203	D	K31718	---	Plates
3½ Ni	SA-203	E	K32018	---	Plates
3½ Ni	SA-203	F	---	---	Plates
3½ Ni	SA-333	3	K31918	---	Pipe, seamless and welded
3½ Ni	SA-334	3	K31918	---	Tubes, welded
3½ Ni	SA-350	LF3	K32025	---	Forgings
3½ Ni	SA-352	LC3	J31550	---	Castings
3½ Ni	SA-420	WPL3	---	---	Fittings
3½ Ni	SA-671	CF66 and CF71	---	---	Pipes, welded
3½ Ni	SA-765	III	K32026	---	Forgings
3½ Ni - 1¾ Cr - ½ Mo - V	SA-508	4N, Classes 1, 2 & 3	K22375	---	Forgings
3½ Ni - 1¾ Cr - ½ Mo - V	SA-508	5 Classes 1 and 2	K42365	---	Forgings
3½ Ni - 1¾ Cr - ½ Mo - V	SA-541	4N, Classes 1, 2 & 3	K42343	---	Forgings
3½ Ni - 1¾ Cr - ½ Mo - V	SA-541	5 Classes 1 and 2	K42348	---	Forgings
4 Ni - 1½ Cr - ½ Mo - V	SA-723	3	K44045	---	Forgings
4½ Ni	SA-352	LC4	J41500	---	Castings
5 Ni - ¼ Mo	SA-645	---	K41583	---	Plates
8 Ni	SA-522	II	K71340	---	Flanges, fittings, etc.
8 Ni	SA-553	II	K71340	---	Plates

LOW ALLOY STEELS BY NOMINAL COMPOSITION (Nickel Steels) (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
9 Ni	SA-333	8	K81340	---	Pipe, seamless and welded
9 Ni	SA-334	8	K81340	---	Tubes, welded
9 Ni	SA-352	LC9	---	---	Castings
9 Ni	SA-353	9 Ni	K81340	---	Plates
9 Ni	SA-420	WPL8	K81340	---	Fittings
9 Ni	SA-522	I	K81340	---	Flanges, fittings, etc.
9 Ni	SA-553	I	K81340	---	Plates
20 Ni - 8 Cr	SA-182	F10	S33100	---	Flanges, fittings, etc.
36 Ni	SA-334	11	---	---	Tubes, welded

HIGH ALLOY STEELS BY NOMINAL COMPOSITION					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
11 Cr - Ti	SA-240	Type 409	S40900	409 SS	Plate, sheet, strip
11 Cr - Ti	SA-268	TP409	S40900	409 SS	Tubes, seamless and welded
11 Cr - Ti	SA-803	TP409	S40900	409 SS	Tubes welded
11 Cr - Cb - Ti	SA-240	---	S40945	---	Plate, sheet, strip
11½ Cr - 1 Ni	SA-240	---	S41050	E-4	Plate, sheet, strip
12 Cr	SA-479	Type 403	S40300	403 SS	Bars and shapes
12 Cr - 1 Al	SA-240	Type 405	S40500	405 SS	Plate, sheet, strip
12 Cr - 1 Al	SA-268	TP405	S40500	405 SS	Tubes, seamless and welded
12 Cr- 1 Al	SA-479	Type 405	S40500	405 SS	Bars and shapes
12 Cr - Ti	SA-268	---	S40800	---	Tubes, seamless and welded
12 Cr - 1 Mo - V - W	SA-437	B4B and B4C	K91352	---	Bolting
12 Cr - 2 W	(SA-335 CC)	---	---	---	Pipe, seamless
12 Cr - 2 W	(SA-213 CC)	---	---	---	Tubes, seamless
12 Cr - 8 Ni - Cu - Ti	SA-564	Type XM-16	S45500	Custom 455 or XM-16	Bars and shapes
12 Cr - 8 Ni - Cu - Ti	SA-693	Type XM-16	S45500	Custom 455 or XM-16	Plate, sheet, strip
12 Cr - 8 Ni - Cu - Ti	SA-705	Type XM-16	S45500	Custom 455 or XM-16	Forgings
12 Cr - 8 Ni - Cu - Ti	SA-564	---	S45503	---	Bars and shapes
12 Cr - 8 Ni - Cu - Ti	SA-705	---	S45503	---	Forgings
12½ Cr - 2 Ni - Si	SA-479	Type 414	S41400	414	Bars and shapes
12½ Cr - Cb	SA-479	Type XM-30	S41040	XM-30	Bars and shapes
12½ Cr - Cb	SA-240	---	S41045	---	Plate, sheet, strip

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
13 Cr	SA-182	F6a	S41000	AISI Type 410	Flanges, fittings, etc.
13 Cr	SA-193	B6/B6X	S41000	AISI Type 410	Bolting
13 Cr	SA-194	6, 6F(S), 6F(Se)	S41000, S41600, S41623	---	Nuts
13 Cr	SA-217	CA15	J91150	CA15	Castings
13 Cr	SA-240	410	S41000	410 SS	Plate, sheet, strip
13 Cr	SA-240	410S	S41008	410S SS	Plate, sheet, strip
13 Cr	SA-268	410	S41000	410 SS	Tubes, seamless and welded
13 Cr	SA-336	F6	S41000	---	Forgings
13 Cr	SA-426	CPCA15	J91150	CPCA15	Pipe, centrifugal cast
13 Cr	SA-479	Type 410	S41000	410 SS	Bars and shapes
13 Cr	SA-487	CA-15 (A-B)	J91150	CA-15 (A-B)	Castings
13 Cr	SA-487	CA-15 (C-D)	J91171	CA-15 (C-D)	Castings
13 Cr	SA-815	WP410	S41000	410 SS	Fittings
13 Cr - Mo	SA-487	CA-15M-A	J91151	CA-15M-A	Castings
13 Cr - ½ Mo	SA-182	F6b	S41026	---	Flanges, fittings, etc.
13 Cr - 4 Ni	SA-352	CA6NM	J91540	CA6NM	Castings
13 Cr - 4 Ni	SA-487	CA6NM-Aand B	J91540	CA6NM-Aand B	Castings
13 Cr - 4½ Ni - Mo	SA-182	F6NM	S41500	---	Flanges, fittings, etc.
13 Cr - 4½ Ni - Mo	SA-240	---	S41500	---	Plate, sheet, strip
13 Cr - 4½ Ni - Mo	SA-268	---	S41500	---	Tubes, seamless and welded
13 Cr - 4½ Ni - Mo	SA-479	---	S41500	---	Bars and shapes
13 Cr - 4½ Ni - Mo	SA-731	---	S41500	---	Pipe, seamless and welded
13 Cr - 4½ Ni - Mo	SA-815	---	S41500	---	Fittings
13 Cr - 8 Ni - 2 Mo	SA-564	XM-13	S13800	13-8 Mo PH or XM-13	Bars and shapes
13 Cr - 8 Ni - 2 Mo	SA-693	XM-13	S13800	13-8 Mo PH or XM-13	Plate, sheet, strip
13 Cr - 8 Ni - 2 Mo	SA-705	XM-13	S13800	13-8 Mo PH or XM-13	Forgings
14 Cr - 6 Ni - Ti	SA-693	XM-9	S36200	Almar 362 or XM-9	Plate, sheet, strip
15 Cr	SA-182	F429	S42900	429 SS	Flanges, fittings, etc.
15 Cr	SA-240	429	S42900	429 SS	Plate, sheet, strip
15 Cr	SA-268	TP429	S42900	429 SS	Tubes, seamless and welded
15 Cr	SA-815	WP429	S42900	429 SS	Fittings
15 Cr - 4 Ni - 3 Mo	SA-564	Type 634	S35500	AM-355	Bars and shapes
15 Cr - 4 Ni - 3 Mo	SA-693	Type 634	S35500	AM-355	Plate, sheet, strip

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
15 Cr - 4 Ni - 3 Mo	SA-705	Type 634	S35500	AM-355	Forgings
15 Cr - 5 Ni - 3 Mo	SA-564	Type XM-12	S15500	15-5 PH or XM-12	Bars and shapes
15 Cr - 5 Ni - 3 Mo	SA-693	Type XM-12	S15500	15-5 PH or XM-12	Plate, sheet, strip
15 Cr - 5 Ni - 3 Mo	SA-705	Type XM-12	S15500	15-5 PH or XM-12	Forgings
15 Cr - 6 Ni - Cu - Mo	SA-564	Type XM-25	S45000	Custom 450 or XM-25	Bars and shapes
15 Cr - 6 Ni - Cu - Mo	SA-693	Type XM-25	S45000	Custom 450 or XM-25	Plate, sheet and strip
15 Cr - 6 Ni - Cu - Mo	SA-705	Type XM-25	S45000	Custom 450 or XM-25	Forgings
15 Cr - 7 Ni - 2½ Mo - 1 Al	SA-564	Type 632	S15700	15-7 Mo PH	Bars and shapes
15 Cr - 7 Ni - 2½ Mo - 1 Al	SA-693	Type 632	S15700	15-7 Mo PH	Plate, sheet, strip
15 Cr - 7 Ni - 2½ Mo - 1 Al	SA-705	Type 632	S15700	15-7 Mo PH	Forgings
15 Cr - 10 Ni - 6 Mn	SA-213	---	S21500	Esshete 1250	Tubes, seamless
15 Cr - 15 Ni - Mo - Ti	SA-213	---	S31272	---	Tubes, seamless
15 Cr - 15 Ni - Mo - Ti	SA-312	---	S31272	---	Pipe, seamless and welded
15 Cr - 35 Ni - ½ Mo	SA-351	HT-30	N08603	HT-30	Castings
16 Cr - 2 Ni	SA-479	Type 431	---	431	Bars and shapes
16 Cr - 2 Ni - 8 Mn - N	SA-240	---	S20400	Nitronic 30	Plate, sheet, strip
16 Cr - 2 Ni - 8 Mn - N	SA-666	---	S20400	Nitronic 30	Sheet, strip, plate and bar
16 Cr - 4 Ni - 3 Cu	SA-747	CB7Cu-1	J92180	CB7Cu-1	Castings
16 Cr - 4 Ni - 3 Mo	SA-693	Type 633	S35000	AM-350	Plate, sheet, strip
16 Cr - 4 Ni - 6 Mn - N	SA-240	---	S20153	201LN SS	Plate, sheet, strip
16 Cr - 8 Ni - 2 Mo	SA-376	16-8-2H	S16800	---	Pipe, seamless
16 Cr - 8 Ni - 2 Mo	SA-430	FP16-8-2H	S16800	---	Pipe, forged/bored
16 Cr - 12 Ni - 2 Mo	SA-182	F316	S31600	316 SS	Flanges, fittings, etc.
16 Cr - 12 Ni - 2 Mo	SA-193	B8M, B8MA, B8M2 and B8M3	S31600	316 SS	Bolting
16 Cr - 12 Ni - 2 Mo	SA-194	8M, 8MA	S31600	316 SS	Nuts
16 Cr - 12 Ni - 2 Mo	SA-213	TP316	S31600	316 SS	Tubes, seamless
16 Cr - 12 Ni - 2 Mo	SA-240	Type 316	S31600	316 SS	Plate, sheet, strip
16 Cr - 12 Ni - 2 Mo	SA-249	TP316	S31600	316 SS	Tubes, welded
16 Cr - 12 Ni - 2 Mo	SA-312	TP316	S31600	316 SS	Pipe, seamless and welded
16 Cr - 12 Ni - 2 Mo	SA-320	B8M and B8MA	S31600	316 SS	Bolting
16 Cr - 12 Ni - 2 Mo	SA-336	F316	S31600	316 SS	Forgings
16 Cr - 12 Ni - 2 Mo	SA-351	CF8M	J92900	CF8M	Castings
16 Cr - 12 Ni - 2 Mo	SA-358	316	S31600	316 SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo	SA-376	TP316	S31600	316 SS	Pipe, seamless

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
16 Cr - 12 Ni - 2 Mo	SA-403	WP316	S31600	316 SS	Fittings
16 Cr - 12 Ni - 2 Mo	SA-409	TP316	S31600	316 SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo	SA-430	FP316	S31600	316 SS	Pipe, forged/bored
16 Cr - 12 Ni - 2 Mo	SA-451	CPF8M	J92900	CPF8M	Pipe, centrifugal cast
16 Cr - 12 Ni - 2 Mo	SA-479	Type 316	S31600	316 SS	Bars and shapes
16 Cr - 12 Ni - 2 Mo	SA-666	Type 316	S31600	316 SS	Plate, sheet, strip
16 Cr - 12 Ni - 2 Mo	SA-688	TP316	S31600	316 SS	Tubes, welded
16 Cr - 12 Ni - 2 Mo	SA-813	TP316	S31600	316 SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo	SA-814	TP316	S31600	316 SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo	SA-182	F316H	S31609	316H SS	Flanges, fittings, etc.
16 Cr - 12 Ni - 2 Mo	SA-213	TP316H	S31609	316H SS	Tubes, seamless
16 Cr - 12 Ni - 2 Mo	SA-240	Type 316H	S31609	316H SS	Plate, sheet, strip
16 Cr - 12 Ni - 2 Mo	SA-249	TP316H	S31609	316H SS	Tubes, welded
16 Cr - 12 Ni - 2 Mo	SA-312	TP316H	S31609	316H SS	Pipe, seamless and welded
16 Cr - 12 Ni - 2 Mo	SA-336	F316H	S31609	316H SS	Forgings
16 Cr - 12 Ni - 2 Mo	SA-358	316H	S31609	316H SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo	SA-376	TP316H	S31609	316H SS	Pipe, seamless
16 Cr - 12 Ni - 2 Mo	SA-403	WP316H	S31609	316H SS	Fittings
16 Cr - 12 Ni - 2 Mo	SA-430	FP316H	S31609	316H SS	Pipe, forged/bored
16 Cr - 12 Ni - 2 Mo	SA-452	TP316H	S31609	316H SS	Pipe, cast/worked
16 Cr - 12 Ni - 2 Mo	SA-479	316H	S31609	316H SS	Bars and shapes
16 Cr - 12 Ni - 2 Mo	SA-813	TP316H	S31609	316H SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo	SA-814	TP316H	S31609	316H SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo	SA-182	F316L	S31603	316L SS	Flanges, fittings, etc.
16 Cr - 12 Ni - 2 Mo	SA-213	TP316L	S31603	316L SS	Tubes, seamless
16 Cr - 12 Ni - 2 Mo	SA-240	Type 316L	S31603	316L SS	Plate, sheet, strip
16 Cr - 12 Ni - 2 Mo	SA-249	TP316L	S31603	316L SS	Tubes, welded
16 Cr - 12 Ni - 2 Mo	SA-312	TP316L	S31603	316L SS	Pipe, seamless and welded
16 Cr - 12 Ni - 2 Mo	SA-336	F316L	S31603	316L SS	Forgings
16 Cr - 12 Ni - 2 Mo	SA-351	CF3M and CF3MA	J92800	CF3M and CF3MA	Castings
16 Cr - 12 Ni - 2 Mo	SA-358	316L	S31603	316L SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo	SA-403	WP316L	S31603	316L SS	Fittings
16 Cr - 12 Ni - 2 Mo	SA-409	TP316L	S31603	316L SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo	SA-451	CPF3M	---	CPF3M	Pipe, centrifugal cast
16 Cr - 12 Ni - 2 Mo	SA-479	316L	S31603	316L SS	Bars and shapes

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
16 Cr - 12 Ni - 2 Mo	SA-666	Type 316L	S31603	316L SS	Plate, sheet, strip
16 Cr - 12 Ni - 2 Mo	SA-688	TP316L	S31603	316L SS	Tubes, welded
16 Cr - 12 Ni - 2 Mo	SA-813	TP316L	S31603	316L SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo	SA-814	TP316L	S31603	316L SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo - N	SA-182	F316N	S31651	316N SS	Flanges, fittings, etc.
16 Cr - 12 Ni - 2 Mo - N	SA-193	B8MN and B8MNA	S31651	316N SS	Bolting
16 Cr - 12 Ni - 2 Mo - N	SA-194	8MN and 8MNA	S31651	316N SS	Nuts
16 Cr - 12 Ni - 2 Mo - N	SA-213	TP316N	S31651	316N SS	Tubes, seamless
16 Cr - 12 Ni - 2 Mo - N	SA-240	Type 316N	S31651	316N SS	Plate, sheet, strip
16 Cr - 12 Ni - 2 Mo - N	SA-249	TP316N	S31651	316N SS	Tubes, welded
16 Cr - 12 Ni - 2 Mo - N	SA-312	TP316N	S31651	316N SS	Pipes, seamless and welded
16 Cr - 12 Ni - 2 Mo - N	SA-336	F316N	S31651	316N SS	Forgings
16 Cr - 12 Ni - 2 Mo - N	SA-358	316N	S31651	316N SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo - N	SA-376	TP316N	S31651	316N SS	Pipe, seamless
16 Cr - 12 Ni - 2 Mo - N	SA-403	WP316N	S31651	316N SS	Fittings
16 Cr - 12 Ni - 2 Mo - N	SA-430	FP316N	S31651	316N SS	Pipe, forged/bored
16 Cr - 12 Ni - 2 Mo - N	SA-479	Type 316N	S31651	316N SS	Bars and shapes
16 Cr - 12 Ni - 2 Mo - N	SA-666	Type 316N	S31651	316N SS	Plate, sheet, strip
16 Cr - 12 Ni - 2 Mo - N	SA-688	TP316N	S31651	316N SS	Tubes, welded
16 Cr - 12 Ni - 2 Mo - N	SA-813	TP316N	S31651	316N SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo - N	SA-814	TP316N	S31651	316N SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo - N	SA-182	F316LN	S31653	316LN SS	Flanges, fittings, etc.
16 Cr - 12 Ni - 2 Mo - N	SA-193	B8MLN/ B8MLNA	S31653	316LN SS	Bolting
16 Cr - 12 Ni - 2 Mo - N	SA-194	8MLN/8MLNA	S31653	316LN SS	Nuts
16 Cr - 12 Ni - 2 Mo - N	SA-213	TP316LN	S31653	316LN SS	Tubes, seamless
16 Cr - 12 Ni - 2 Mo - N	SA-240	Type 316LN	S31653	316LN SS	Plate, sheet, strip
16 Cr - 12 Ni - 2 Mo - N	SA-249	TP316LN	S31653	316LN SS	Tubes, welded
16 Cr - 12 Ni - 2 Mo - N	SA-312	TP316LN	S31653	316LN SS	Pipe, seamless and welded
16 Cr - 12 Ni - 2 Mo - N	SA-320	8MLN/8MLNA	S31653	316LN SS	Bolting
16 Cr - 12 Ni - 2 Mo - N	SA-336	F316LN	S31653	316LN SS	Forgings
16 Cr - 12 Ni - 2 Mo - N	SA-351	CF3MN	---	CF3MN	Casting
16 Cr - 12 Ni - 2 Mo - N	SA-358	316LN	S31653	316LN SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo - N	SA-376	TP316LN	S31653	316LN SS	Pipe, seamless
16 Cr - 12 Ni - 2 Mo - N	SA-403	316LN	S31653	316LN SS	Fittings
16 Cr - 12 Ni - 2 Mo - N	SA-479	Type 316LN	S31653	316LN SS	Bars and shapes

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
16 Cr - 12 Ni - 2 Mo - N	SA-688	TP316LN	S31653	316LN SS	Tubes, welded
16 Cr - 12 Ni - 2 Mo - N	SA-813	TP316LN	S31653	316LN SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo - N	SA-814	TP316LN	S31653	316LN SS	Pipe, welded
16 Cr - 12 Ni - 2 Mo - Ti	SA-240	Type 316Ti	S31635	316Ti SS	Plate, sheet, strip
16 Cr - 12 Ni - 2 Mo - Ti	SA-479	Type 316Ti	S31635	316Ti SS	Bars and shapes
16 Cr - 12 Ni - 2 Mo - Cb	SA-240	Type 316Cb	S31640	316Cb SS	Plate, sheet, strip
16 Cr - 12 Ni - 2 Mo - Cb	SA-479	Type 316Cb	S31640	316Cb SS	Bars and shapes
16 Cr - 14 Ni - 2 Mo	SA-351	CF10MC	J92971	CF10MC	Castings
16 Cr - 14 Ni - 2 Mo	SA-451	CPF10MC	---	CPF10MC	Pipe, cast
16½ Cr - 5 Ni - 5 Mn - 3½ Si	SA-240	S20161	S20161	Gall Tough	Plate, sheet, strip
16½ Cr - 5 Ni - 5 Mn - 3½ Si	SA-479	S20161	S20161	Gall Tough	Bars and shapes
17 Cr	SA-182	F430	S43000	430 SS	Flanges, fittings, etc.
17 Cr	SA-240	Type 430	S43000	430 SS	Plate, sheet, strip
17 Cr	SA-268	TP430	S43000	430 SS	Tubes, seamless and welded
17 Cr	SA-479	Type 430	S43000	430 SS	Bars and shapes
17 Cr	SA-815	WP430	S43000	430 SS	Fittings
17 Cr - Ti	SA-240	Type 439	S43035	439 (formerly XM-8)	Plate, sheet, strip
17 Cr - Ti	SA-268	TP439	S43035	(formerly XM-8)	Tubes, seamless and welded
17 Cr - Ti	SA-479	Type 439	S43035	439 (formerly XM-8)	Bars and shapes
17 Cr - Ti	SA-731	TP439	S43035	439 (formerly XM-8)	Pipe, seamless and welded
17 Cr - Ti	SA-803	TP439	S43035	439 (formerly XM-8)	Tubes, welded
17 Cr - 1½ Ni - 15 Mn	SA-666	---	S20500	205 SS	Plate, sheet, strip
17 Cr - 4 Ni - 4 Cu	SA-564	Type 630	S17400	17-4 PH	Bars and shapes
17 Cr - 4 Ni - 4 Cu	SA-693	Type 630	S17400	17-4 PH	Plate, sheet, strip
17 Cr - 4 Ni - 4 Cu	SA-705	Type 630	S17400	17-4 PH	Forgings
17 Cr - 4 Ni - 6 Mn	SA-213	TP201	S20100	201 SS	Tubes, seamless
17 Cr - 4 Ni - 6 Mn	SA-240	Type 201 (-1 and -2)	S20100	201 SS	Plate, sheet, strip
17 Cr - 4 Ni - 6 Mn	SA-249	TP201	S20100	201 SS	Tubes, welded
17 Cr - 4 Ni - 6 Mn	SA-666	Type 201 (-1 and -2)	S20100	201 SS	Plate, sheet, strip
17 Cr - 4 Ni - 7 Mn	SA-240	Type 201L	S20103	201L SS	Plate, sheet, strip
17 Cr - 4 Ni - 7 Mn - N	SA-240	Type 201LN	S20153	201LN SS	Plate, sheet, strip
17 Cr - 7 Ni	SA-240	---	S30100	301 SS	Plate, sheet, strip
17 Cr - 7 Ni	SA-666	---	S30100	301 SS	Plate, sheet, strip
17 Cr - 7 Ni - 1 Al	SA-564	Type 631	S17700	17-7 PH	Bars and shapes
17 Cr - 7 Ni - 1 Al	SA-693	Type 631	S17700	17-7 PH	Plate, sheet, strip

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
17 Cr - 7 Ni - 1 Al	SA-705	Type 631	S17700	17-7 PH	Forgings
17 Cr - 7 Ni - Al - Ti	SA-564	Type 635	S17600	Stainless W	Bars and shapes
17 Cr - 7 Ni - Al - Ti	SA-693	Type 635	S17600	Stainless W	Plate, sheet, strip
17 Cr - 7 Ni - Al - Ti	SA-705	Type 635	S17600	Stainless W	Forgings
18 Cr - Ti - Cb	SA-268	TP430Ti	S43036	430 Ti SS	Tubes, seamless and welded
18 Cr - Ti - Cb	SA-815	WP430Ti	S43036	430 Ti SS	Fittings
18 Cr - 2 Mo	SA-213	18 Cr - 2 Mo	S44400	18-2	Tubes, seamless
18 Cr - 2 Mo	SA-240	Type 18 Cr - 2 Mo	S44400	18-2	Plate, sheet, strip
18 Cr - 2 Mo	SA-268	18 Cr - 2 Mo	S44400	18-2	Tubes, seamless and welded
18 Cr - 2 Mo	SA-479	18 Cr - 2 Mo	S44400	18-2	Bars and shapes
18 Cr - 2 Mo	SA-731	18 Cr - 2 Mo	S44400	18-2	Pipe, seamless and welded
18 Cr - 2 Mo	SA-803	18 Cr - 2 Mo	S44400	18-2	Tubes, welded
18 Cr - 3 Ni - 12 Mn	SA-240	Type XM-29	S24000	18-3 Mn	Plate, sheet, strip
18 Cr - 3 Ni - 12 Mn	SA-249	TPXM-29	S24000	18-3 Mn	Tubes, welded
18 Cr - 3 Ni - 12 Mn	SA-312	TPXM-29	S24000	18-3 Mn	Pipe, seamless and welded
18 Cr - 3 Ni - 12 Mn	SA-358	XM-29	S24000	18-3 Mn	Pipe, welded
18 Cr - 3 Ni - 12 Mn	SA-479	Type XM-29	S24000	18-3 Mn	Bars and shapes
18 Cr - 3 Ni - 12 Mn	SA-688	TPXM-29	S24000	18-3 Mn	Tubes, welded
18 Cr - 3 Ni - 12 Mn	SA-813	TPXM-29	S24000	18-3 Mn	Pipe, welded
18 Cr - 3 Ni - 12 Mn	SA-814	TPXM-29	S24000	18-3 Mn	Pipe, welded
18 Cr - 5 Ni - 3 Mo - N	SA-789	---	S31500	3RE60	Tubes, seamless and welded
18 Cr - 5 Ni - 3 Mo - N	SA-790	---	S31500	3RE60	Pipe, seamless and welded
18 Cr - 5 Ni - 9 Mn	SA-213	TP202	S20200	202 SS	Tubes, seamless
18 Cr - 5 Ni - 9 Mn	SA-240	Type 202	S20200	202 SS	Plate, sheet, strip
18 Cr - 5 Ni - 9 Mn	SA-249	TP202	S20200	202 SS	Tubes, welded
18 Cr - 5 Ni - 9 Mn	SA-666	Type 202	S20200	202 SS	Plate, sheet, strip
18 Cr - 5½ Ni - 15 Mn	SA-666	---	S21460	XM-14, Tenelon	Plate, sheet, strip
18 Cr - 8 Ni	SA-240	Type 302	S30200	302 SS	Plate, sheet, strip
18 Cr - 8 Ni	SA-479	Type 302	S30200	302 SS	Bars and shapes
18 Cr - 8 Ni	SA-666	Type 302	S30200	302 SS	Plate, sheet, strip
18 Cr - 8 Ni - S	SA-194	8F and 8FA	S30300	303 + S SS	Nuts
18 Cr - 8 Ni - S	SA-320	B8F and B8FA	---	303 + S SS	Bolting
18 Cr - 8 Ni - Se	SA-194	8F and 8FA	S30323	303 + Se SS	Nuts
18 Cr - 8 Ni	SA-320	B8F and B8FA	---	303 + Se SS	Bolting

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
18 Cr - 8 Ni	SA-182	F304	S30400	304 SS	Flanges, fittings, etc.
18 Cr - 8 Ni	SA-193	B8 and B8A	S30400	304 SS	Bolting
18 Cr - 8 Ni	SA-194	8 and 8A	S30400	304 SS	Nuts
18 Cr - 8 Ni	SA-213	TP304	S30400	304 SS	Tubes, seamless
18 Cr - 8 Ni	SA-240	Type 304	S30400	304 SS	Plate, sheet, strip
18 Cr - 8 Ni	SA-249	TP304	S30400	304 SS	Tubes, welded
18 Cr - 8 Ni	SA-312	TP304	S30400	304 SS	Pipe, seamless and welded
18 Cr - 8 Ni	SA-320	B8 and B8A	S30400	304 SS	Bolting
18 Cr - 8 Ni	SA-336	F304	S30400	304 SS	Forgings
18 Cr - 8 Ni	SA-351	CF8 and CF8A	J92600	CF8 and CF8A	Castings
18 Cr - 8 Ni	SA-358	304	S30400	304 SS	Pipe, welded
18 Cr - 8 Ni	SA-376	TP304	S30400	304 SS	Pipe, seamless
18 Cr - 8 Ni	SA-403	WP304	S30400	304 SS	Fittings
18 Cr - 8 Ni	SA-409	TP304	S30400	304 SS	Pipe, welded
18 Cr - 8 Ni	SA-430	FP304	S30400	304 SS	Pipe, forged/bored
18 Cr - 8 Ni	SA-451	CPF8 and CPF8A	J92600	CPF8 and CPF8A	Pipe, centrifugal cast
18 Cr - 8 Ni	SA-479	Type 304	S30400	304 SS	Bars and shapes
18 Cr - 8 Ni	SA-666	Type 304	S30400	304 SS	Plate, sheet, strip
18 Cr - 8 Ni	SA-688	TP304	S30400	304 SS	Tubes, welded
18 Cr - 8 Ni	SA-813	TP304	S30400	304 SS	Pipe, welded
18 Cr - 8 Ni	SA-814	TP304	S30400	304 SS	Pipe, welded
18 Cr - 8 Ni	SA-182	F304H	S30409	304H SS	Flanges, fittings, etc.
18 Cr - 8 Ni	SA-213	TP304H	S30409	304H SS	Tubes, seamless
18 Cr - 8 Ni	SA-240	Type 304H	S30409	304H SS	Plate, sheet, strip
18 Cr - 8 Ni	SA-249	TP304H	S30409	304H SS	Tubes, welded
18 Cr - 8 Ni	SA-312	TP304H	S30409	304H SS	Pipe, seamless and welded
18 Cr - 8 Ni	SA-336	F304H	S30409	304H SS	Forgings
18 Cr - 8 Ni	SA-358	304H	S30409	304H SS	Pipe, welded
18 Cr - 8 Ni	SA-376	TP304H	S30409	304H SS	Pipe, seamless
18 Cr - 8 Ni	SA-403	WP304H	S30409	304H SS	Fittings
18 Cr - 8 Ni	SA-430	FP304H	S30409	304H SS	Pipe, forged/bored
18 Cr - 8 Ni	SA-452	TP304H	S30409	304H SS	Pipe, cast/worked
18 Cr - 8 Ni	SA-479	Type 304H	S30409	304H SS	Bars and shapes
18 Cr - 8 Ni	SA-813	TP304H	S30409	304H SS	Pipe, welded
18 Cr - 8 Ni	SA-814	TP304H	S30409	304H SS	Pipe, welded

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
18 Cr - 8 Ni	SA-182	F304L	S30403	304L SS	Flanges, fittings, etc.
18 Cr - 8 Ni	SA-213	TP304L	S30403	304L SS	Tubes, seamless
18 Cr - 8 Ni	SA-240	Type 304L	S30403	304L SS	Plate, sheet, strip
18 Cr - 8 Ni	SA-249	TP304L	S30403	304L SS	Tubes, welded
18 Cr - 8 Ni	SA-312	TP304L	S30403	304L SS	Pipe, seamless and welded
18 Cr - 8 Ni	SA-336	F304L	S30403	304L SS	Forgings
18 Cr - 8 Ni	SA-351	CF3 and CF3A	J92500	CF3 and CF3A	Castings
18 Cr - 8 Ni	SA-358	304L	S30403	304L SS	Pipe, welded
18 Cr - 8 Ni	SA-403	WP304L	S30403	304L SS	Fittings
18 Cr - 8 Ni	SA-409	TP304L	S30403	304L SS	Pipe, welded
18 Cr - 8 Ni	SA-451	CPF3 and CPF3A	J92500	CPF3 and CPF3A	Pipe, centrifugal cast
18 Cr - 8 Ni	SA-479	Type 304L	S30403	304L SS	Bars and shapes
18 Cr - 8 Ni	SA-666	Type 304L	S30403	304L SS	Plate, sheet, strip
18 Cr - 8 Ni	SA-688	TP304L	S30403	304L SS	Tubes, welded
18 Cr - 8 Ni	SA-813	TP304L	S30403	304L SS	Pipe, welded
18 Cr - 8 Ni	SA-814	TP304L	S30403	304L SS	Pipe, welded
18 Cr - 8 Ni - N	SA-182	F304N	S30451	304N SS	Flanges, fittings, etc.
18 Cr - 8 Ni - N	SA-193	B8N and B8NA	S30451	304N SS	Bolting
18 Cr - 8 Ni - N	SA-194	8N and 8NA	S30451	304N SS	Nuts
18 Cr - 8 Ni - N	SA-213	TP304N	S30451	304N SS	Tubes, seamless
18 Cr - 8 Ni - N	SA-240	Type 304N	S30451	304N SS	Plate, sheet, strip
18 Cr - 8 Ni - N	SA-249	TP304N	S30451	304N SS	Tubes, welded
18 Cr - 8 Ni - N	SA-312	TP304N	S30451	304N SS	Pipe, seamless and welded
18 Cr - 8 Ni - N	SA-336	F304N	S30451	304N SS	Forgings
18 Cr - 8 Ni - N	SA-358	304N	S30451	304N SS	Pipe, welded
18 Cr - 8 Ni - N	SA-376	TP304N	S30451	304N SS	Pipe, seamless
18 Cr - 8 Ni - N	SA-403	WP304N	S30451	304N SS	Fittings
18 Cr - 8 Ni - N	SA-430	FP304N	S30451	304N SS	Pipe, forged/bored
18 Cr - 8 Ni - N	SA-479	Type 304N	S30451	304N SS	Bars and shapes
18 Cr - 8 Ni - N	SA-666	Type 304N	S30451	304N SS	Plate, sheet, strip
18 Cr - 8 Ni - N	SA-688	TP304N	S30451	304N SS	Tubes, welded
18 Cr - 8 Ni - N	SA-813	TP304N	S30451	304N SS	Pipe, welded
18 Cr - 8 Ni - N	SA-814	TP304N	S30451	304N SS	Pipe, welded
18 Cr - 8 Ni - N	SA-240	Type XM-21	S30452	XM-21	Plate, sheet, strip
18 Cr - 8 Ni - N	SA-182	F304LN	S30453	304LN SS	Flanges, fittings, etc.

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
18 Cr - 8 Ni - N	SA-193	B8LN and B8LNA	S30453	304LN SS	Bolting
18 Cr - 8 Ni - N	SA-194	8LN and 8LNA	S30453	304LN SS	Nuts
18 Cr - 8 Ni - N	SA-213	TP304LN	S30453	304LN SS	Tubes, seamless
18 Cr - 8 Ni - N	SA-240	Type 304LN	S30453	304LN SS	Plate, sheet, strip
18 Cr - 8 Ni - N	SA-249	TP304LN	S30453	304LN SS	Tubes, welded
18 Cr - 8 Ni - N	SA-312	TP304LN	S30453	304LN SS	Pipe, seamless and welded
18 Cr - 8 Ni - N	SA-320	B8LN and B8LNA	S30453	304LN SS	Bolting
18 Cr - 8 Ni - N	SA-336	F304LN	S30453	304LN SS	Forgings
18 Cr - 8 Ni - N	SA-358	304LN	S30453	304LN SS	Pipe, welded
18 Cr - 8 Ni - N	SA-376	TP304LN	S30453	304LN SS	Pipe, seamless
18 Cr - 8 Ni - N	SA-403	304LN	S30453	304LN SS	Fittings
18 Cr - 8 Ni - N	SA-479	Type 304LN	S30453	304LN SS	Bars and shapes
18 Cr - 8 Ni - N	SA-666	Type 304LN	S30453	304LN SS	Plate, sheet, strip
18 Cr - 8 Ni - N	SA-688	TP304LN	S30453	304LN SS	Tubes, welded
18 Cr - 8 Ni - N	SA-813	TP304LN	S30453	304LN SS	Pipe, welded
18 Cr - 8 Ni - N	SA-814	TP304LN	S30453	304LN SS	Pipe, welded
18 Cr - 8 Ni - N	SA-240	Type XM-21	S30452	XM-21	Plate, sheet, strip
18 Cr - 8 Ni - 4 Si - N	SA-193	B8S and B8SA	S21800	Nitronic 60	Bolting
18 Cr - 8 Ni - 4 Si - N	SA-194	8S and 8SA	S21800	Nitronic 60	Nuts
18 Cr - 8 Ni - 4 Si - N	SA-240	Type S21800	S21800	Nitronic 60	Plate, sheet, strip
18 Cr - 8 Ni - 4 Si - N	SA-351	CF10SMnN	S21800	Nitronic 60	Castings
18 Cr - 8 Ni - 4 Si - N	SA-479	Type S21800	S21800	Nitronic 60	Bars and shapes
18 Cr - 9 Ni - N - Ce	SA-240	---	S30415	153 MA	Plate, sheet, strip
18 Cr - 9 Ni - N - Ce	SA-312	---	S30415	153 MA	Pipe, seamless and welded
18 Cr - 9 Ni - N - Ce	SA-358	---	S30415	153 MA	Pipe, welded
18 Cr - 10 Ni - Cb	SA-182	F347	S34700	347 SS	Flanges, fittings, etc.
18 Cr - 10 Ni - Cb	SA-193	B8C and B8CA	S34700	347 SS	Bolting
18 Cr - 10 Ni - Cb	SA-194	8C and 8CA	S34700	347 SS	Nuts
18 Cr - 10 Ni - Cb	SA-213	TP347	S34700	347 SS	Tubes, seamless
18 Cr - 10 Ni - Cb	SA-240	Type 347	S34700	347 SS	Plate, sheet, strip
18 Cr - 10 Ni - Cb	SA-249	TP347	S34700	347 SS	Tubes, welded
18 Cr - 10 Ni - Cb	SA-312	TP347	S34700	347 SS	Pipe, seamless and welded
18 Cr - 10 Ni - Cb	SA-320	B8C and B8CA	S34700	347 SS	Bolting
18 Cr - 10 Ni - Cb	SA-336	F347	S34700	347 SS	Forgings
18 Cr - 10 Ni - Cb	SA-351	CF8C	J92710	347 SS	Castings

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
18 Cr - 10 Ni - Cb	SA-358	347	S34700	347 SS	Pipe, welded
18 Cr - 10 Ni - Cb	SA-376	TP347	S34700	347 SS	Pipe, seamless
18 Cr - 10 Ni - Cb	SA-403	WP347	S34700	347 SS	Fittings
18 Cr - 10 Ni - Cb	SA-409	TP347	S34700	347 SS	Pipe, welded
18 Cr - 10 Ni - Cb	SA-430	FP347	S34700	347 SS	Pipe, forged/bored
18 Cr - 10 Ni - Cb	SA-451	CPF8C	J92710	CPF8C	Pipe, centrifugal cast
18 Cr - 10 Ni - Cb	SA-479	Type 347	S34700	347 SS	Bars and shapes
18 Cr - 10 Ni - Cb	SA-813	TP347	S34700	347 SS	Pipe, welded
18 Cr - 10 Ni - Cb	SA-814	TP347	S34700	347 SS	Pipe, welded
18 Cr - 10 Ni - Cb	SA-182	F347H	S34709	347H SS	Flanges, fittings, etc.
18 Cr - 10 Ni - Cb	SA-213	TP347H	S34709	347H SS	Tubes, seamless
18 Cr - 10 Ni - Cb	SA-213	TP347HFG	---	347HFG SS	Tubes, seamless
18 Cr - 10 Ni - Cb	SA-240	Type 347H	S34709	347H SS	Plate, sheet, strip
18 Cr - 10 Ni - Cb	SA-249	TP347H	S34709	347H SS	Tubes, welded
18 Cr - 10 Ni - Cb	SA-312	TP347H	S34709	347H SS	Pipe, seamless and welded
18 Cr - 10 Ni - Cb	SA-336	F347H	S34709	347H SS	Forgings
18 Cr - 10 Ni - Cb	SA-376	TP347H	S34709	347H SS	Pipe, seamless
18 Cr - 10 Ni - Cb	SA-403	WP347H	S34709	347H SS	Fittings
18 Cr - 10 Ni - Cb	SA-430	FP347H	S34709	347H SS	Pipe, forged/bored
18 Cr - 10 Ni - Cb	SA-452	TP347H	S34709	347H SS	Pipe, cast/worked
18 Cr - 10 Ni - Cb	SA-479	Type 347H	S34709	347H SS	Bars and shapes
18 Cr - 10 Ni - Cb	SA-813	TP347H	S34709	347H SS	Pipe, welded
18 Cr - 10 Ni - Cb	SA-814	TP347H	S34709	347H SS	Pipe, welded
18 Cr - 10 Ni - Cb	SA-182	F348	S34800	348 SS	Flanges, fittings, etc.
18 Cr - 10 Ni - Cb	SA-213	TP348	S34800	348 SS	Tubes, seamless
18 Cr - 10 Ni - Cb	SA-240	Type 348	S34800	348 SS	Plate, sheet, strip
18 Cr - 10 Ni - Cb	SA-249	TP348	S34800	348 SS	Tubes, welded
18 Cr - 10 Ni - Cb	SA-312	TP348	S34800	348 SS	Pipe, seamless and welded
18 Cr - 10 Ni - Cb	SA-336	F348	S34800	348 SS	Forgings
18 Cr - 10 Ni - Cb	SA-358	348	S34800	348 SS	Pipe, welded
18 Cr - 10 Ni - Cb	SA-376	TP348	S34800	348 SS	Pipe, seamless
18 Cr - 10 Ni - Cb	SA-403	WP348	S34800	348 SS	Fittings
18 Cr - 10 Ni - Cb	SA-409	TP348	S34800	348 SS	Pipe, welded
18 Cr - 10 Ni - Cb	SA-451	CPF8C	J92710	CPF8C	Pipe, centrifugal cast
18 Cr - 10 Ni - Cb	SA-479	Type 348	S34800	348 SS	Bars and shapes

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
18 Cr - 10 Ni - Cb	SA-813	TP348	S34800	348 SS	Pipe, welded
18 Cr - 10 Ni - Cb	SA-814	TP348	S34800	348 SS	Pipe, welded
18 Cr - 10 Ni - Cb	SA-182	F348H	S34809	348H SS	Flanges, fittings, etc.
18 Cr - 10 Ni - Cb	SA-213	TP348H	S34809	348H SS	Tubes, seamless
18 Cr - 10 Ni - Cb	SA-240	Type 348H	S34809	348H SS	Plate, sheet, strip
18 Cr - 10 Ni - Cb	SA-249	TP348H	S34809	348H SS	Tubes, welded
18 Cr - 10 Ni - Cb	SA-312	TP348H	S34809	348H SS	Pipe, seamless and welded
18 Cr - 10 Ni - Cb	SA-336	F348H	S34809	348H SS	Forgings
18 Cr - 10 Ni - Cb	SA-403	WP348H	S34809	348H SS	Fittings
18 Cr - 10 Ni - Cb	SA-479	Type 348H	S34809	348H SS	Bars and shapes
18 Cr - 10 Ni - Cb	SA-813	TP348H	S34809	348H SS	Pipe, welded
18 Cr - 10 Ni - Cb	SA-814	TP348H	S34809	348H SS	Pipe, welded
18 Cr - 10 Ni - Ti	SA-182	F321	S32100	321 SS	Flanges, fittings, etc.
18 Cr - 10 Ni - Ti	SA-193	B8T and B8TA	S32100	321 SS	Bolting
18 Cr - 10 Ni - Ti	SA-194	8T and 8TA	S32100	321 SS	Nuts
18 Cr - 10 Ni - Ti	SA-213	TP321	S32100	321 SS	Tubes, seamless
18 Cr - 10 Ni - Ti	SA-240	Type 321	S32100	321 SS	Plate, sheet, strip
18 Cr - 10 Ni - Ti	SA-249	TP321	S32100	321 SS	Tubes, welded
18 Cr - 10 Ni - Ti	SA-312	TP321	S32100	321 SS	Pipe, seamless and welded
18 Cr - 10 Ni - Ti	SA-320	B8T and B8TA	S32100	321 SS	Bolting
18 Cr - 10 Ni - Ti	SA-336	F321	S32100	321 SS	Forgings
18 Cr - 10 Ni - Ti	SA-358	321	S32100	321 SS	Pipe, welded
18 Cr - 10 Ni - Ti	SA-376	TP321	S32100	321 SS	Pipe, seamless
18 Cr - 10 Ni - Ti	SA-403	WP321	S32100	321 SS	Fittings
18 Cr - 10 Ni - Ti	SA-409	TP321	S32100	321 SS	Pipe, welded
18 Cr - 10 Ni - Ti	SA-430	FP321	S32100	321 SS	Pipe, forged/bored
18 Cr - 10 Ni - Ti	SA-479	Type 321	S32100	321 SS	Bars and shapes
18 Cr - 10 Ni - Ti	SA-813	TP321	S32100	321 SS	Pipe, welded
18 Cr - 10 Ni - Ti	SA-814	TP321	S32100	321 SS	Pipe, welded
18 Cr - 10 Ni - Ti	SA-182	F321H	S32109	321H SS	Flanges, fittings, etc.
18 Cr - 10 Ni - Ti	SA-213	TP321H	S32109	321H SS	Tubes, seamless
18 Cr - 10 Ni - Ti	SA-240	Type 321H	S32109	321H SS	Plate, sheet, strip
18 Cr - 10 Ni - Ti	SA-249	TP321H	S32109	321H SS	Tubes, welded
18 Cr - 10 Ni - Ti	SA-312	TP321H	S32109	321H SS	Pipe, seamless and welded
18 Cr - 10 Ni - Ti	SA-336	F321H	S32109	321H SS	Forgings

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
18 Cr - 10 Ni - Ti	SA-376	TP321H	S32109	321H SS	Pipe, seamless
18 Cr - 10 Ni - Ti	SA-403	WP321H	S32109	321H SS	Fittings
18 Cr - 10 Ni - Ti	SA-430	FP321H	S32109	321H SS	Pipe, forged/bored
18 Cr - 10 Ni - Ti	SA-479	Type 321H	S32109	321H SS	Bars and shapes
18 Cr - 10 Ni - Ti	SA-813	TP321H	S32109	321H SS	Pipe, welded
18 Cr - 10 Ni - Ti	SA-814	TP321H	S32109	321H SS	Pipe, welded
18 Cr - 11 Ni	SA-193	B8P and B8PA	S30500	305 SS	Bolting
18 Cr - 11 Ni	SA-194	8P and 8PA	S30500	305 SS	Nuts
18 Cr - 11 Ni	SA-240	Type 305	S30500	305 SS	Plate, sheet, strip
18 Cr - 11 Ni	SA-249	TP305	S30500	305 SS	Tubes, welded
18 Cr - 11 Ni	SA-320	B8P and B8PA	S30500	305 SS	Bolting
18 Cr - 11 Ni - Cb - N	(SA-213 CC)	---	S34751	347N SS	Tubes, seamless
18 Cr - 11 Ni - Cb - N	(SA-312 CC)	---	S34751	347N SS	Pipe, seamless and welded
18 Cr - 13 Ni - 3 Mo	SA-182	F317	S31700	317 SS	Flanges, fittings, etc.
18 Cr - 13 Ni - 3 Mo	SA-240	Type 317	S31700	317 SS	Plate, sheet, strip
18 Cr - 13 Ni - 3 Mo	SA-249	TP317	S31700	317 SS	Tubes, welded
18 Cr - 13 Ni - 3 Mo	SA-213	TP317	S31700	317 SS	Tubes, seamless
18 Cr - 13 Ni - 3 Mo	SA-312	TP317	S31700	317 SS	Pipe, seamless and welded
18 Cr - 13 Ni - 3 Mo	SA-403	317	S31700	317 SS	Fittings
18 Cr - 13 Ni - 3 Mo	SA-409	TP317	S31700	317 SS	Pipe, welded
18 Cr - 13 Ni - 3 Mo	SA-479	Type 317	S31700	317 SS	Bars and shapes
18 Cr - 13 Ni - 3 Mo	SA-813	TP317	S31700	317 SS	Pipe, welded
18 Cr - 13 Ni - 3 Mo	SA-814	TP317	S31700	317 SS	Pipe, welded
18 Cr - 13 Ni - 3 Mo	SA-182	F317L	S31703	317L SS	Flanges, fittings, etc.
18 Cr - 13 Ni - 3 Mo	SA-213	TP317L	S31703	317L SS	Tubes, seamless
18 Cr - 13 Ni - 3 Mo	SA-240	Type 317L	S31703	317L SS	Plate, sheet, strip
18 Cr - 13 Ni - 3 Mo	SA-249	TP317L	S31703	317L SS	Tubes, welded
18 Cr - 13 Ni - 3 Mo	SA-312	TP317L	S31703	317L SS	Pipe, seamless and welded
18 Cr - 13 Ni - 3 Mo	SA-403	317L	S31703	317L SS	Fittings
18 Cr - 13 Ni - 3 Mo	SA-813	TP317L	S31703	317L SS	Pipe, welded
18 Cr - 13 Ni - 3 Mo	SA-814	TP317L	S31703	317L SS	Pipe, welded
18 Cr - 13 Ni - 3 Mo - N	SA-240	Type S31753	S31753	317LN SS	Plate, sheet, strip
18 Cr - 15 Mn - N	SA-240	Type XM-31	S21400	Tenelon	Plate, sheet, strip
18 Cr - 15 Ni - 3.7 Si	SA-213	---	S30615	RA85H	Tubes, seamless
18 Cr - 15 Ni - 3.7 Si	SA-240	---	S30615	RA85H	Plate, sheet, strip

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
18 Cr - 15 Ni - 3.7 Si	SA-312	---	S30615	RA85H	Pipe, seamless and welded
18 Cr - 15 Ni - 4 Si	SA-182	F46	S30600	18-15 LC Si	Flanges, fittings, etc.
18 Cr - 15 Ni - 4 Si	(SA-213 CC)	---	S30600	18-15 LC Si	Tubes, seamless
18 Cr - 15 Ni - 4 Si	SA-240	---	S30600	18-15 LC Si	Plate, sheet, strip
18 Cr - 15 Ni - 4 Si	SA-312	---	S30600	18-15 LC Si	Pipe, seamless and welded
18 Cr - 15 Ni - 4 Si	SA-336	F46	S30600	18-15 LC Si	Forgings
18 Cr - 15 Ni - 4 Si	SA-358	---	S30600	18-15 LC Si	Pipe, welded
18 Cr - 15 Ni - 4 Si	SA-479	---	S30600	18-15 LC Si	Bars and shapes
18 Cr - 17 Ni - 5.3 Si	(SA-182 CC)	---	S30601	18-17 LC	Flanges, fittings, etc.
18 Cr - 17 Ni - 5.3 Si	(SA-213 CC)	---	S30601	18-17 LC	Tubes, seamless
18 Cr - 17 Ni - 5.3 Si	SA-240	---	S30601	18-17 LC	Plate, sheet, strip
18 Cr - 17 Ni - 5.3 Si	(SA-268 CC)	---	S30601	18-17 LC	Tubes, seamless and welded
18 Cr - 17 Ni - 5.3 Si	(SA-312 CC)	---	S30601	18-17 LC	Pipe, seamless and welded
18 Cr - 17 Ni - 5.3 Si	(SA-479 CC)	---	S30601	18-17 LC	Bars and shapes
18 Cr - 18 Ni - 2 Si	SA-213	TP XM-15	S38100	18-18-2	Tubes, seamless
18 Cr - 18 Ni - 2 Si	SA-240	Type XM-15	S38100	18-18-2	Plate, sheet, strip
18 Cr - 18 Ni - 2 Si	SA-249	TPXM-15	S38100	18-18-2	Tubes, welded
18 Cr - 18 Ni - 2 Si	SA-312	TPXM-15	S38100	18-18-2	Pipe, seamless and welded
18 Cr - 18 Ni - 2 Si	SA-813	TPXM-15	S38100	18-18-2	Pipe, welded
18 Cr - 18 Ni - 2 Si	SA-814	TPXM-15	S38100	18-18-2	Pipe, welded
18 Cr - 20 Ni - 5.5 Si	SA-213	S32615	S32615	SX	Tubes, seamless
18 Cr - 20 Ni - 5.5 Si	SA-240	Type S32615	S32615	SX	Plate, sheet, strip
18 Cr - 20 Ni - 5.5 Si	SA-312	S32615	S32615	SX	Pipe, seamless and welded
18 Cr - 20 Ni - 5.5 Si	SA-479	Type S32615	S32615	SX	Bars and shapes
19 Cr - Ti - Cb - N	SA-240	S46800	S46800	---	Plate, sheet, strip
19 Cr - 8 Mn - 6 Ni - Mo/N	SA-240	Type XM-17	S21600	XM-17	Plate, sheet, strip
19 Cr - 8 Mn - 6 Ni - Mo/N	SA-479	Type XM-17	S21600	XM-17	Bars and shapes
19 Cr - 8 Mn - 6 Ni - Mo/N	SA-240	Type XM-18	S21603	XM-18	Plate, sheet, strip
19 Cr - 8 Mn - 6 Ni - Mo/N	SA-479	Type XM-18	S21603	XM-18	Bars and shapes
19 Cr - 9 Ni - Mo - W	SA-453	651	S63198	19-9DL	Bolting
19 Cr - 9 Ni - ½ Mo	SA-351	CF10	---	CF10	Castings
19 Cr - 9 Ni - 2 Mo	SA-351	CF10M	---	CF10M	Castings
19 Cr - 10 Ni - 3 Mo	SA-351	CG8M	---	CG8M	Castings
19 Cr - 11 Ni - 3 Mo	SA-351	CG3M	---	CG3M	Castings
19 Cr - 15 Ni - 4 Mo	SA-182	F47	S31725	317LM SS	Flanges, Fittings, Valves, Parts

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
19 Cr - 15 Ni - 4 Mo	SA-213	S31725	S31725	317LM SS	Tubes, seamless
19 Cr - 15 Ni - 4 Mo	SA-240	S31725	S31725	317LM SS	Plate, sheet, strip
19 Cr - 15 Ni - 4 Mo	SA-249	S31725	S31725	317LM SS	Tubes, welded
19 Cr - 15 Ni - 4 Mo	SA-312	S31725	S31725	317LM SS	Pipe, seamless and welded
19 Cr - 15 Ni - 4 Mo	SA-358	S31725	S31725	317LM SS	Pipe, welded
19 Cr - 15 Ni - 4 Mo	SA-376	S31725	S31725	317LM SS	Pipe, seamless
19 Cr - 15 Ni - 4 Mo	SA-409	S31725	S31725	317LM SS	Pipe, welded
19 Cr - 15 Ni - 4 Mo	SA-479	Type S31725	S31725	317LM SS	Bars and shapes
19 Cr - 15½ Ni - 4 Mo	SA-182	F48	S31726	317L4 SS	Flanges, Fittings, Valves, Parts
19 Cr - 15½ Ni - 4 Mo	SA-213	S31726	S31726	317L4 SS	Tubes, seamless
19 Cr - 15½ Ni - 4 Mo	SA-240	S31726	S31726	317L4 SS	Plate, sheet, strip
19 Cr - 15½ Ni - 4 Mo	SA-249	S31726	S31726	317L4 SS	Tubes, welded
19 Cr - 15½ Ni - 4 Mo	SA-312	S31726	S31726	317L4 SS	Pipe, seamless and welded
19 Cr - 15½ Ni - 4 Mo	SA-358	S31726	S31726	317L4 SS	Pipe, welded
19 Cr - 15½ Ni - 4 Mo	SA-376	S31726	S31726	317L4 SS	Pipe, seamless
19 Cr - 15½ Ni - 4 Mo	SA-409	S31726	S31726	317L4 SS	Pipe, welded
19 Cr - 15½ Ni - 4 Mo	SA-479	Type S31726	S31726	317L4 SS	Bars and shapes
20 Cr - ½ Cu - Cb	SA-240	S44500	S44500	---	Plate, sheet, strip
20 Cr - 18 Ni - 6 Mo - Cu - N	SA-182	F44	S31254	254 SMO	Flanges, fittings, etc.
20 Cr - 18 Ni - 6 Mo - Cu - N	SA-193	B8MLCuN/B8MLCuNA	S31254	254 SMO	Bolting
20 Cr - 18 Ni - 6 Mo - Cu - N	SA-194	8MLCuN/8MLCuNA	S31254	254 SMO	Nuts
20 Cr - 18 Ni - 6 Mo - Cu - N	SA-240	S31254	S31254	254 SMO	Plate, sheet, strip
20 Cr - 18 Ni - 6 Mo - Cu - N	SA-249	S31254	S31254	254 SMO	Tubes, welded
20 Cr - 18 Ni - 6 Mo - Cu - N	SA-312	S31254	S31254	254 SMO	Pipe, seamless and welded
20 Cr - 18 Ni - 6 Mo - Cu - N	SA-351	CK3MCuN	J93254	254 SMO or CK3MCuN	Castings
20 Cr - 18 Ni - 6 Mo - Cu - N	SA-358	S31254	S31254	254 SMO	Pipe, welded
20 Cr - 18 Ni - 6 Mo - Cu - N	SA-403	S31254	S31254	254 SMO	Fittings
20 Cr - 18 Ni - 6 Mo - Cu - N	SA-409	S31254	S31254	254 SMO	Pipe, welded
20 Cr - 18 Ni - 6 Mo - Cu - N	SA-479	S31254	S31254	254 SMO	Bars and shapes
20 Cr - 18 Ni - 6 Mo - Cu - N	SA-813	S31254	S31254	254 SMO	Pipe, welded
20 Cr - 18 Ni - 6 Mo - Cu - N	SA-814	S31254	S31254	254 SMO	Pipe, welded
20 Cr - 10 Ni	SA-479	Type ER308	S30880	308 SS	Bars and shapes
20 Cr - 32 Ni - 1 Cb	SA-351	CT15C	---	CT15C	Castings
21 Cr - 6 Ni - 9 Mn	SA-312	TPXM10	S21900	XM-10 or 21-6-9	Pipe, seamless and welded
21 Cr - 6 Ni - 9 Mn	SA-813	TPXM10	S21900	XM-10 or 21-6-9	Pipe, welded

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
21 Cr - 6 Ni - 9 Mn	SA-814	TPXM10	S21900	XM-10 or 21-6-9	Pipe, welded
21 Cr - 6 Ni - 9 Mn	SA-182	FXM-11	S21904	Nitronic 40 or XM-11 or 21-6-9 LC	Flanges, fittings, etc.
21 Cr - 6 Ni - 9 Mn	SA-312	TPXM-11	S21904	Nitronic 40 or XM-11 or 21-6-9 LC	Pipe, seamless and welded
21 Cr - 6 Ni - 9 Mn	SA-336	FXM-11	S21904	Nitronic 40 or XM-11 or 21-6-9 LC	Forgings
21 Cr - 6 Ni - 9 Mn	SA-479	Type XM-11	S21904	Nitronic 40 or XM-11 or 21-6-9 LC	Bars and shapes
21 Cr - 6 Ni - 9 Mn	SA-666	Type XM-11	S21904	Nitronic 40 or XM-11 or 21-6-9 LC	Plate, sheet, strip
21 Cr - 6 Ni - 9 Mn	SA-813	TPXM-11	S21904	Nitronic 40 or XM-11 or 21-6-9 LC	Pipe, welded
21 Cr - 6 Ni - 9 Mn	SA-814	TPXM-11	S21904	Nitronic 40 or XM-11 or 21-6-9 LC	Pipe, welded
21 Cr - 11 Ni - N	SA-182	F45	S30815	253 MA	Flanges, fittings, etc.
21 Cr - 11 Ni - N	SA-213	S30815	S30815	253 MA	Tubes, seamless
21 Cr - 11 Ni - N	SA-240	S30815	S30815	253 MA	Plate, sheet, strip
21 Cr - 11 Ni - N	SA-249	S30815	S30815	253 MA	Tubes, welded
21 Cr - 11 Ni - N	SA-312	S30815	S30815	253 MA	Pipe, seamless and welded
21 Cr - 11 Ni - N	SA-358	S30815	S30815	253 MA	Pipe, welded
21 Cr - 11 Ni - N	SA-409	S30815	S30815	253 MA	Pipe, welded
21 Cr - 11 Ni - N	SA-479	S30815	S30815	253 MA	Bars and shapes
21 Cr - 11 Ni - N	SA-813	S30815	S30815	253 MA	Pipe, welded
21 Cr - 11 Ni - N	SA-814	S30815	S30815	253 MA	Pipe, welded
22 Cr - 5 Ni - 3 Mo - N	SA-182	F51	S31803	2205	Flanges, fittings, etc.
22 Cr - 5 Ni - 3 Mo - N	SA-240	S31803	S31803	2205	Plate, sheet, strip
22 Cr - 5 Ni - 3 Mo - N	SA-479	S31803	S31803	2205	Bars and shapes
22 Cr - 5 Ni - 3 Mo - N	SA-789	S31803	S31803	2205	Tubes, seamless and welded
22 Cr - 5 Ni - 3 Mo - N	SA-790	S31803	S31803	2205	Pipe, seamless and welded
22 Cr - 5 Ni - 3 Mo - N	SA-815	S31803	S31803	2205	Fittings
22 Cr - 13 Ni - 5 Mn	SA-182	FXM-19	S20910	Nitronic 50 or 22-13-5	Flanges, fittings, etc.
22 Cr - 13 Ni - 5 Mn	SA-193	B8R and B8RA	S20910	Nitronic 50 or 22-13-5	Bolting
22 Cr - 13 Ni - 5 Mn	SA-194	8R and 8RA	S20910	Nitronic 50 or 22-13-5	Nuts
22 Cr - 13 Ni - 5 Mn	SA-213	XM-19	S20910	Nitronic 50 or 22-13-5	Tubes, seamless
22 Cr - 13 Ni - 5 Mn	SA-240	Type XM-19	S20910	Nitronic 50 or 22-13-5	Plate, sheet, strip
22 Cr - 13 Ni - 5 Mn	SA-249	TPXM-19	S20910	Nitronic 50 or 22-13-5	Tubes, welded
22 Cr - 13 Ni - 5 Mn	SA-312	TPXM-19	S20910	Nitronic 50 or 22-13-5	Pipe, seamless and welded
22 Cr - 13 Ni - 5 Mn	SA-336	FXM-19	S20910	Nitronic 50 or 22-13-5	Forgings
22 Cr - 13 Ni - 5 Mn	SA-351	CG6MMN	J93790	Nitronic 50 or 22-13-5 or CG6MMN	Castings
22 Cr - 13 Ni - 5 Mn	SA-358	XM-19	S20910	Nitronic 50 or 22-13-5	Pipe, welded
22 Cr - 13 Ni - 5 Mn	SA-403	XM-19	S20910	Nitronic 50 or 22-13-5	Fittings

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
22 Cr - 13 Ni - 5 Mn	SA-479	Type XM-19	S20910	Nitronic 50 or 22-13-5	Bars and shapes
22 Cr - 13 Ni - 5 Mn	SA-813	TPXM-19	S20910	Nitronic 50 or 22-13-5	Pipe, welded
22 Cr - 13 Ni - 5 Mn	SA-814	TPXM-19	S20910	Nitronic 50 or 22-13-5	Pipe, welded
23 Cr - 4 Ni - Mo - Cu-N	SA-240	S32304	S32304	2304	Plate, sheet, strip
23 Cr - 4 Ni - Mo - Cu-N	SA-789	S32304	S32304	2304	Tubes, seamless and welded
23 Cr - 4 Ni - Mo - Cu-N	SA-790	S32304	S32304	2304	Pipe, seamless and welded
23 Cr - 12 Ni	SA-403	WP309	S30900	309 SS	Fittings
23 Cr - 12 Ni	SA-213	TP309H	S30909	309H SS	Tubes, seamless
23 Cr - 12 Ni	SA-240	Type 309H	S30909	309H SS	Plate, sheet, strip
23 Cr - 12 Ni	SA-249	TP309H	S30909	309H SS	Tubes, welded
23 Cr - 12 Ni	SA-312	TP309H	S30909	309H SS	Pipe, seamless and welded
23 Cr - 12 Ni	SA-479	Type 309H	S30909	309H SS	Bars and shapes
23 Cr - 12 Ni	SA-213	TP309S	S30908	309S SS	Tubes, seamless
23 Cr - 12 Ni	SA-240	Type 309S	S30908	309S SS	Plate, sheet, strip
23 Cr - 12 Ni	SA-249	TP309S	S30908	309S SS	Tubes, welded
23 Cr - 12 Ni	SA-312	TP309S	S30908	309S SS	Pipe, seamless and welded
23 Cr - 12 Ni	SA-336	F309H	S30909	309H SS	Forgings
23 Cr - 12 Ni	SA-358	309S	S30908	309S SS	Pipe, welded
23 Cr - 12 Ni	SA-409	309S	S30908	309S SS	Pipe, welded
23 Cr - 12 Ni	SA-479	Type 309S	S30908	309S SS	Bars and shapes
23 Cr - 12 Ni	SA-813	TP309S	S30908	309S SS	Pipe, welded
23 Cr - 12 Ni	SA-814	TP309S	S30908	309S SS	Pipe, welded
23 Cr - 12 Ni - Cb	SA-213	TP309Cb	S30940	309Cb SS	Tubes, seamless
23 Cr - 12 Ni - Cb	SA-240	Type 309Cb	S30940	309Cb SS	Plate, sheet, strip
23 Cr - 12 Ni - Cb	SA-249	TP309Cb	S30940	309Cb SS	Tubes, welded
23 Cr - 12 Ni - Cb	SA-312	TP309Cb	S30940	309Cb SS	Pipe, seamless and welded
23 Cr - 12 Ni - Cb	SA-358	309Cb	S30940	309Cb SS	Pipe, welded
23 Cr - 12 Ni - Cb	SA-409	TP309Cb	S30940	309Cb SS	Pipe, welded
23 Cr - 12 Ni - Cb	SA-479	Type 309Cb	S30940	309Cb SS	Bars and shapes
23 Cr - 12 Ni - Cb	SA-813	TP309Cb	S30940	309Cb SS	Pipe, welded
23 Cr - 12 Ni - Cb	SA-814	TP309Cb	S30940	309Cb SS	Pipe, welded
23 Cr - 12 Ni - Cb	SA-213	TP309H Cb	S30941	309H Cb SS	Tubes, seamless
23 Cr - 12 Ni - Cb	SA-240	Type 309H Cb	S30941	309H Cb SS	Plate, sheet, strip
23 Cr - 12 Ni - Cb	SA-249	TP309H Cb	S30941	309H Cb SS	Tubes, welded
23 Cr - 12 Ni - Cb	SA-312	TP309H Cb	S30941	309H Cb SS	Pipe, seamless and welded

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
24 Cr - 9 Ni - N	SA-451	CPE20N	---	---	Pipe, centrifugal cast
24 Cr - 9 Ni - Mo - N	SA-351	CE20N	---	---	Castings
24 Cr - 10 Ni - 3 Mo - N	SA-351	CE8MN	J93345	CE8MN	Castings
24 Cr-17 Ni-6 Mn-4.5 Mo-N	(SA-182 CC)	S34565	S34565	4565S	Flanges, fittings, etc.
24 Cr-17 Ni-6 Mn-4.5 Mo-N	(SA-213 CC)	S34565	S34565	4565S	Tubes, seamless
24 Cr-17 Ni-6 Mn-4.5 Mo-N	SA-240	S34565	S34565	4565S	Plate, sheet, strip
24 Cr-17 Ni-6 Mn-4.5 Mo-N	SA-249	S34565	S34565	4565S	Tubes, welded
24 Cr-17 Ni-6 Mn-4.5 Mo-N	SA-312	S34565	S34565	4565S	Pipe, seamless and welded
24 Cr-17 Ni-6 Mn-4.5 Mo-N	SA-358	S34565	S34565	4565S	Pipe, welded
24 Cr-17 Ni-6 Mn-4.5 Mo-N	(SA-376 CC)	S34565	S34565	4565S	Pipe, seamless
24 Cr-17 Ni-6 Mn-4.5 Mo-N	SA-403	S34565	S34565	4565S	Fittings
24 Cr-17 Ni-6 Mn-4.5 Mo-N	SA-409	S34565	S34565	4565S	Pipe, welded
24 Cr-17 Ni-6 Mn-4.5 Mo-N	SA-479	S34565	S34565	4565S	Bars and shapes
24 Cr - 22 Ni - 7.5 Mo	(SA-182 CC)		S32654	654 SMO	Flanges, fittings, etc.
24 Cr - 22 Ni - 7.5 Mo	SA-240		S32654	654 SMO	Plate, sheet, strip
24 Cr - 22 Ni - 7.5 Mo	(SA-249 CC)		S32654	654 SMO	Tubes, welded
24 Cr - 22 Ni - 7.5 Mo	SA-312		S32654	654 SMO	Pipe, seamless and welded
24 Cr - 22 Ni - 7.5 Mo	SA-358		S32654	654 SMO	Pipe, welded
24 Cr - 22 Ni - 7.5 Mo	(SA-403 CC)		S32654	654 SMO	Fittings
25 Cr - 4 Ni - 4 Mo - Ti	SA-240	S44635	S44635	25-4-4	Plate, sheet, strip
25 Cr - 4 Ni - 4 Mo - Ti	SA-268	25-4-4	S44635	25-4-4	Tubes, seamless and welded
25 Cr - 4 Ni - 4 Mo - Ti	SA-803	25-4-4	S44635	25-4-4	Tubes, welded
25 Cr - 5 Ni - 3 Cu - 2 Mo	SA-240	S32550	S32550	Ferralium 255	Plate, sheet, strip
25 Cr - 5 Ni - 3 Cu - 2 Mo	SA-351	CD4MCu	J93370	Ferralium 255, CD4MCu	Castings
25 Cr - 5 Ni - 3 Cu - 2 Mo	SA-479	F255	S32550	Ferralium 255	Bars and shapes
25 Cr - 5 Ni - 3 Cu - 2 Mo	SA-789	S32550	S32550	Ferralium 255	Tubes, seamless and welded
25 Cr - 5 Ni - 3 Cu - 2 Mo	SA-790	S32550	S32550	Ferralium 255	Pipe, seamless and welded
25 Cr - 6 Ni - Mo - N	SA-182	F50	S31200	44LN	Flanges, fittings, etc.
25 Cr - 6 Ni - Mo - N	SA-240	S31200	S31200	44LN	Plate, sheet, strip
25 Cr - 6 Ni - Mo - N	SA-789	S31200	S31200	44LN	Tubes, seamless and welded
25 Cr - 6 Ni - Mo - N	SA-790	S31200	S31200	44LN	Pipe, seamless and welded
25 Cr - 6 Ni - 3 Mo - N	SA-240	S31260	S31260	DP-3	Plate, sheet, strip
25 Cr - 6 Ni - 3 Mo - N	SA-789	S31260	S31260	DP-3	Tubes, seamless and welded
25 Cr - 6 Ni - 3 Mo - N	SA-790	S31260	S31260	DP-3	Pipe, seamless and welded
25 Cr - 7 Ni - 3 Mo - Cu - W	SA-240	---	S32760	Zeron 100	Plate, sheet, strip

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
25 Cr - 7 Ni - 3 Mo - Cu - W	SA-789	---	S32760	Zeron 100	Tubes, seamless and welded
25 Cr - 7 Ni - 3 Mo - Cu - W	SA-790	---	S32760	Zeron 100	Pipe, seamless and welded
25 Cr - 7 Ni - 3 Mo - Cu - W	SA-815	S32760	S32760	Zeron 100	Fittings
25 Cr-7 Ni-3 Mo-2 W-Cu-N	SA-789	---	S32740	---	Tubes, seamless and welded
25 Cr-7 Ni-3 Mo-2 W-Cu-N	SA-790	---	S32740	---	Pipe, seamless and welded
25 Cr - 7 Ni - 3 Mo - 2 W - N	SA-815	S39274	S39274	DP3W	Fittings
25 Cr-7.5 Ni-3.5 Mo-N-Cu-W	SA-351	CD3MWCuN	J93880	---	Castings
25 Cr - 7 Ni- 3.5 Mo - Cu - W - N	SA-479	---	S39277	AF 918	Bars and shapes
25 Cr - 7 Ni - 4 Mo - N	SA-182	F53	S32750	SAF 2507	Flanges, fittings, etc.
25 Cr - 7 Ni - 4 Mo - N	SA-240	---	S32750	SAF 2507	Plate, sheet, strip
25 Cr - 7 Ni - 4 Mo - N	SA-479	---	S32750	SAF 2507	Bars and shapes
25 Cr - 7 Ni - 4 Mo - N	SA-789	S32750	S32750	SAF 2507	Tubes, seamless and welded
25 Cr - 7 Ni - 4 Mo - N	SA-790	S32750	S32750	SAF 2507	Pipe, seamless and welded
25 Cr - 7 Ni - 4 Mo - N	SA-815	S32750	S32750	2507	Fittings
25 Cr - 12 Ni	SA-351	CH8	J93400	CH8	Castings
25 Cr - 12 Ni	SA-351	CH10	J93401	CH10	Castings
25 Cr - 12 Ni	SA-351	CH20	J93402	CH20	Castings
25 Cr - 12 Ni	SA-451	CPH8	J93400	CPH8	Pipe, centrifugal cast
25 Cr - 12 Ni	SA-451	CPH10	J93401	CPH10	Pipe, centrifugal cast
25 Cr - 12 Ni	SA-451	CPH20	J93402	CPH20	Pipe, centrifugal cast
25 Cr - 20 Ni	SA-182	F310	S31000	310 SS	Flanges, fittings, etc.
25 Cr - 20 Ni	SA-336	F310	S31000	310 SS	Forgings
25 Cr - 20 Ni	SA-351	CK20	J94202	CK20	Castings
25 Cr - 20 Ni	SA-403	310	S31000	310 SS	Fittings
25 Cr - 20 Ni	SA-451	CPK20	J94202	CPK20	Pipe, centrifugal cast
25 Cr - 20 Ni	SA-213	TP310H	S31009	310H SS	Tubes, seamless
25 Cr - 20 Ni	SA-240	Type 310H	S31009	310H SS	Plate, sheet, strip
25 Cr - 20 Ni	SA-249	TP310H	S31009	310H SS	Tubes, welded
25 Cr - 20 Ni	SA-312	TP310H	S31009	310H SS	Pipe, seamless and welded
25 Cr - 20 Ni	SA-336	F310H	S31009	310H SS	Forgings
25 Cr - 20 Ni	SA-479	Type 310H	S31009	310H SS	Bars and shapes
25 Cr - 20 Ni	SA-213	TP310S	S31008	310S SS	Tubes, seamless
25 Cr - 20 Ni	SA-240	Type 310S	S31008	310S SS	Plate, sheet, strip
25 Cr - 20 Ni	SA-249	TP310S	S31008	310S SS	Tubes, welded
25 Cr - 20 Ni	SA-312	TP310S	S31008	310S SS	Pipe, seamless and welded

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
25 Cr - 20 Ni	SA-358	310S	S31008	310S SS	Pipe, welded
25 Cr - 20 Ni	SA-409	TP310S	S31008	310S SS	Pipe, welded
25 Cr - 20 Ni	SA-479	Type 310S	S31008	310S SS	Bars and shapes
25 Cr - 20 Ni	SA-813	TP310S	S31008	310S SS	Pipe, welded
25 Cr - 20 Ni	SA-814	TP310S	S31008	310S SS	Pipe, welded
25 Cr - 20 Ni - Cb	SA-213	TP310Cb	S31040	310Cb SS	Tubes, seamless
25 Cr - 20 Ni - Cb	SA-240	Type 310Cb	S31040	310Cb SS	Plate, sheet, strip
25 Cr - 20 Ni - Cb	SA-249	TP310Cb	S31040	310Cb SS	Tubes, welded
25 Cr - 20 Ni - Cb	SA-312	TP310Cb	S31040	310Cb SS	Pipe, seamless and welded
25 Cr - 20 Ni - Cb	SA-358	310Cb	S31040	310Cb SS	Pipe, welded
25 Cr - 20 Ni - Cb	SA-409	TP310Cb	S31040	310Cb SS	Pipe, welded
25 Cr - 20 Ni - Cb	SA-479	Type 310Cb	S31040	310Cb SS	Bars and shapes
25 Cr - 20 Ni - Cb	SA-813	TP310Cb	S31040	310Cb SS	Pipe, welded
25 Cr - 20 Ni - Cb	SA-814	TP310Cb	S31040	310Cb SS	Pipe, welded
25 Cr - 20 Ni - Cb	SA-213	TP310H Cb	S31041	310HCb SS	Tubes, seamless
25 Cr - 20 Ni - Cb	SA-240	Type 310H Cb	S31041	310HCb SS	Plate, sheet, strip
25 Cr - 20 Ni - Cb	SA-249	TP310H Cb	S31041	310HCb SS	Tubes, welded
25 Cr - 20 Ni - Cb	SA-312	TP310H Cb	S31041	310HCb SS	Pipe, seamless and welded
25 Cr - 20 Ni - Cb - N	SA-213	---	S31042	310HCbN	Tubes, seamless
25 Cr - 20 Ni - ½ Mo	SA-351	HK30	J94203	HK30	Castings
25 Cr - 20 Ni - ½ Mo	SA-351	HK40	J94204	HK40	Castings
25 Cr - 20 Ni - 2 Mo - N	(SA-182 CC)	---	S31050	310MoLN	Flanges, fittings, etc.
25 Cr - 20 Ni - 2 Mo - N	SA-213	S31050	S31050	310Mo LN	Tubes, seamless
25 Cr - 20 Ni - 2 Mo - N	SA-240	Type 310Mo LN	S31050	310Mo LN	Plate, sheet, strip
25 Cr - 20 Ni - 2 Mo - N	SA-249	S31050	S31050	310Mo LN	Tubes, welded
25 Cr - 20 Ni - 2 Mo - N	SA-312	S31050	S31050	310Mo LN	Pipe, seamless and welded
25 Cr - 35 Ni- N - Ce	SA-240	---	S35315	353 MA	Plate, sheet, strip
26 Cr - 3 Ni - 3 Mo	SA-240	Type S44660	S44660	SC-1 or 26-3-3	Plate, sheet, strip
26 Cr - 3 Ni - 3 Mo	SA-268	26-3-3	S44660	SC-1 or 26-3-3	Tubes, seamless and welded
26 Cr - 3 Ni - 3 Mo	SA-731	26-3-3	S44660	SC-1 or 26-3-3	Pipe, seamless and welded
26 Cr - 3 Ni - 3 Mo	SA-803	26-3-3	S44660	SC-1 or 26-3-3	Tubes, welded
26 Cr - 4 Ni - Mo	SA-240	Type 329	S32900	329 SS	Plate, sheet, strip
26 Cr - 4 Ni - Mo	SA-789	S32900	S32900	329 SS	Tubes, seamless and welded
26 Cr - 4 Ni - Mo	SA-790	S32900	S32900	329 SS	Pipe, seamless and welded
26 Cr - 4 Ni - Mn - N	SA-182	F52	S32950	7 Mo Plus	Flanges, fittings, etc.

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
26 Cr - 4 Ni - Mn - N	SA-240	Type S32950	S32950	7 Mo Plus	Plate, sheet, strip
26 Cr - 4 Ni - Mn - N	SA-789	S32950	S32950	7 Mo Plus	Tubes, seamless and welded
26 Cr - 4 Ni - Mn - N	SA-790	S32950	S32950	7 Mo Plus	Pipe, seamless and welded
26 Cr - 4 Ni - Mn - N	SA-815	S32950	S32950	7 Mo Plus	Fittings
26 Cr - 4 Ni - Mn - N	SA-479	S32950	S32950	7 Mo Plus	Bars and shapes
27 Cr	SA-268	TP446	S44600	446 SS	Tubes, seamless and welded
27 Cr	SA-815	WP446	S44600	446 SS	Fittings
27 Cr - 1 Cu	SA-268	TP443	S44300	443	Tubes, seamless and welded
27 Cr - 1 Mo	SA-182	FXM-27Cb	S44627	XM-27	Flanges, fittings, etc.
27 Cr - 1 Mo	SA-240	Type XM-27	S44627	XM-27	Plate, sheet, strip
27 Cr - 1 Mo	SA-268	TPXM-27	S44627	XM-27	Tubes, seamless and welded
27 Cr - 1 Mo	SA-479	Type XM-27	S44627	XM-27	Bars and shapes
27 Cr - 1 Mo	SA-731	TPXM-27	S44627	XM-27	Pipe, seamless and welded
27 Cr - 1 Mo	SA-803	TPXM-27	S44627	XM-27	Tubes, welded
27 Cr - 1 Mo	SA-815	WP-27	S44627	XM-27	Fittings
27 Cr - 1 Mo - Ti	SA-240	Type XM-33	S44626	26-1	Plate, sheet, strip
27 Cr - 1 Mo - Ti	SA-268	TPXM-33	S44626	26-1	Tubes, seamless and welded
27 Cr - 1 Mo - Ti	SA-731	TPXM-33	S44626	26-1	Pipe, seamless and welded
27 Cr - 1 Mo - Ti	SA-803	TPXM-33	S44626	26-1	Tubes, welded
27 Cr - 1 Mo - Ti	SA-815	WP-33	S44626	26-1	Fittings
27 Cr - 32 Ni - Cb	SA-213	---	S33228	Nicrofer 3228 NbCe or Alloy AC66	Tubes, seamless
27 Cr - 32 Ni - Cb	SA-240	---	S33228	Nicrofer 3228 NbCe or Alloy AC66	Plate, sheet, strip
27 Cr - 32 Ni - Cb	SA-312	---	S33228	Nicrofer 3228 NbCe or Alloy AC66	Pipe, seamless and welded
27 Cr - 32 Ni - Cb	SA-479	---	S33228	Nicrofer 3228 NbCe or Alloy AC66	Bars and shapes
28 Cr - 3 Ni - 2 Mo - Cb	SA-240	---	S32803	Cronifer 2803	Plate, sheet, strip
28 Cr - 3 Ni - 2 Mo - Cb	SA-268	---	S32803	Cronifer 2803	Tubes, seamless and welded
29 Cr - 4 Mo	SA-240	---	S44700	29-4	Plate, sheet, strip
29 Cr - 4 Mo	SA-268	29-4	S44700	29-4	Tubes, seamless and welded
29 Cr - 4 Mo	SA-479	---	S44700	29-4	Bars and shapes
29 Cr - 4 Mo	SA-731	29-4	S44700	29-4	Pipe, seamless and welded
29 Cr - 4 Mo	SA-803	29-4	S44700	29-4	Tubes, welded
29 Cr - 4 Mo - Ti	SA-240	S44735	S44735	29-4C	Plate, sheet, strip
29 Cr - 4 Mo - Ti	SA-268	S44735	S44735	29-4C	Tubes, seamless and welded
29 Cr - 4 Mo - Ti	SA-803	29-4C	S44735	29-4C	Tubes, welded
29 Cr - 4 Mo - 2 Ni	SA-240	---	S44800	28-4-2	Plate, sheet, strip

HIGH ALLOY STEELS BY NOMINAL COMPOSITION (Continued)					
Nominal Composition	**Specification No.**	**Grade Designation**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
29 Cr - 4 Mo - 2 Ni	SA-268	29-4-2	S44800	28-4-2	Tubes, seamless and welded
29 Cr - 4 Mo - 2 Ni	SA-479	S44800	S44800	28-4-2	Bars and shapes
29 Cr - 4 Mo - 2 Ni	SA-731	29-4-2	S44800	28-4-2	Pipe, seamless and welded
29 Cr - 4 Mo - 2 Ni	SA-803	29-4-2	S44800	28-4-2	Tubes, welded
20 Ni - 8 Cr	SA-182	F10	S33100	---	Flanges, fittings, etc.
25 Ni - 15 Cr - 2 Ti	SA-453	660	S66286	A286 SS	Bolting
25 Ni - 15 Cr - 2 Ti	SA-638	660	S66286	A286 SS	Bars
26 Ni - 14 Cr - Mo - Ti	SA-453	662	S66220	Discaloy	Bolting
26 Ni - 14 Cr - Mo - Ti	SA-453	665	S66545	W545	Bars
26 Ni - 14 Cr - Mo - Ti	SA-638	662	S66220	Discaloy	Bars
29 Ni - 20 Cr - 3 Cu - 2 Mo	SA-351	CN7M	N08007	CN7M	Castings

ALUMINUM BASE ALLOYS BY NOMINAL COMPOSITION				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
99.60 Al	SB-209	A91060	Aluminum 1060	Sheet and plate
99.60 Al	SB-210	A91060	Aluminum 1060	Tubes, seamless
99.60 Al	SB-221	A91060	Aluminum 1060	Bars, rods and shapes
99.60 Al	SB-234	A91060	Aluminum 1060	Tubes, seamless
99.60 Al	SB-241	A91060	Aluminum 1060	Pipe and tubes, seamless
99.0 Al - Cu	SB-209	A91100	Aluminum 1100	Sheet and plate
99.0 Al - Cu	SB-221	A91100	Aluminum 1100	Rods, bars and shapes
99.0 Al - Cu	SB-241	A91100	Aluminum 1100	Pipe and tubes, seamless
Al - Cu - Mg	SB-26	A02040	Aluminum casting 204.0	Castings
Al - Cu - Mg	SB-108	A02040	Aluminum casting 204.0	Castings
Al - 4 Cu - Mg	SB-211	A92024	Aluminum 2024	Bars, rod and wire
Al - 4 Cu - Mg	SB-221	A92024	Aluminum 2024	Bars, rods and shapes
Al - 4 Cu - Si - Mn	SB-211	A92014	Aluminum 2014	Bars, rod and wire
Al - 4 Cu - Si - Mn	SB-247	A92014	Aluminum 2014	Forgings
Al - Mg - Si	SB-210	A96063	Aluminum 6063	Tubes, seamless
Al - Mg - Si	SB-221	A96063	Aluminum 6063	Bars, rods and shapes
Al - Mg - Si	SB-241	A96063	Aluminum 6063	Pipe and tubes, seamless
Al - Mg - Si - Cu	SB-209	A96061	Aluminum 6061	Sheet and plate
Al - Mg - Si - Cu	SB-210	A96061	Aluminum 6061	Tubes, seamless
Al - Mg - Si - Cu	SB-211	A96061	Aluminum 6061	Bars, rod and wire

ALUMINUM BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
Al - Mg - Si - Cu	SB-221	A96061	Aluminum 6061	Bars, rods and shapes
Al - Mg - Si - Cu	SB-234	A96061	Aluminum 6061	Tubes, seamless
Al - Mg - Si - Cu	SB-241	A96061	Aluminum 6061	Pipe and tubes, seamless
Al - Mg - Si - Cu	SB-247	A96061	Aluminum 6061	Forgings
Al - Mg - Si - Cu	SB-308	A96061	Aluminum 6061	Shapes
---	SB-209	A86061	Alclad 6061	Sheet and plate
Al - 2.5 Mg	SB-209	A95052	Aluminum 5052	Sheet and plate
Al - 2.5 Mg	SB-209	A95652	Aluminum 5652	Sheet and plate
Al - 2.5 Mg	SB-210	A95052	Aluminum 5052	Tubes, seamless
Al - 2.5 Mg	SB-234	A95052	Aluminum 5052	Tubes, seamless
Al - 2.5 Mg	SB-241	A95052	Aluminum 5052	Pipe and tubes, seamless
Al - 2.7 Mg - Mn	SB-209	A95454	Aluminum 5454	Sheet and plate
Al - 2.7 Mg - Mn	SB-221	A95454	Aluminum 5454	Bars, rods and shapes
Al - 2.7 Mg - Mn	SB-234	A95454	Aluminum 5454	Tubes, seamless
Al - 2.7 Mg - Mn	SB-241	A95454	Aluminum 5454	Pipe and tubes, seamless
Al - 3.5 Mg	SB-209	A95154	Aluminum 5154	Sheet and plate
Al - 3.5 Mg	SB-209	A95254	Aluminum 5254	Sheet and plate
Al - 3.5 Mg	SB-210	A95154	Aluminum 5154	Tubes, seamless
Al - 3.5 Mg	SB-221	A95154	Aluminum 5154	Bars, rods and shapes
Al - 4.0 Mg - Mn	SB-209	A95086	Aluminum 5086	Sheet and plate
Al - 4.0 Mg - Mn	SB-221	A95086	Aluminum 5086	Bars, rods and shapes
Al - 4.0 Mg - Mn	SB-241	A95086	Aluminum 5086	Pipe and tubes, seamless
Al - 4.4 Mg - Mn	SB-209	A95083	Aluminum 5083	Sheet and plate
Al - 4.4 Mg - Mn	SB-221	A95083	Aluminum 5083	Bars, rods and shapes
Al - 4.4 Mg - Mn	SB-241	A95083	Aluminum 5083	Pipe and tubes, seamless
Al - 4.4 Mg - Mn	SB-247	A95083	Aluminum 5083	Forgings
Al - 5.1 Mg - Mn	SB-209	A95456	Aluminum 5456	Sheet and plate
Al - 5.1 Mg - Mn	SB-221	A95456	Aluminum 5456	Bars, rods and shapes
Al - 5.1 Mg - Mn	SB-241	A95456	Aluminum 5456	Pipe and tubes, seamless
Al - Mn - Cu	SB-209	A93003	Aluminum 3003	Sheet and plate
Al - Mn - Cu	SB-210	A93003	Aluminum 3003	Tubes, seamless
Al - Mn - Cu	SB-221	A93003	Aluminum 3003	Bars, rods and shapes
Al - Mn - Cu	SB-234	A93003	Aluminum 3003	Tubes, seamless
Al - Mn - Cu	SB-241	A93003	Aluminum 3003	Pipe and tubes, seamless
Al - Mn - Cu	SB-247	A93003	Aluminum 3003	Forgings

ALUMINUM BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
---	SB-209	A83003	Alclad 3003	Sheet and plate
---	SB-210	A83003	Alclad 3003	Tubes, seamless
---	SB-234	A83003	Alclad 3003	Tubes, seamless
---	SB-241	A83003	Alclad 3003	Pipe and tubes, seamless
Al - Mn - Mg	SB-209	A93004	Aluminum 3004	Sheet and plate
---	SB-209	A83004	Alclad 3004	Sheet and plate
Al - Si	SB-26	A24430	Aluminum casting 443.0	Castings
Al - Si - Mg	SB-26	A03560	Aluminum casting 356.0	Castings
Al - Si - Mg	SB-108	A03560	Aluminum casting 356.0	Castings

COPPER BASE ALLOYS BY NOMINAL COMPOSITION				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
99.95 Cu	SB-42	C10200	Copper 102, OF	Pipe, seamless
99.95 Cu	SB-75	C10200	Copper 102, OF	Tubes, seamless
99.95 Cu	SB-111	C10200	Copper 102, OF	Tubes, seamless
99.95 Cu	SB-152	C10200	Copper 102, OF	Sheet, strip, etc.
99.95 Cu	SB-187	C10200	Copper 102, OF	Bar, rod and shapes
99.95 Cu	SB-359	C10200	Copper 102, OF	Tubes, seamless with fins
99.95 Cu	SB-395	C10200	Copper 102, OF	Tubes, seamless - U
99.95 Cu + Ag	SB-152	C10400	Copper 104, OFS	Sheet, strip, etc.
99.95 Cu + Ag	SB-152	C10500	Copper 105, OFS	Sheet, strip, e tc.
99.95 Cu + Ag	SB-152	C10700	Copper 107, OFS	Sheet, strip, etc.
99.90 Cu	SB-152	C11000	Copper 110, ETP	Sheet, strip, etc.
99.90 Cu	SB-187	C11000	Copper 110, ETP	Bar, rod and shapes
99.90 Cu + Ag + P	SB-152	C12300	Copper 123, DPS	Sheet, strip, etc.
99.90 Cu + P	SB-42	C12000	Copper 120, DLP	Pipe, seamless
99.90 Cu + P	SB-75	C12000	Copper 120, DLP	Tubes, seamless
99.90 Cu + P	SB-111	C12000	Copper 120, DLP	Tubes, seamless
99.90 Cu + P	SB-359	C12000	Copper 120, DLP	Tubes, seamless with fins
99.90 Cu + P	SB-395	C12000	Copper 120, DLP	Tubes, seamless - U
99.9 Cu + P	SB-42	C12200	Copper 122, DHP	Pipe, seamless
99.9 Cu + P	SB-75	C12200	Copper 122, DHP	Tubes, seamless
99.9 Cu + P	SB-111	C12200	Copper 122, DHP	Tubes, seamless
99.9 Cu + P	SB-152	C12200	Copper 122, DHP	Sheet, strip, etc.
99.9 Cu + P	SB-359	C12200	Copper 122, DHP	Tubes, seamless with fins

COPPER BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
99.9 Cu + P	SB-395	C12200	Copper 122, DHP	Tubes, seamless - U
99.9 Cu + P	SB-543	C12200	Copper 122, DHP	Tubes, welded
99.88 Cu	SB-152	C12500	Copper 125, FRTP	Sheet, strip, etc.
99.40 Cu + As + P	SB-75	C14200	Copper 142, DPA	Tubes, seamless
99.40 Cu + As + P	SB-111	C14200	Copper 142, DPA	Tubes, seamless
99.40 Cu + As + P	SB-152	C14200	Copper 142, DPA	Sheet, strip, etc.
99.40 Cu + As + P	SB-359	C14200	Copper 142, DPA	Tubes, seamless with fins
99.40 Cu + As + P	SB-395	C14200	Copper 142, DPA	Tubes, seamless - U
98.7 Cu + Fe + P	SB-111	C19200	Copper 192, 1% Fe, 0.03% P	Tubes, seamless
98.7 Cu + Fe + P	SB-359	C19200	Copper 192, 1% Fe, 0.03% P	Tubes, seamless with fins
98.7 Cu + Fe + P	SB-395	C19200	Copper 192, 1% Fe, 0.03% P	Tubes, seamless - U
98.5 Cu - 1.5 Si	SB-98	C65100	Bronze, low silicon, B	Rods, bars and shapes
97.4 Cu + Fe	SB-543	C19400	Copper 194, Cu-Fe	Tubes, welded
97 Cu - 3 Si	SB-96	C65500	Bronze, high silicon, A	Plate and sheet
97 Cu - 3 Si	SB-98	C65500	Bronze, high silicon, A	Rods, bars and shapes
97 Cu - 3 Si	SB-315	C65500	Bronze, high silicon, A	Pipe and tube, seamless
95 Cu - 5 Al	SB-111	C60800	Aluminum bronze	Tubes, seamless
95 Cu - 5 Al	SB-359	C60800	Aluminum bronze	Tubes, seamless with fins
95 Cu - 5 Al	SB-395	C60800	Aluminum bronze	Tubes, seamless - U
95 Cu - 5 Ni	SB-111	C70400	Copper-nickel 5%	Tubes, seamless
95 Cu - 5 Ni	SB-359	C70400	Copper-nickel 5%	Tubes, seamless with fins
95 Cu - 5 Ni	SB-543	C70400	Copper-nickel 5%	Tubes, welded
94 Cu - 3 Si - Pb	SB-98	C66100	Bronze, silicon	Rods, bars and shapes
91 Cu - 7 Al - 2 Si	SB-150	C64200	Aluminum bronze No. 1	Rods, bars and shapes
91 Cu - 7 Al - 2 Si	SB-283	C64200	Aluminum bronze No. 1	Forgings
90 Cu - 7 Al - 3 Fe	SB-150	C61400	Aluminum bronze D	Rods, bars and shapes
90 Cu - 7 Al - 3 Fe	SB-169	C61400	Aluminum bronze D	Plate, sheet, etc.
90 Cu - 7 Al - 3 Fe	SB-171	C61400	Aluminum bronze D	Plates
90 Cu - 10 Ni	SB-111	C70600	Copper-nickel 10%	Tubes, seamless
90 Cu - 10 Ni	SB-151	C70600	Copper-nickel 10%	Rods and bars
90 Cu - 10 Ni	SB-171	C70600	Copper-nickel 10%	Plates
90 Cu - 10 Ni	SB-359	C70600	Copper-nickel 10%	Tubes, seamless with fins
90 Cu - 10 Ni	SB-395	C70600	Copper-nickel 10%	Tubes, seamless - U
90 Cu - 10 Ni	SB-466	C70600	Copper-nickel 10%	Pipe and tube, seamless
90 Cu - 10 Ni	SB-467	C70600	Copper-nickel 10%	Pipe and tube, welded

COPPER BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
90 Cu - 10 Ni	SB-543	C70600	Copper-nickel 10%	Tubes, welded
88 Cu - 9 Al - 3 Fe	SB-148	C95200	Aluminum bronze 9A, cast	Castings
88 Cu - 9 Al - 3 Fe	SB-150	C62300	Aluminum bronze	Rods, bars and shapes
88 Cu - 9 Al - 3 Fe	SB-271	C95200	Aluminum bronze 9A, cast	Castings
88 Cu - 9 Al - 3 Fe	SB-505	C95200	Aluminum bronze 9A, cast	Castings
88 Cu - Sn - Zn - Pb	SB-61	C92200	Tin bronze, leaded, cast (Navy ″M″ bronze, steam bronze)	Castings
88 Cu - Sn - Zn - Pb	SB-584	C92200	Tin bronze, leaded, cast (Navy ″M″ bronze, steam bronze)	Castings
87.5 Cu - 10 Ni - Fe - Mn	SB-369	C96200	Copper-nickel, cast	Castings
87 Cu - 8 Sn - 4 Zn	(SB-584 CC)	C90300	Tin bronze	Castings
85 Cu - 11 Al - 4 Fe	SB-148	C95400	Aluminum bronze 9C, cast	Castings
85 Cu - 11 Al - 4 Fe	SB-271	C95400	Aluminum bronze 9C, cast	Castings
85 Cu - 5 Sn - 5 Zn - 5 Pb	SB-62	C83600	Red brass, leaded, cast (ounce metal)	Castings
85 Cu - 15 Zn	SB-43	C23000	Red brass 230,	Pipe, seamless
85 Cu - 15 Zn	SB-111	C23000	Red brass 230	Tubes, seamless
85 Cu - 15 Zn	SB-135	C23000	Red brass 230	Tubes, seamless
85 Cu - 15 Zn	SB-359	C23000	Red brass 230	Tubes, seamless with fins
85 Cu - 15 Zn	SB-395	C23000	Red brass 230	Tubes, seamless - U
85 Cu - 15 Zn	SB-543	C23000	Red brass 230	Tubes, welded
81 Cu - 10 Al - 3 Fe	SB-150	C63000	Aluminum bronze No. 2	Rods, bars and shapes
81 Cu - 10 Al - 3 Fe	SB-171	C63000	Aluminum bronze No. 2	Plates
81 Cu - 9 Zn - 7 Pb - 3 Sn	SB-584	C84400	Semi-red brass, leaded, cast (valve metal)	Castings
80 Cu - 16 Ni - Mn - Zn - Cr	SB-111	C72200	Copper-nickel, chromium	Tubes, seamless
80 Cu - 20 Ni	SB-111	C71000	Copper-nickel 20%	Tubes, seamless
80 Cu - 20 Ni	SB-359	C71000	Copper-nickel 20%	Tubes, seamless with fins
80 Cu - 20 Ni	SB-395	C71000	Copper-nickel 20%	Tubes, seamless - U
80 Cu - 20 Ni	SB-466	C71000	Copper-nickel 20%i	Pipe and tube, seamless
80 Cu - 10 Sn - 10 Pb	SB-584	C93700	Tin bronze, high lead (bushing and bearing bronze)	Castings
78 Cu - 20 Zn - 2 Al	SB-111	C68700	Aluminum brass arsenical	Tubes, seamless
78 Cu - 20 Zn - 2 Al	SB-359	C68700	Aluminum brass arsenical	Tubes, seamless with fins
78 Cu - 20 Zn - 2 Al	SB-395	C68700	Aluminum brass arsenical	Tubes, seamless - U
78 Cu - 20 Zn - 2 Al	SB-543	C68700	Aluminum brass arsenical	Tubes, welded
71 Cu - 28 Zn - 1 Sn	SB-111	C44300	Admiralty metal, arsenical	Tubes, seamless
71 Cu - 28 Zn - 1 Sn	SB-171	C44300	Admiralty metal, arsenical	Plates

COPPER BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
71 Cu - 28 Zn - 1 Sn	SB-359	C44300	Admiralty metal, arsenical	Tubes, seamless with fins
71 Cu - 28 Zn - 1 Sn	SB-395	C44300	Admiralty metal, arsenical	Tubes, seamless - U
71 Cu - 28 Zn - 1 Sn	SB-543	C44300	Admiralty metal, arsenical	Tubes, welded
71 Cu - 28 Zn - 1 Sn	SB-111	C44400	Admiralty metal,antimonial	Tubes, seamless
71 Cu - 28 Zn - 1 Sn	SB-171	C44400	Admiralty metal,antimonial	Plates
71 Cu - 28 Zn - 1 Sn	SB-359	C44400	Admiralty metal,antimonial	Tubes, seamless with fins
71 Cu - 28 Zn - 1 Sn	SB-395	C44400	Admiralty metal,antimonial	Tubes, seamless - U
71 Cu - 28 Zn - 1 Sn	SB-543	C44400	Admiralty metal,antimonial	Tubes, welded
71 Cu - 28 Zn - 1 Sn	SB-111	C44500	Admiralty metal, phosphorized	Tubes, seamless
71 Cu - 28 Zn - 1 Sn	SB-171	C44500	Admiralty metal, phosphorized	Plates
71 Cu - 28 Zn - 1 Sn	SB-359	C44500	Admiralty metal, phosphorized	Tubes, seamless with fins
71 Cu - 28 Zn - 1 Sn	SB-395	C44500	Admiralty metal, phosphorized	Tubes, seamless - U
71 Cu - 28 Zn - 1 Sn	SB-543	C44500	Admiralty metal, phosphorized	Tubes, welded
70 Cu - 30 Ni	SB-111	C71500	Copper-nickel 30%	Tubes, seamless
70 Cu - 30 Ni	SB-151	C71500	Copper-nickel 30%	Rods and bars
70 Cu - 30 Ni	SB-171	C71500	Copper-nickel 30%	Plates
70 Cu - 30 Ni	SB-359	C71500	Copper-nickel 30%	Tubes, seamless with fins
70 Cu - 30 Ni	SB-395	C71500	Copper-nickel 30%	Tubes, seamless - U
70 Cu - 30 Ni	SB-466	C71500	Copper-nickel 30%	Pipe and tube, seamless
70 Cu - 30 Ni	SB-467	C71500	Copper-nickel 30%	Pipe and tube, welded
70 Cu - 30 Ni	SB-543	C71500	Copper-nickel 30%	Tubes, welded
66 Cu - 30 Ni - 2 Fe - 2 Mn	SB-111	C71640	---	Tubes, seamless
66 Cu - 30 Ni - 2 Fe - 2 Mn	SB-543	C71640	---	Tubes, welded
65 Cu - 20 Ni - 8 Zn	SB-584	C97600	Nickel-bronze, leaded (dairy metal)	Castings
60 Cu - 37 Zn - 2 Pb	SB-283	C37700	Brass forging 377	Forgings
60 Cu - 39 Zn - Pb	SB-171	C36500	Muntz metal leaded 365	Plates
60 Cu - 39 Zn - Sn	SB-171	C46400	Naval brass uninhibited	Plates
60 Cu - 39 Zn - Sn - As	SB-171	C46500	Naval brass arsenical	Plates
60 Cu - 40 Zn	SB-111	C28000	Muntz metal 280	Tubes, seamless

NICKEL BASE ALLOYS BY NOMINAL COMPOSITION				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
99.0 Ni	SB-160	N02200	Nickel 200	Rod and bar
99.0 Ni	SB-161	N02200	Nickel 200	Pipe and tube, seamless
99.0 Ni	SB-162	N02200	Nickel 200	Plate, sheet, strip
99.0 Ni	SB-163	N02200	Nickel 200	Tubes, seamless
99.0 Ni	SB-366	N02200	Nickel 200	Fittings
99.0 Ni	SB-564	N02200	Nickel 200	Forgings
99.0 Ni - Low C	SB-160	N02201	Nickel 201	Rod and bar
99.0 Ni - Low C	SB-161	N02201	Nickel 201	Pipe and tube, seamless
99.0 Ni - Low C	SB-162	N02201	Nickel 201	Plate, sheet, strip
99.0 Ni - Low C	SB-163	N02201	Nickel 201	Tubes, seamless
99.0 Ni - Low C	SB-366	N02201	Nickel 201	Fittings
95 Ni	SA-494	N02100	CZ100	Castings
72 Ni - 15 Cr - 8 Fe	SB-163	N06600	Inconel 600	Tubes, seamless
72 Ni - 15 Cr - 8 Fe	SB-166	N06600	Inconel 600	Rod and bar
72 Ni - 15 Cr - 8 Fe	SB-167	N06600	Inconel 600	Pipe and tube, seamless
72 Ni - 15 Cr - 8 Fe	SB-168	N06600	Inconel 600	Plate, sheet, strip
72 Ni - 15 Cr - 8 Fe	SB-366	N06600	Inconel 600	Fittings
72 Ni - 15 Cr - 8 Fe	SB-516	N06600	Inconel 600	Tubes, welded
72 Ni - 15 Cr - 8 Fe	SB-517	N06600	Inconel 600	Pipe, welded
72 Ni - 15 Cr - 8 Fe	SB-564	N06600	Inconel 600	Forgings
70 Ni - 16 Cr - 7 Fe - Ti - Al	SB-637	N07750	Inconel X-750	Bars and forgings
70 Ni - 16 Cr - 7 Fe - Ti - Cb	SB-637	N07752	---	Bars and forgings
70 Ni - 19 Cr - Fe - Ti - Al	SB-637	N07080	Nimonic 80A, old Gr 804	Bars and forgings
70 Ni - 16 Mo - 7 Cr - 5 Fe	SB-366	N10003	Hastelloy N	Fittings
70 Ni - 16 Mo - 7 Cr - 5 Fe	SB-434	N10003	Hastelloy N	Plate, sheet, strip
70 Ni - 16 Mo - 7 Cr - 5 Fe	SB-573	N10003	Hastelloy N	Rod
69 Ni - 12 Cr - 4 Bi - 4 Sn	SA-494	---	CY5SnBiM	Castings
68 Ni - 16 Cr - 11 Fe	SA-494	N06040	CY-40	Castings
67 Ni - 28 Cu - 3 Al	(SB-164 CC)	N0XXXX	---	Rod and bar
67 Ni - 30 Cu	SB-127	N04400	Monel 400, Ni - Cu	Plate, sheet, strip
67 Ni - 30 Cu	SB-163	N04400	Monel 400, Ni - Cu	Tubes, seamless
67 Ni - 30 Cu	SB-164	N04400	Monel 400, Ni - Cu	Rod and bar
67 Ni - 30 Cu	SB-165	N04400	Monel 400, Ni - Cu	Pipe and tube, seamless
67 Ni - 30 Cu	SB-366	N04400	Monel 400, Ni - Cu	Fittings
67 Ni - 30 Cu	SB-564	N04400	Monel 400, Ni - Cu	Forgings

NICKEL BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
67 Ni - 30 Cu - S	SB-164	N04405	Monel 405, Ni - Cu	Rod and bar
65 Ni - 29 Cu	SA-494	---	M-35-1	Castings
65 Ni - 29 Cu	SA-494	N04020	M-35-2	Castings
65 Ni - 28 Mo - 2 Fe	SB-333	N10665	Hastelloy B-2	Plate and strip
65 Ni - 28 Mo - 2 Fe	SB-335	N10665	Hastelloy B-2	Rod
65 Ni - 28 Mo - 2 Fe	SB-366	N10665	Hastelloy B-2	Fittings
65 Ni - 28 Mo - 2 Fe	SB-619	N10665	Hastelloy B-2	Pipe, welded
65 Ni - 28 Mo - 2 Fe	SB-622	N10665	Hastelloy B-2	Pipe and tube, seamless
65 Ni - 28 Mo - 2 Fe	SB-626	N10665	Hastelloy B-2	Tubes, welded
64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W	(SB-333 CC)	N10675	Hastelloy B-3	Plate, sheet, strip
64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W	SB-335	N10675	Hastelloy B-3	Rod
64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W	SB-366	N10675	Hastelloy B-3	Fittings
64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W	SB-564	N10675	Hastelloy B-3	Forgings
64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W	SB-619	N10675	Hastelloy B-3	Pipe, welded
64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W	SB-622	N10675	Hastelloy B-3	Pipe and tube, seamless
64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W	SB-626	N10675	Hastelloy B-3	Tubes, welded
63 Ni - 16 Cr - 16 Mo	SA-494	---	CW-2M	Castings
63 Ni - 31 Mo - 1 Cr - Si	SA-494	---	Nickel alloy casting N-7M	Castings
63 Ni - 29 Cu - 2 Cb - Si	SA-494	---	M-30C	Castings
62 Ni - 25 Cr - 10 Fe - Al	SB-366	N06025	Nicrofer 6025 HT/CRV 602/WPV 602	Welding fittings
62 Ni - 25 Cr - 10 Fe - Al	SB-168	N06025	Nicrofer 6025 HT	Plate, sheet, strip
62 Ni - 25 Cr - 10 Fe - Al	SB-167	N06025	Nicrofer 6025 HT	Pipe and tube, seamless
62 Ni - 25 Cr - 10 Fe - Al	SB-163	N06025	Nicrofer 6025 HT	Tubes, seamless
62 Ni - 25 Cr - 10 Fe - Al	SB-516	N06025	Nicrofer 6025 HT	Tubes, welded
62 Ni - 25 Cr - 10 Fe - Al	SB-517	N06025	Nicrofer 6025 HT	Pipe, welded
62 Ni - 28 Mo - 4 Fe - 1 Cu	(SB-333 CC)	N10629	---	Plate, sheet, strip
62 Ni - 28 Mo - 4 Fe - 1 Cu	SB-335	N10629	---	Rod
62 Ni - 28 Mo - 4 Fe - 1 Cu	SB-366	N10629	Nickel-molybdenum B-4	Welding fittings
62 Ni - 28 Mo - 4 Fe - 1 Cu	(SB-564 CC)	N10629	---	Forgings
62 Ni - 28 Mo - 4 Fe - 1 Cu	SB-619	N10629	---	Pipe, welded
62 Ni - 28 Mo - 4 Fe - 1 Cu	SB-622	N10629	---	Pipe and tube, seamless
62 Ni - 28 Mo - 4 Fe - 1 Cu	SB-626	N10629	---	Tubes, welded
62 Ni - 28 Mo - 5 Fe	SB-333	N10001	Hastelloy B	Plate and strip
62 Ni - 28 Mo - 5 Fe	SB-335	N10001	Hastelloy B	Rod
62 Ni - 28 Mo - 5 Fe	SB-366	N10001	Hastelloy B	Fittings

NICKEL BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
62 Ni - 28 Mo - 5 Fe	SB-619	N10001	Hastelloy B	Pipe, welded
62 Ni - 28 Mo - 5 Fe	SB-622	N10001	Hastelloy B	Pipe and tube, seamless
62 Ni - 28 Mo - 5 Fe	SB-626	N10001	Hastelloy B	Tubes, welded
62 Ni - 28 Mo - 5 Fe	SA-494 (N12-MV)	N30012	Hastelloy B	Castings
62 Ni - 30 Cu - 3 Si	SA-494	---	M-30H	Castings
61 Ni - 16 Mo - 16 Cr	SB-366	N06455	Hastelloy C-4	Fittings
61 Ni - 16 Mo - 16 Cr	SB-574	N06455	Hastelloy C-4	Rod
61 Ni - 16 Mo - 16 Cr	SB-575	N06455	Hastelloy C-4	Plate, sheet, strip
61 Ni - 16 Mo - 16 Cr	SB-619	N06455	Hastelloy C-4	Pipe, welded
61 Ni - 16 Mo - 16 Cr	SB-622	N06455	Hastelloy C-4	Pipe and tube, welded
61 Ni - 16 Mo - 16 Cr	SB-626	N06455	Hastelloy C-4	Tubes, welded
61 Ni - 30 Cu - 4 Si	SA-494	---	M-25S	Castings
60 Ni - 22 Cr - 9 Mo - 3.5 Cb	SB-366	N06625	Inconel 625	Fittings
60 Ni - 22 Cr - 9 Mo - 3.5 Cb	SB-443	N06625	Inconel 625	Plate, sheet, strip
60 Ni - 22 Cr - 9 Mo - 3.5 Cb	SB-444	N06625	Inconel 625	Pipe and tube, seamless
60 Ni - 22 Cr - 9 Mo - 3.5 Cb	SB-446	N06625	Inconel 625	Rod and bar
60 Ni - 22 Cr - 9 Mo - 3.5 Cb	SB-564	N06625	Inconel 625	Forgings
60 Ni - 22 Cr - 9 Mo - 3.5 Cb	SB-704	N06625	Inconel 625	Tubes, welded
60 Ni - 22 Cr - 9 Mo - 3.5 Cb	SB-705	N06625	Inconel 625	Pipe, welded
60 Ni - 23 Cr - Fe - 1.3 Al	(SB-163 CC)	N06601	Inconel 601	Tubes, seamless
60 Ni - 23 Cr - Fe - 1.3 Al	SB-166	N06601	Inconel 601	Rod and bar
60 Ni - 23 Cr - Fe - 1.3 Al	SB-167	N06601	Inconel 601	Pipe and tube, seamless
60 Ni - 23 Cr - Fe - 1.3 Al	SB-168	N06601	Inconel 601	Plate, sheet, strip
59 Ni - 18 Cr - 18 Mo	SA-494	---	CW-6M	Castings
59 Ni - 23 Cr - 16 Mo - Fe - Al	SB-366	N06059	VDM59/CR5923/WP5923	Welding fittings
59 Ni - 23 Cr - 16 Mo - Fe - Al	SB-564	N06059	VDM59	Forgings
59 Ni - 23 Cr - 16 Mo - Fe - Al	SB-574	N06059	VDM59	Rod
59 Ni - 23 Cr - 16 Mo - Fe - Al	SB-575	N06059	VDM59	Plate, sheet, strip
59 Ni - 23 Cr - 16 Mo - Fe - Al	SB-619	N06059	VDM59	Pipe, welded
59 Ni - 23 Cr - 16 Mo - Fe - Al	SB-622	N06059	VDM59	Pipe and tube, seamless
59 Ni - 23 Cr - 16 Mo - Fe - Al	SB-626	N06059	VDM59	Tubes, welded
58 Ni - 29 Cr - 9 Fe	SB-163	N06690	Inconel 690	Tubes, seamless
58 Ni - 29 Cr - 9 Fe	SB-166	N06690	Inconel 690	Rod and bar
58 Ni - 29 Cr - 9 Fe	SB-167	N06690	Inconel 690	Pipe and tube, seamless
58 Ni - 29 Cr - 9 Fe	SB-168	N06690	Inconel 690	Plate, sheet, strip

NICKEL BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
58 Ni - 29 Cr - 9 Fe	SB-564	N06690	Inconel 690	Forgings
58 Ni - 21 Cr - 9 Mo - 4 Cb	SA-494	---	CW-6MC	Castings
57 Ni-21 Cr-13 Mo-4 Fe-3 W	SA-494	---	CX2MW	Castings
57 Ni-20 Cr-13 Mo-6 Fe-Ti-Cu	SB-622	N06060	SM2060	Pipe and tube, seamless
57 Ni - 21 Cr - 8 Mo - 3 Cb	(SB-443 CC)	N07725	Inconel 725	Plate, sheet, strip
57 Ni - 21 Cr - 8 Mo - 3 Cb	(SB-444 CC)	N07725	Inconel 725	Pipe and tube, seamless
57 Ni - 21 Cr - 8 Mo - 3 Cb	(SB-446 CC)	N07725	Inconel 725	Rod and bar
57 Ni - 21 Cr - 8 Mo - 3 Cb	(SB-564 CC)	N07725	Inconel 725	Forgings
55 Ni - 21 Cr - 13.5 Mo	SB-366	N06022	Hastelloy C-22	Fittings
55 Ni - 21 Cr - 13.5 Mo	SB-564	N06022	Hastelloy C-22	Forgings
55 Ni - 21 Cr - 13.5 Mo	SB-574	N06022	Hastelloy C-22	Rod
55 Ni - 21 Cr - 13.5 Mo	SB-575	N06022	Hastelloy C-22	Plate, sheet, strip
55 Ni - 21 Cr - 13.5 Mo	SB-619	N06022	Hastelloy C-22	Pipe, welded
55 Ni - 21 Cr - 13.5 Mo	SB-622	N06022	Hastelloy C-22	Pipe and tube, seamless
55 Ni - 21 Cr - 13.5 Mo	SB-626	N06022	Hastelloy C-22	Tubes, welded
54 Ni - 16 Mo - 15 Cr	SB-366	N10276	Hastelloy C-276	Fittings
54 Ni - 16 Mo - 15 Cr	SB-564	N10276	Hastelloy C-276	Forgings
54 Ni - 16 Mo - 15 Cr	SB-574	N10276	Hastelloy C-276	Rod
54 Ni - 16 Mo - 15 Cr	SB-575	N10276	Hastelloy C-276	Plate, sheet, strip
54 Ni - 16 Mo - 15 Cr	SB-619	N10276	Hastelloy C-276	Pipe, welded
54 Ni - 16 Mo - 15 Cr	SB-622	N10276	Hastelloy C-276	Pipe and tube, seamless
54 Ni - 16 Mo - 15 Cr	SB-626	N10276	Hastelloy C-276	Tubes, welded
53 Ni - 17 Mo - 16 Cr - 6 Fe - 5 W	SA-494 (CW-12MW)	N30002	C	Castings
53 Ni - 19 Cr - 19 Fe - Cb - Mo	SB-637	N07718	Inconel 718	Bars and forgings
53 Ni - 20 Cr - 14 Co - 4 Mo	SB-637	N07001	Waspaloy, old Gr 685	Bars and forgings
53 Ni - 22 Cr - 14 W - Co - Fe - Mo	SB-366	N06230	Alloy 230	Welding fittings
53 Ni - 22 Cr - 14 W - Co - Fe - Mo	SB-435	N06230	Alloy 230	Sheet and plate
53 Ni - 22 Cr - 14 W - Co - Fe - Mo	SB-564	N06230	Alloy 230	Forgings
53 Ni - 22 Cr - 14 W - Co - Fe - Mo	SB-572	N06230	Alloy 230	Rod
53 Ni - 22 Cr - 14 W - Co - Fe - Mo	SB-619	N06230	Alloy 230	Pipe, welded
53 Ni - 22 Cr - 14 W - Co - Fe - Mo	SB-622	N06230	Alloy 230	Pipe and tube, seamless
53 Ni - 22 Cr - 14 W - Co - Fe - Mo	SB-626	N06230	Alloy 230	Tubes, welded
52 Ni - 21 Cr - 13 Fe - 11 Mo	SB-622	N06250	SM2050	Pipe and tube, welded
51 Ni - 19 Cr - 10 Mo - 10 Co	SB-637	N07252	Old Gr 689, M252	Bars and forgings
51 Ni - 31 Cr - 10 Mo - W	SB-564	N06110	Allcor	Forgings

NICKEL BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
50 Ni - 17 Cr - 17 Co - Mo - Fe	SB-637	N07500	Udimet 500, old Gr 684	Bars and forgings
50 Ni-25 Cr-15 Fe-6 Mo-Ti	SB-564	N06686	Inconel 686	Forgings
50 Ni-25 Cr-15 Fe-6 Mo-Ti	SB-574	N06686	Inconel 686	Rod
50 Ni-25 Cr-15 Fe-6 Mo-Ti	SB-575	N06686	Inconel 686	Plate, sheet, strip
50 Ni-25 Cr-15 Fe-6 Mo-Ti	SB-619	N06686	Inconel 686	Pipe, welded
50 Ni-25 Cr-15 Fe-6 Mo-Ti	SB-622	N06686	Inconel 686	Pipe and tube, seamless
50 Ni-25 Cr-15 Fe-6 Mo-Ti	SB-626	N06686	Inconel 686	Tubes, welded
49 Ni - 24 Cr - 14 Fe - 7 Mo	SB-622	N06255	SM2550	Pipe and tube, welded
49 Ni - 25 Cr - 18 Fe - 6 Mo	SB-581	N06975	Hastelloy G-2	Rod
49 Ni - 25 Cr - 18 Fe - 6 Mo	SB-582	N06975	Hastelloy G-2	Plate, sheet, strip
49 Ni - 25 Cr - 18 Fe - 6 Mo	SB-619	N06975	Hastelloy G-2	Pipe, welded
49 Ni - 25 Cr - 18 Fe - 6 Mo	SB-622	N06975	Hastelloy G-2	Pipe and tube, seamless
49 Ni - 25 Cr - 18 Fe - 6 Mo	SB-626	N06975	Hastelloy G-2	Tubes, welded
47 Ni - 22 Cr - 19 Fe - 6 Mo	SB-366	N06007	Hastelloy G	Fittings
47 Ni - 22 Cr - 19 Fe - 6 Mo	SB-581	N06007	Hastelloy G	Rod
47 Ni - 22 Cr - 19 Fe - 6 Mo	SB-582	N06007	Hastelloy G	Plate, sheet, strip
47 Ni - 22 Cr - 19 Fe - 6 Mo	SB-619	N06007	Hastelloy G	Pipe, welded
47 Ni - 22 Cr - 19 Fe - 6 Mo	SB-622	N06007	Hastelloy G	Pipe and tube, seamless
47 Ni - 22 Cr - 19 Fe - 6 Mo	SB-626	N06007	Hastelloy G	Tubes, welded
47 Ni - 22 Cr - 20 Fe - 7 Mo	SB-366	N06985	Hastelloy G-3	Fittings
47 Ni - 22 Cr - 20 Fe - 7 Mo	SB-581	N06985	Hastelloy G-3	Rod
47 Ni - 22 Cr - 20 Fe - 7 Mo	SB-582	N06985	Hastelloy G-3	Plate, sheet, strip
47 Ni - 22 Cr - 20 Fe - 7 Mo	SB-619	N06985	Hastelloy G-3	Pipe, welded
47 Ni - 22 Cr - 20 Fe - 7 Mo	SB-622	N06985	Hastelloy G-3	Pipe and tube, seamless
47 Ni - 22 Cr - 20 Fe - 7 Mo	SB-626	N06985	Hastelloy G-3	Tubes, welded
47 Ni - 22 Cr - 9 Mo - 18 Fe	SB-366	N06002	Hastelloy X	Fittings
47 Ni - 22 Cr - 9 Mo - 18 Fe	SB-435	N06002	Hastelloy X	Sheet and plate
47 Ni - 22 Cr - 9 Mo - 18 Fe	SB-572	N06002	Hastelloy X	Rod
47 Ni - 22 Cr - 9 Mo - 18 Fe	SB-619	N06002	Hastelloy X	Pipe, welded
47 Ni - 22 Cr - 9 Mo - 18 Fe	SB-622	N06002	Hastelloy X	Pipe and tube, seamless
47 Ni - 22 Cr - 9 Mo - 18 Fe	SB-626	N06002	Hastelloy X	Tubes, welded
46 Ni - 27 Cr - 23 Fe - 2.75 Si	SB-163	N06045	Nicrofer 45	Tubes, seamless
46 Ni - 27 Cr - 23 Fe - 2.75 Si	SB-167	N06045	Nicrofer 45	Pipe and tube, seamless
46 Ni - 27 Cr - 23 Fe - 2.75 Si	(SB-166 CC)	N06045	Nicrofer 45	Rod and bar
46 Ni - 27 Cr - 23 Fe - 2.75 Si	SB-168	N06045	Nicrofer 45	Plate, sheet, strip

NICKEL BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
46 Ni - 27 Cr - 23 Fe - 2.75 Si	SB-366	N06045	Nicrofer 45/CRV45TM/WPV45TM	Welding fittings
46 Ni - 27 Cr - 23 Fe - 2.75 Si	SB-516	N06045	Nicrofer 45	Tubes, welded
46 Ni - 27 Cr - 23 Fe - 2.75 Si	SB-517	N06045	Nicrofer 45	Pipe, welded
46 Ni - 27 Cr - 23 Fe - 2.75 Si	(SB-564 CC)	N06045	Nicrofer 45	Forgings
45 Ni - 22 Cr - 12 Co - 9 Mo	SB-166	N06617	Inconel 617	Rod and bar
45 Ni - 22 Cr - 12 Co - 9 Mo	SB-168	N06617	Inconel 617	Plate, sheet, strip
45 Ni - 22 Cr - 12 Co - 9 Mo	(SB-443 CC)	N06617	Inconel 617	Plate, sheet, strip
45 Ni - 22 Cr - 12 Co - 9 Mo	(SB-444 CC)	N06617	Inconel 617	Pipe and tube, seamless
45 Ni - 22 Cr - 12 Co - 9 Mo	SB-564	N06617	Inconel 617	Forgings
42 Ni - 21 Cr - 5.5 Mo - 2.3 Cu	SB-423	N08221	---	Pipe and tube, seamless
42 Ni - 21 Cr - 5.5 Mo - 2.3 Cu	SB-424	N08221	---	Plate, sheet, strip
42 Ni - 21 Cr - 5.5 Mo - 2.3 Cu	SB-425	N08221	---	Rod and bar
42 Ni - 21.5 Cr - 5.5 Mo - 2.3 Cu	SB-163	N08825	Inconel 825	Tubes, seamless
42 Ni - 21.5 Cr - 5.5 Mo - 2.3 Cu	SB-366	N08825	Inconel 825	Fittings
42 Ni - 21.5 Cr - 5.5 Mo - 2.3 Cu	SB-423	N08825	Inconel 825	Pipe and tube, seamless
42 Ni - 21.5 Cr - 5.5 Mo - 2.3 Cu	SB-424	N08825	Inconel 825	Plate, sheet, strip
42 Ni - 21.5 Cr - 5.5 Mo - 2.3 Cu	SB-425	N08825	Inconel 825	Rod and bar
42 Ni - 21.5 Cr - 5.5 Mo - 2.3 Cu	SB-564	N08825	Inconel 825	Forgings
42 Ni - 21.5 Cr - 5.5 Mo - 2.3 Cu	SB-704	N08825	Inconel 825	Tubes, welded
42 Ni - 21.5 Cr - 5.5 Mo - 2.3 Cu	SB-705	N08825	Inconel 825	Pipe, welded
42 Ni-22 Fe-21 Cr-Mo-Ti-Cu	(SB-423 CC)	N09925	925	Pipe and tube, seamless
42 Ni-22 Fe-21 Cr-Mo-Ti-Cu	(SB-424 CC)	N09925	925	Plate, sheet, strip
42 Ni-22 Fe-21 Cr-Mo-Ti-Cu	(SB-425 CC)	N09925	925	Rod and bar
42 Ni-22 Fe-21 Cr-Mo-Ti-Cu	(SB-564 CC)	N09925	925	Forgings
41 Ni-29 Fe-21 Cr-3 Mo-Cb	SA-494	---	Cu5MCuC	Castings
40 Ni - 29 Cr - 15 Fe - 5 Mo	SB-366	N06030	Hastelloy G-30	Welding fittings
40 Ni - 29 Cr - 15 Fe - 5 Mo	SB-581	N06030	Hastelloy G-30	Rod
40 Ni - 29 Cr - 15 Fe - 5 Mo	SB-582	N06030	Hastelloy G-30	Plate, sheet, strip
40 Ni - 29 Cr - 15 Fe - 5 Mo	SB-619	N06030	Hastelloy G-30	Pipe, welded
40 Ni - 29 Cr - 15 Fe - 5 Mo	SB-622	N06030	Hastelloy G-30	Pipe and tube, seamless
40 Ni - 29 Cr - 15 Fe - 5 Mo	SB-626	N06030	Hastelloy G-30	Tubes, welded
37 Ni - 33 Fe - 23 Cr - 4 Mo - 1 Cu	SB-462	N08024	20 - Mo 4	Forgings
37 Ni - 33 Fe - 23 Cr - 4 Mo - 1 Cu	SB-463	N08024	20 - Mo 4	Plate, sheet, strip
37 Ni - 33 Fe - 23 Cr - 4 Mo - 1 Cu	SB-464	N08024	20 - Mo 4	Pipe, seamless and welded
37 Ni - 33 Fe - 23 Cr - 4 Mo - 1 Cu	SB-468	N08024	20 - Mo 4	Tubes, seamless and welded

NICKEL BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
37 Ni - 33 Fe - 23 Cr - 4 Mo - 1 Cu	SB-473	N08024	20 - Mo 4	Bar and wire
37 Ni - 33 Fe - 23 Cr - 4 Mo - 1 Cu	SB-729	N08024	20 - Mo 4	Pipe and tube, seamless
36 Ni - 35 Fe - 22 Cr - 4 Mo	SB-622	N08135	SM-2035	Pipe and tube, seamless
35 Ni - 19 Cr - 1¼ Si	SB-366	N08330	RA-330	Fittings
35 Ni - 19 Cr - 1¼ Si	SB-511	N08330	RA-330	Bars
35 Ni - 19 Cr - 1¼ Si	SB-535	N08330	RA-330	Pipe, seamless and welded
35 Ni - 19 Cr - 1¼ Si	SB-536	N08330	RA-330	Plate, sheet, strip
35 Ni - 19 Cr - 1¼ Si	SB-710	N08330	RA-330	Pipe, welded
35 Ni - 19 Cr - 1¼ Si	SB-511	N08332	RA-330TX	Bars
35 Ni - 19 Cr - 1¼ Si	SB-535	N08332	RA-330TX	Pipe, seamless and welded
35 Ni - 19 Cr - 1¼ Si	SB-536	N08332	RA-330TX	Plate, sheet, strip
35 Ni - 30 Fe - 24 Cr - 6 Mo - Cu	SB-462	N08026	20 - Mo 6	Forgings
35 Ni - 30 Fe - 24 Cr - 6 Mo - Cu	SB-463	N08026	20 - Mo 6	Plate, sheet, strip
35 Ni - 30 Fe - 24 Cr - 6 Mo - Cu	SB-464	N08026	20 - Mo 6	Pipe, seamless and welded
35 Ni - 30 Fe - 24 Cr - 6 Mo - Cu	SB-468	N08026	20 - Mo 6	Tubes, seamless and welded
35 Ni - 30 Fe - 24 Cr - 6 Mo - Cu	SB-473	N08026	20 - Mo 6	Bar and wire
35 Ni - 30 Fe - 24 Cr - 6 Mo - Cu	SB-729	N08026	20 - Mo 6	Pipe and tube, seamless
35 Ni - 35 Fe - 20 Cr - Cb	SB-366	N08020	20 - Cb 3	Fittings
35 Ni - 35 Fe - 20 Cr - Cb	SB-462	N08020	20 - Cb 3	Forgings
35 Ni - 35 Fe - 20 Cr - Cb	SB-463	N08020	20 - Cb 3	Plate, sheet, strip
35 Ni - 35 Fe - 20 Cr - Cb	SB-464	N08020	20 - Cb 3	Pipe, seamless and welded
35 Ni - 35 Fe - 20 Cr - Cb	SB-468	N08020	20 - Cb 3	Tubes, seamless and welded
35 Ni - 35 Fe - 20 Cr - Cb	SB-473	N08020	20 - Cb 3	Bar and wire
35 Ni - 35 Fe - 20 Cr - Cb	SB-729	N08020	20 - Cb 3	Pipe and tube, seamless
33 Ni - 42 Fe - 21 Cr	SB-163	N08800	Inconel 800	Tubes, seamless
33 Ni - 42 Fe - 21 Cr	SB-366	N08800	Inconel 800	Fittings
33 Ni - 42 Fe - 21 Cr	SB-407	N08800	Inconel 800	Pipe and tube, seamless
33 Ni - 42 Fe - 21 Cr	SB-408	N08800	Inconel 800	Rod and bar
33 Ni - 42 Fe - 21 Cr	SB-409	N08800	Inconel 800	Plate, sheet, strip
33 Ni - 42 Fe - 21 Cr	SB-514	N08800	Inconel 800	Pipe, welded
33 Ni - 42 Fe - 21 Cr	SB-515	N08800	Inconel 800	Tubes, welded
33 Ni - 42 Fe - 21 Cr	SB-564	N08800	Inconel 800	Forgings
33 Ni - 42 Fe - 21 Cr	SB-163	N08810	Inconel 800H	Tubes, seamless
33 Ni - 42 Fe - 21 Cr	SB-366	N08810	Inconel 800H	Fittings
33 Ni - 42 Fe - 21 Cr	SB-407	N08810	Inconel 800H	Pipe and tube, seamless

NICKEL BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
33 Ni - 42 Fe - 21 Cr	SB-408	N08810	Inconel 800H	Rod and bar
33 Ni - 42 Fe - 21 Cr	SB-409	N08810	Inconel 800H	Plate, sheet, strip
33 Ni - 42 Fe - 21 Cr	SB-514	N08810	Inconel 800H	Pipe, welded
33 Ni - 42 Fe - 21 Cr	SB-515	N08810	Inconel 800H	Tubes, welded
33 Ni - 42 Fe - 21 Cr	SB-564	N08810	Inconel 800H	Forgings
33 Ni - 42 Fe - 21 Cr - Al - Ti	SB-366	N08811	Inconel 800HT	Fittings
33 Ni - 42 Fe - 21 Cr - Al - Ti	SB-407	N08811	Inconel 800HT	Pipe and tube, seamless
33 Ni - 42 Fe - 21 Cr - Al - Ti	SB-408	N08811	Inconel 800HT	Rod and bar
33 Ni - 42 Fe - 21 Cr - Al - Ti	SB-409	N08811	Inconel 800HT	Plate, sheet, strip
33 Ni - 42 Fe - 21 Cr - Al - Ti	(SB-515 CC)	N08811	Inconel 800HT	Tubes, welded
33 Ni - 42 Fe - 21 Cr - Al - Ti	SB-163	N08811	Inconel 800HT	Tubes, seamless
33 Ni - 42 Fe - 21 Cr - Al - Ti	SB-564	N08811	Inconel 800HT	Forgings
33 Ni - 36 Fe - 25 Cr - 3 Mo	SB-622	N08535	---	Pipe and tube, seamless
32 Ni - 45 Fe - 20.5 Cr - Ti	SB-163	N08801	Inconel 801	Tubes, seamless
32 Ni - 45 Fe - 20.5 Cr - Ti	SB-407	N08801	Inconel 801	Pipe and tube, seamless
31 Ni - 31 Fe - 27 Cr - 7 Mo	SB-366	N08031	Alloy 31	Welding fittings
31 Ni - 31 Fe - 27 Cr - 7 Mo	SB-564	N08031	Alloy 31	Forgings
31 Ni - 31 Fe - 27 Cr - 7 Mo	(SB-581 CC)	N08031	Alloy 31	Rods
31 Ni - 31 Fe - 27 Cr - 7 Mo	SB-619	N08031	Alloy 31	Pipe, welded
31 Ni - 31 Fe - 27 Cr - 7 Mo	SB-622	N08031	Alloy 31	Pipe and tube, seamless
31 Ni - 31 Fe - 27 Cr - 7 Mo	SB-625	N08031	Alloy 31	Plate, sheet, strip
31 Ni - 31 Fe - 27 Cr - 7 Mo	SB-626	N08031	Alloy 31	Tubes, welded
31 Ni - 31 Fe - 27 Cr - 7 Mo	SB-649	N08031	Alloy 31	Bar and wire
31 Ni - 31 Fe - 29 Cr - Mo	SB-668	N08028	Sanicro 28	Tubes, seamless
31 Ni - 31 Fe - 29 Cr - Mo	SB-709	N08028	Sanicro 28	Plate, sheet, strip
29 Ni - 30 Co - 28 Cr - 2.75 Si	(SB-366 CC)	N12160	HR160	Fittings
29 Ni - 30 Co - 28 Cr - 2.75 Si	(SB-435 CC)	N12160	HR160	Plate, sheet, strip
29 Ni - 30 Co - 28 Cr - 2.75 Si	SB-564	N12160	HR160	Forgings
29 Ni - 30 Co - 28 Cr - 2.75 Si	SB-572	N12160	HR160	Rod
29 Ni - 30 Co - 28 Cr - 2.75 Si	SB-619	N12160	HR160	Pipe, welded
29 Ni - 30 Co - 28 Cr - 2.75 Si	SB-622	N12160	HR160	Pipe and tube, seamless
29 Ni - 30 Co - 28 Cr - 2.75 Si	SB-626	N12160	HR160	Tubes, welded
29 Ni - 20 Cr - 3 Cu - 2 Mo	SA-351	N08007	CN7M	Castings
28 Ni - 39 Fe - 16 Cr - 4 Cu	SB-366	N08926	25-6 Mo/CR1925N/WP1925N	Fittings
28 Ni - 39 Fe - 16 Cr - 4 Cu	(SB-462 CC)	N08926	25-6 Mo	Forgings

NICKEL BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
28 Ni - 39 Fe - 16 Cr - 4 Cu	SB-625	N08926	25-6 Mo	Plate, sheet, strip
28 Ni - 39 Fe - 16 Cr - 4 Cu	SB-649	N08926	25-6 Mo	Bar and wire
28 Ni - 39 Fe - 16 Cr - 4 Cu	SB-673	N08926	25-6 Mo	Pipe, welded
28 Ni - 39 Fe - 16 Cr - 4 Cu	SB-674	N08926	25-6 Mo	Tubes, welded
28 Ni - 39 Fe - 16 Cr - 4 Cu	SB-677	N08926	25-6 Mo	Pipe and tube, seamless
28 Ni - 39 Fe - 16 Cr - 4 Cu	SB-804	N08926	25-6 Mo	Pipe, welded
26 Ni - 43 Fe - 22 Cr - 5 Mo	SB-619	N08320	20 Mod.	Pipe, welded
26 Ni - 43 Fe - 22 Cr - 5 Mo	SB-620	N08320	20 Mod.	Plate, sheet, strip
26 Ni - 43 Fe - 22 Cr - 5 Mo	SB-621	N08320	20 Mod.	Rod
26 Ni - 43 Fe - 22 Cr - 5 Mo	SB-622	N08320	20 Mod.	Pipe and tube, seamless
26 Ni - 43 Fe - 22 Cr - 5 Mo	SB-626	N08320	20 Mod.	Tubes, welded
26 Ni - 14 Cr - Mo - Ti	SA-453	S66545	W545, Grade 665	Bolting
26 Ni - 14 Cr - Mo - Ti	SA-453	S66220	Discaloy, Grade 662	Bolting
26 Ni - 14 Cr - Mo - Ti	SA-638	S66220	Discaloy, Grade 662	Bars and forgings
25 Ni - 20 Cr - 6 Mo - Cu - N	SB-366	N08925	VDM 1925	Fittings
25 Ni - 20 Cr - 6 Mo - Cu - N	SB-625	N08925	VDM 1925	Plate, sheet, strip
25 Ni - 20 Cr - 6 Mo - Cu - N	SB-649	N08925	VDM 1925	Bar and wire
25 Ni - 20 Cr - 6 Mo - Cu - N	SB-673	N08925	VDM 1925	Pipe, welded
25 Ni - 20 Cr - 6 Mo - Cu - N	SB-674	N08925	VDM 1925	Tubes, welded
25 Ni - 20 Cr - 6 Mo - Cu - N	SB-677	N08925	VDM 1925	Pipe and tube, seamless
25 Cr - 25 Ni - 5.5 Mo	SB-625	N08932	UR - SB 8	Plate, sheet, strip
25 Ni - 47 Fe - 21 Cr - 5 Mo	SB-599	M08700	JS700	Plate, sheet, strip
25 Ni - 47 Fe - 21 Cr - 5 Mo	SB-672	M08700	JS700	Bar and wire
44 Fe - 25 Ni - 21 Cr - Mo	SA-240	N08904	904L, AL4X	Plate, sheet, strip
25 Ni - 15 Cr - 2 Ti	SA-638	S66286	A-286 SS, Grade 660	Bars and forgings
25 Ni - 15 Cr - 2 Ti	SA-453	S66286	A-286 SS, Grade 660	Bolting
44 Fe - 25 Ni - 21 Cr - Mo	SB-625	N08904	904L, AL4X	Plate, sheet, strip
44 Fe - 25 Ni - 21 Cr - Mo	SB-649	N08904	904L, AL4X	Bar and wire
44 Fe - 25 Ni - 21 Cr - Mo	SB-673	N08904	904L, AL4X	Pipe, welded
44 Fe - 25 Ni - 21 Cr - Mo	SB-674	N08904	904L, AL4X	Tubes, welded
44 Fe - 25 Ni - 21 Cr - Mo	SB-677	N08904	904L, AL4X	Pipe and tube, seamless
46 Fe - 24 Ni - 21 Cr - 6 Mo	SB-675	N08366	AL-6X	Pipe, welded
46 Fe - 24 Ni - 21 Cr - 6 Mo	SB-676	N08366	AL-6X	Tubes, welded
46 Fe - 24 Ni - 21 Cr - 6 Mo	SB-688	N08366	AL-6X	Plate, sheet, strip
46 Fe - 24 Ni - 21 Cr - 6 Mo	SB-690	N08366	AL-6X	Pipe and tube, seamless

NICKEL BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
46 Fe - 24 Ni - 21 Cr - 6 Mo	SB-691	N08366	AL-6X	Rod, bar and wire
46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SA-240	N08367	AL-6XN	Plate, sheet, strip
46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SA-351	(N08367)	AL-6XN	Castings
46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-366	N08367	AL-6XN	Fittings
46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-462	N08367	AL-6XN	Forgings
46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-564	N08367	AL-6XN	Forgings
46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-675	N08367	AL-6XN	Pipe, welded
46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-676	N08367	AL-6XN	Tubes, welded
46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-688	N08367	AL-6XN	Plate, sheet, strip
46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-690	N08367	AL-6XN	Pipe and tube, seamless
46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-691	N08367	AL-6XN	Rod, bar and wire
46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-804	N08367	AL-6XN	Pipe, welded

SPECIAL ALLOYS BY NOMINAL COMPOSITION				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
21 Ni - 30 Fe - 22 Cr - 18 Co - 3 Mo - 3 W	SB-435	R30566	HS-566	Plate, sheet, strip
21 Ni - 30 Fe - 22 Cr - 18 Co - 3 Mo - 3 W	SB-572	R30566	HS-566	Rod
21 Ni - 30 Fe - 22 Cr - 18 Co - 3 Mo - 3 W	SB-619	R30566	HS-566	Pipe, welded
21 Ni - 30 Fe - 22 Cr - 18 Co - 3 Mo - 3 W	SB-622	R30566	HS-566	Pipe and tube, seamless
21 Ni - 30 Fe - 22 Cr - 18 Co - 3 Mo - 3 W	SB-626	R30566	HS-566	Tubes, welded
21 Ni - 30 Fe - 22 Cr - 18 Co - 3 Mo - 3 W	SB-366	R30566	HS-566	Welded fittings
Co - 26 Cr - 9 Ni - 5 Mo - 3 Fe - 2 W	(SB-435 CC)	R31233	Udimet	Plate, sheet, strip
Co - 26 Cr - 9 Ni - 5 Mo - 3 Fe - 2 W	(SB-572 CC)	R31233	Udimet	Rod

TITANIUM BASE ALLOYS BY NOMINAL COMPOSITION				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
Ti, unalloyed	SB-265	R50250	Titanium Grade 1	Plate, sheet, strip
Ti, unalloyed	SB-337	R50250	Titanium Grade 1	Pipe, seamless and welded
Ti, unalloyed	SB-338	R50250	Titanium Grade 1	Tubes, seamless and welded
Ti, unalloyed	SB-348	R50250	Titanium Grade 1	Bars and billets
Ti, unalloyed	SB-363	(R50250)	Titanium Grade WPT1	Fittings
Ti, unalloyed	SB-381	R50250	Titanium Grade F1	Forgings
Ti, unalloyed	SB-265	R50400	Titanium Grade 2	Plate, sheet, strip
Ti, unalloyed	SB-337	R50400	Titanium Grade 2	Pipe, seamless and welded

TITANIUM BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
Ti, unalloyed	SB-338	R50400	Titanium Grade 2	Tubes, seamless and welded
Ti, unalloyed	SB-348	R50400	Titanium Grade 2	Bars and billets
Ti, unalloyed	SB-363	(R50400)	Titanium Grade WPT2	Fittings
Ti, unalloyed	SB-367	R50400	Titanium Grade C-2, cast	Castings
Ti, unalloyed	SB-381	R50400	Titanium Grade F2	Forgings
Ti, unalloyed	SB-265	R50550	Titanium Grade 3	Plate, sheet, strip
Ti, unalloyed	SB-337	R50550	Titanium Grade 3	Pipe, seamless and welded
Ti, unalloyed	SB-338	R50550	Titanium Grade 3	Tubes, seamless and welded
Ti, unalloyed	SB-348	R50550	Titanium Grade 3	Bars and billets
Ti, unalloyed	SB-363	(R50550)	Titanium Grade WPT3	Fittings
Ti, unalloyed	SB-367	R50550	Titanium Grade C-3, cast	Castings
Ti, unalloyed	SB-381	R50550	Titanium Grade F3	Forgings
Ti, unalloyed	SB-265	R50700	Titanium Grade 4	Plate, sheet, strip
Ti, unalloyed	SB-348	R50700	Titanium Grade 4	Bars and billets
Ti, unalloyed	SB-381	R50700	Titanium Grade F4	Forgings
Ti - 0.06 Pd	SB-265	R52402	Titanium Grade 16	Plate, sheet, strip
Ti - 0.06 Pd	SB-348	R52402	Titanium Grade 16	Bars and billets
Ti - 0.06 Pd	SB-363	(R52402)	Titanium Grade WPT16	Fittings
Ti - 0.06 Pd	SB-367	(R52402)	Titanium Grade Ti-Pd16	Castings
Ti - 0.06 Pd	SB-381	R52402	Titanium Grade F16	Forgings
Ti - 0.06 Pd	SB-265	R52252	Titanium Grade 17	Plate, sheet, strip
Ti - 0.06 Pd	SB-348	R52252	Titanium Grade 17	Bars and billets
Ti - 0.06 Pd	SB-363	(R52252)	Titanium Grade WPT17	Fittings
Ti - 0.06 Pd	SB-367	(R52252)	Titanium Grade Ti-Pd17	Castings
Ti - 0.06 Pd	SB-381	R52252	Titanium Grade F17	Forgings
Ti - 0.2 Pd	SB-265	R52400	Titanium Grade 7	Plate, sheet, strip
Ti - 0.2 Pd	SB-337	R52400	Titanium Grade 7	Pipe, seamless and welded
Ti - 0.2 Pd	SB-338	R52400	Titanium Grade 7	Tubes, seamless and welded
Ti - 0.2 Pd	SB-348	R52400	Titanium Grade 7	Bars and billets
Ti - 0.2 Pd	SB-363	(R52400)	Titanium Grade WPT7	Fittings
Ti - 0.2 Pd	SB-367	(R52400)	Titanium Grade Ti-Pd7B and Ti-Pd8A	Castings
Ti - 0.2 Pd	SB-381	R52400	Titanium Grade F7	Forgings
Ti - 0.2 Pd	SB-265	R52250	Titanium Grade 11	Plate, sheet, strip
Ti - 0.2 Pd	SB-338	R52250	Titanium Grade 11	Tubes, seamless and welded
Ti - 0.2 Pd	SB-348	R52250	Titanium Grade 11	Bars and billets

TITANIUM BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
Ti - 0.2 Pd	SB-363	(R52250)	Titanium Grade WPT11	Fittings
Ti - 0.2 Pd	SB-381	R52250	Titanium Grade F11	Forgings
Ti + 0.3 Mo + 0.8 Ni	SB-265	R53400	Titanium Grade 12	Plate, sheet, strip
Ti + 0.3 Mo + 0.8 Ni	SB-337	R53400	Titanium Grade 12	Pipe, seamless and welded
Ti + 0.3 Mo + 0.8 Ni	SB-338	R53400	Titanium Grade 12	Tubes, seamless and welded
Ti + 0.3 Mo + 0.8 Ni	SB-348	R53400	Titanium Grade 12	Bars and billets
Ti + 0.3 Mo + 0.8 Ni	SB-363	(R53400)	Titanium Grade WPT12	Fittings
Ti + 0.3 Mo + 0.8 Ni	SB-381	R53400	Titanium Grade F12	Forgings
Ti - 0.5 Ni - Ru	SB-265	R53413	Titanium Grade 13	Plate, sheet, strip
Ti - 0.5 Ni - Ru	SB-348	R53413	Titanium Grade 13	Bars and billets
Ti - 0.5 Ni - Ru	SB-363	(R53413)	Titanium Grade WPT13	Fittings
Ti - 0.5 Ni - Ru	SB-381	R53413	Titanium Grade F13	Forgings
Ti - 0.5 Ni - Ru	SB-265	R53414	Titanium Grade 14	Plate, sheet, strip
Ti - 0.5 Ni - Ru	SB-348	R53414	Titanium Grade 14	Bars and billets
Ti - 0.5 Ni - Ru	SB-363	(R53414)	Titanium Grade WPT14	Fittings
Ti - 0.5 Ni - Ru	SB-381	R53414	Titanium Grade F14	Forgings
Ti - 0.5 Ni - Ru	SB-265	R53415	Titanium Grade 15	Plate, sheet, strip
Ti - 0.5 Ni - Ru	SB-348	R53415	Titanium Grade 15	Bars and billets
Ti - 0.5 Ni - Ru	SB-363	(R53415)	Titanium Grade WPT15	Fittings
Ti - 0.5 Ni - Ru	SB-381	R53415	Titanium Grade F15	Forgings
Ti + 3 Al + 2.5 V	SB-265	R56320	Titanium Grade 9	Plate, sheet, strip
Ti + 3 Al + 2.5 V	SB-337	R56320	Titanium Grade 9	Pipe, seamless and welded
Ti + 3 Al + 2.5 V	SB-338	R56320	Titanium Grade 9	Tubes, seamless and welded
Ti + 3 Al + 2.5 V	SB-348	R56320	Titanium Grade 9	Bars and billets
Ti + 3 Al + 2.5 V	SB-363	(R56320)	Titanium Grade WPT9	Fittings
Ti + 3 Al + 2.5 V	SB-381	R56320	Titanium Grade F9	Forgings
Ti - 3 Al - 2.5 V - 0.05 Pd	SB-265	R56322	Titanium Grade 18	Plate, shhet, strip
Ti - 3 Al - 2.5 V - 0.05 Pd	SB-348	R56322	Titanium Grade 18	Bars and billets
Ti - 3 Al - 2.5 V - 0.05 Pd	SB-363	(R56322)	Titanium Grade WPT18	Fittings
Ti - 3 Al - 2.5 V - 0.05 Pd	SB-367	(R56322)	Titanium Grade Ti-Pd18	Castings
Ti - 3 Al - 2.5 V - 0.05 Pd	SB-381	R56322	Titanium Grade F18	Forgings
Ti - 5 Al - 2.5 Sn	SB-265	R54520	Titanium Grade 6	Plate, sheet, strip
Ti - 5 Al - 2.5 Sn	SB-348	R54520	Titanium Grade 6	Bars and billets
Ti - 5 Al - 2.5 Sn	SB-367	(R54520)	Titanium Grade C-6, cast	Castings
Ti - 5 Al - 2.5 Sn	SB-381	R54520	Titanium Grade F6	Forgings

TITANIUM BASE ALLOYS BY NOMINAL COMPOSITION (Continued)				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
Ti - 6 Al - 4V	SB-265	R56400	Titanium Grade 5	Plate, sheet, strip
Ti - 6 Al - 4V	SB-348	R56400	Titanium Grade 5	Bars and billets
Ti - 6 Al - 4V	SB-367	(R56400)	Titanium Grade C-5, cast	Castings
Ti - 6 Al - 4V	SB-381	R56400	Titanium Grade F5	Forgings
Ti - 6 Al - 4V	SB-363	---	Titanium Grade WPT23	Fittings
Ti - 6 Al - 4V	SB-265	---	Titanium Grade 23	Plate, sheet, strip
Ti - 8 V - 6 Cr - Mo - Zr - Al	SB-265	---	Titanium Grade 19	Plate, sheet, strip
Ti - 8 V - 6 Cr - Mo - Zr - Al	SB-363	---	Titanium Grade WPT19	Fittings
Ti - 8 V - 6 Cr - Mo - Zr -Al -Pd	SB-265	R58645	Titanium Grade 20 or Beta C	Plate, sheet, strip
Ti - 15 Mo - 3 Al- Cb	SB-265	---	Titanium Grade 21	Plate, sheet, strip
Ti - 8 V - 6 Cr - Mo - Zr -Al -P	SB-363	(R58645)	Titanium Grade WPT20	Fittings

ZIRCONIUM BASE ALLOYS BY NOMINAL COMPOSITION				
Nominal Composition	**Specification No.**	**UNS No.**	**Common Name or Trade Name**	**Product Form**
99.2 Zr	SB-493	R60702	Zirconium 702	Forgings
99.2 Zr	SB-523	R60702	Zirconium 702	Tubes, seamless and welded
99.2 Zr	SB-550	R60702	Zirconium 702	Bars and wire
99.2 Zr	SB-551	R60702	Zirconium 702	Plate
99.2 Zr	SB-658	R60702	Zirconium 702	Pipe, seamless and welded
97.5 Zr + Sn	SB-493	R60704	Zirconium 704	Forgings
97.5 Zr + Sn	SB-523	R60704	Zirconium 704	Tubes, seamless and welded
97.5 Zr + Sn	SB-550	R60704	Zirconium 704	Bars and wire
97.5 Zr + Sn	SB-551	R60704	Zirconium 704	Strip, sheet and plate
97.5 Zr + Sn	SB-658	R60704	Zirconium 704	Pipe, seamless and we;ded
95.5 Zr + Cb	SB-493	R60705	Zirconium 705	Forgings
95.5 Zr + Cb	SB-523	R60705	Zirconium 705	Tubes, seamless and welded
95.5 Zr + Cb	SB-550	R60705	Zirconium 705	Bars and wire
95.5 Zr + Cb	SB-551	R60705	Zirconium 705	Plate
95.5 Zr + Cb	SB-658	R60705	Zirconium 705	Pipe, seamless and welded
95.5 Zr + Cb	SB-551	R60706	Zirconium 706	Strip, sheet and plate

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
13-8 Mo PH or XM-13	Bars and shapes	13 Cr - 8 Ni - 2 Mo	SA-564	XM-13	S13800
13-8 Mo PH or XM-13	Plate, sheet, strip	13 Cr - 8 Ni - 2 Mo	SA-693	XM-13	S13800
13-8 Mo PH or XM-13	Forgings	13 Cr - 8 Ni - 2 Mo	SA-705	XM-13	S13800
15-5 PH or XM-12	Bars and shapes	15 Cr - 5 Ni - 3 Mo	SA-564	Type XM-12	S15500
15-5 PH or XM-12	Plate, sheet, strip	15 Cr - 5 Ni - 3 Mo	SA-693	Type XM-12	S15500
15-5 PH or XM-12	Forgings	15 Cr - 5 Ni - 3 Mo	SA-705	Type XM-12	S15500
15-7 Mo PH	Bars and shapes	15 Cr - 7 Ni - 2½ Mo - 1 Al	SA-564	Type 632	S15700
15-7 Mo PH	Plate, sheet, strip	15 Cr - 7 Ni - 2½ Mo - 1 Al	SA-693	Type 632	S15700
15-7 Mo PH	Forgings	15 Cr - 7 Ni - 2½ Mo - 1 Al	SA-705	Type 632	S15700
153 MA	Plate, sheet, strip	18 Cr - 9 Ni - N - Ce	SA-240	---	S30415
153 MA	Pipe, seamless and welded	18 Cr - 9 Ni - N - Ce	SA-312	---	S30415
153 MA	Pipe, welded	18 Cr - 9 Ni - N - Ce	SA-358	---	S30415
17-4 PH	Bars and shapes	17 Cr - 4 Ni - 4 Cu	SA-564	Type 630	S17400
17-4 PH	Plate, sheet, strip	17 Cr - 4 Ni - 4 Cu	SA-693	Type 630	S17400
17-4 PH	Forgings	17 Cr - 4 Ni - 4 Cu	SA-705	Type 630	S17400
17-7 PH	Bars and shapes	17 Cr - 7 Ni - 1 Al	SA-564	Type 631	S17700
17-7 PH	Plate, sheet, strip	17 Cr - 7 Ni - 1 Al	SA-693	Type 631	S17700
17-7 PH	Forgings	17 Cr - 7 Ni - 1 Al	SA-705	Type 631	S17700
18-15 LC Si	Flanges, fittings, etc.	18 Cr - 15 Ni - 4 Si	SA-182	F46	S30600
18-15 LC Si	Tubes, seamless	18 Cr - 15 Ni - 4 Si	(SA-213 CC)	---	S30600
18-15 LC Si	Plate, sheet, strip	18 Cr - 15 Ni - 4 Si	SA-240	---	S30600
18-15 LC Si	Pipe, seamless and welded	18 Cr - 15 Ni - 4 Si	SA-312	---	S30600
18-15 LC Si	Forgings	18 Cr - 15 Ni - 4 Si	SA-336	F46	S30600
18-15 LC Si	Pipe, welded	18 Cr - 15 Ni - 4 Si	SA-358	---	S30600
18-15 LC Si	Bars and shapes	18 Cr - 15 Ni - 4 Si	SA-479	---	S30600
18-17 LC	Flanges, fittings, etc.	18 Cr - 17 Ni - 5.3 Si	(SA-182 CC)	---	S30601
18-17 LC	Tubes, seamless	18 Cr - 17 Ni - 5.3 Si	(SA-213 CC)	---	S30601
18-17 LC	Plate, sheet, strip	18 Cr - 17 Ni - 5.3 Si	SA-240	---	S30601
18-17 LC	Tubes, seamless and welded	18 Cr - 17 Ni - 5.3 Si	(SA-268 CC)	---	S30601
18-17 LC	Pipe, seamless and welded	18 Cr - 17 Ni - 5.3 Si	(SA-312 CC)	---	S30601
18-17 LC	Bars and shapes	18 Cr - 17 Ni - 5.3 Si	(SA-479 CC)	---	S30601
18-18-2	Tubes, seamless	18 Cr - 18 Ni - 2 Si	SA-213	TP XM-15	S38100
18-18-2	Plate, sheet, strip	18 Cr - 18 Ni - 2 Si	SA-240	Type XM-15	S38100
18-18-2	Tubes, welded	18 Cr - 18 Ni - 2 Si	SA-249	TPXM-15	S38100
18-18-2	Pipe, seamless and welded	18 Cr - 18 Ni - 2 Si	SA-312	TPXM-15	S38100

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
18-18-2	Pipe, welded	18 Cr - 18 Ni - 2 Si	SA-813	TPXM-15	S38100
18-18-2	Pipe, welded	18 Cr - 18 Ni - 2 Si	SA-814	TPXM-15	S38100
18-2	Tubes, seamless	18 Cr - 2 Mo	SA-213	18 Cr - 2 Mo	S44400
18-2	Plate, sheet, strip	18 Cr - 2 Mo	SA-240	Type 18 Cr - 2 Mo	S44400
18-2	Tubes, seamless and welded	18 Cr - 2 Mo	SA-268	18 Cr - 2 Mo	S44400
18-2	Bars and shapes	18 Cr - 2 Mo	SA-479	18 Cr - 2 Mo	S44400
18-2	Pipe, seamless and welded	18 Cr - 2 Mo	SA-731	18 Cr - 2 Mo	S44400
18-2	Tubes, welded	18 Cr - 2 Mo	SA-803	18 Cr - 2 Mo	S44400
18-3 Mn	Plate, sheet, strip	18 Cr - 3 Ni - 12 Mn	SA-240	Type XM-29	S24000
18-3 Mn	Tubes, welded	18 Cr - 3 Ni - 12 Mn	SA-249	TPXM-29	S24000
18-3 Mn	Pipe, seamless and welded	18 Cr - 3 Ni - 12 Mn	SA-312	TPXM-29	S24000
18-3 Mn	Pipe, welded	18 Cr - 3 Ni - 12 Mn	SA-358	XM-29	S24000
18-3 Mn	Bars and shapes	18 Cr - 3 Ni - 12 Mn	SA-479	Type XM-29	S24000
18-3 Mn	Tubes, welded	18 Cr - 3 Ni - 12 Mn	SA-688	TPXM-29	S24000
18-3 Mn	Pipe, welded	18 Cr - 3 Ni - 12 Mn	SA-813	TPXM-29	S24000
18-3 Mn	Pipe, welded	18 Cr - 3 Ni - 12 Mn	SA-814	TPXM-29	S24000
19-9DL	Bolting	19 Cr - 9 Ni - Mo - W	SA-453	651	S63198
201 SS	Tubes, seamless	17 Cr - 4 Ni - 6 Mn	SA-213	TP201	S20100
201 SS	Plate, sheet, strip	17 Cr - 4 Ni - 6 Mn	SA-240	Type 201 (-1 and -2)	S20100
201 SS	Tubes, welded	17 Cr - 4 Ni - 6 Mn	SA-249	TP201	S20100
201 SS	Plate, sheet, strip	17 Cr - 4 Ni - 6 Mn	SA-666	Type 201 (-1 and -2)	S20100
201L SS	Plate, sheet, strip	17 Cr - 4 Ni - 7 Mn	SA-240	Type 201L	S20103
201LN SS	Plate, sheet, strip	17 Cr - 4 Ni - 7 Mn - N	SA-240	Type 201LN	S20153
202 SS	Tubes, seamless	18 Cr - 5 Ni - 9 Mn	SA-213	TP202	S20200
202 SS	Plate, sheet, strip	18 Cr - 5 Ni - 9 Mn	SA-240	Type 202	S20200
202 SS	Tubes, welded	18 Cr - 5 Ni - 9 Mn	SA-249	TP202	S20200
202 SS	Plate, sheet, strip	18 Cr - 5 Ni - 9 Mn	SA-666	Type 202	S20200
205 SS	Plate, sheet, strip	17 Cr - 1½ Ni - 15 Mn	SA-666	---	S20500
2205	Flanges, fittings, etc.	22 Cr - 5 Ni - 3 Mo - N	SA-182	F51	S31803
2205	Plate, sheet, strip	22 Cr - 5 Ni - 3 Mo - N	SA-240	S31803	S31803
2205	Bars and shapes	22 Cr - 5 Ni - 3 Mo - N	SA-479	S31803	S31803
2205	Tubes, seamless and welded	22 Cr - 5 Ni - 3 Mo - N	SA-789	S31803	S31803
2205	Pipe, seamless and welded	22 Cr - 5 Ni - 3 Mo - N	SA-790	S31803	S31803
2205	Fittings	22 Cr - 5 Ni - 3 Mo - N	SA-815	S31803	S31803

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
2304	Plate, sheet, strip	23 Cr - 4 Ni - Mo - Cu-N	SA-240	S32304	S32304
2304	Tubes, seamless and welded	23 Cr - 4 Ni - Mo - Cu-N	SA-789	S32304	S32304
2304	Pipe, seamless and welded	23 Cr - 4 Ni - Mo - Cu-N	SA-790	S32304	S32304
25-4-4	Plate, sheet, strip	25 Cr - 4 Ni - 4 Mo - Ti	SA-240	S44635	S44635
25-4-4	Tubes, seamless and welded	25 Cr - 4 Ni - 4 Mo - Ti	SA-268	25-4-4	S44635
25-4-4	Tubes, welded	25 Cr - 4 Ni - 4 Mo - Ti	SA-803	25-4-4	S44635
2507	Fittings	25 Cr - 7 Ni - 4 Mo - N	SA-815	S32750	S32750
253 MA	Flanges, fittings, etc.	21 Cr - 11 Ni - N	SA-182	F45	S30815
253 MA	Tubes, seamless	21 Cr - 11 Ni - N	SA-213	S30815	S30815
253 MA	Plate, sheet, strip	21 Cr - 11 Ni - N	SA-240	S30815	S30815
253 MA	Tubes, welded	21 Cr - 11 Ni - N	SA-249	S30815	S30815
253 MA	Pipe, seamless and welded	21 Cr - 11 Ni - N	SA-312	S30815	S30815
253 MA	Pipe, welded	21 Cr - 11 Ni - N	SA-358	S30815	S30815
253 MA	Pipe, welded	21 Cr - 11 Ni - N	SA-409	S30815	S30815
253 MA	Bars and shapes	21 Cr - 11 Ni - N	SA-479	S30815	S30815
253 MA	Pipe, welded	21 Cr - 11 Ni - N	SA-813	S30815	S30815
253 MA	Pipe, welded	21 Cr - 11 Ni - N	SA-814	S30815	S30815
254 SMO	Flanges, fittings, etc.	20 Cr - 18 Ni - 6 Mo - Cu - N	SA-182	F44	S31254
254 SMO	Bolting	20 Cr - 18 Ni - 6 Mo - Cu - N	SA-193	B8MLCuN/B8MLCuNA	S31254
254 SMO	Nuts	20 Cr - 18 Ni - 6 Mo - Cu - N	SA-194	8MLCuN/8MLCuNA	S31254
254 SMO	Plate, sheet, strip	20 Cr - 18 Ni - 6 Mo - Cu - N	SA-240	S31254	S31254
254 SMO	Tubes, welded	20 Cr - 18 Ni - 6 Mo - Cu - N	SA-249	S31254	S31254
254 SMO	Pipe, seamless and welded	20 Cr - 18 Ni - 6 Mo - Cu - N	SA-312	S31254	S31254
254 SMO	Pipe, welded	20 Cr - 18 Ni - 6 Mo - Cu - N	SA-358	S31254	S31254
254 SMO	Fittings	20 Cr - 18 Ni - 6 Mo - Cu - N	SA-403	S31254	S31254
254 SMO	Pipe, welded	20 Cr - 18 Ni - 6 Mo - Cu - N	SA-409	S31254	S31254
254 SMO	Bars and shapes	20 Cr - 18 Ni - 6 Mo - Cu - N	SA-479	S31254	S31254
254 SMO	Pipe, welded	20 Cr - 18 Ni - 6 Mo - Cu - N	SA-813	S31254	S31254
254 SMO	Pipe, welded	20 Cr - 18 Ni - 6 Mo - Cu - N	SA-814	S31254	S31254
254 SMO or CK3MCuN	Castings	20 Cr - 18 Ni - 6 Mo - Cu - N	SA-351	CK3MCuN	J93254
26-1	Plate, sheet, strip	27 Cr - 1 Mo - Ti	SA-240	Type XM-33	S44626
26-1	Tubes, seamless and welded	27 Cr - 1 Mo - Ti	SA-268	TPXM-33	S44626
26-1	Pipe, seamless and welded	27 Cr - 1 Mo - Ti	SA-731	TPXM-33	S44626
26-1	Tubes, welded	27 Cr - 1 Mo - Ti	SA-803	TPXM-33	S44626
26-1	Fittings	27 Cr - 1 Mo - Ti	SA-815	WP-33	S44626

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
28-4-2	Plate, sheet, strip	29 Cr - 4 Mo - 2 Ni	SA-240	---	S44800
28-4-2	Tubes, seamless and welded	29 Cr - 4 Mo - 2 Ni	SA-268	29-4-2	S44800
28-4-2	Bars and shapes	29 Cr - 4 Mo - 2 Ni	SA-479	S44800	S44800
28-4-2	Pipe, seamless and welded	29 Cr - 4 Mo - 2 Ni	SA-731	29-4-2	S44800
28-4-2	Tubes, welded	29 Cr - 4 Mo - 2 Ni	SA-803	29-4-2	S44800
29-4	Plate, sheet, strip	29 Cr - 4 Mo	SA-240	---	S44700
29-4	Tubes, seamless and welded	29 Cr - 4 Mo	SA-268	29-4	S44700
29-4	Bars and shapes	29 Cr - 4 Mo	SA-479	---	S44700
29-4	Pipe, seamless and welded	29 Cr - 4 Mo	SA-731	29-4	S44700
29-4	Tubes, welded	29 Cr - 4 Mo	SA-803	29-4	S44700
29-4C	Plate, sheet, strip	29 Cr - 4 Mo - Ti	SA-240	S44735	S44735
29-4C	Tubes, seamless and welded	29 Cr - 4 Mo - Ti	SA-268	S44735	S44735
29-4C	Tubes, welded	29 Cr - 4 Mo - Ti	SA-803	29-4C	S44735
301 SS	Plate, sheet, strip	17 Cr - 7 Ni	SA-240	---	S30100
301 SS	Plate, sheet, strip	17 Cr - 7 Ni	SA-666	---	S30100
302 SS	Plate, sheet, strip	18 Cr - 8 Ni	SA-240	Type 302	S30200
302 SS	Bars and shapes	18 Cr - 8 Ni	SA-479	Type 302	S30200
302 SS	Plate, sheet, strip	18 Cr - 8 Ni	SA-666	Type 302	S30200
303 + S SS	Nuts	18 Cr - 8 Ni - S	SA-194	8F and 8FA	S30300
303 + S SS	Bolting	18 Cr - 8 Ni - S	SA-320	B8F and B8FA	---
303 + Se SS	Nuts	18 Cr - 8 Ni - Se	SA-194	8F and 8FA	S30323
303 + Se SS	Bolting	18 Cr - 8 Ni	SA-320	B8F and B8FA	---
304 SS	Flanges, fittings, etc.	18 Cr - 8 Ni	SA-182	F304	S30400
304 SS	Bolting	18 Cr - 8 Ni	SA-193	B8 and B8A	S30400
304 SS	Nuts	18 Cr - 8 Ni	SA-194	8 and 8A	S30400
304 SS	Tubes, seamless	18 Cr - 8 Ni	SA-213	TP304	S30400
304 SS	Plate, sheet, strip	18 Cr - 8 Ni	SA-240	Type 304	S30400
304 SS	Tubes, welded	18 Cr - 8 Ni	SA-249	TP304	S30400
304 SS	Pipe, seamless and welded	18 Cr - 8 Ni	SA-312	TP304	S30400
304 SS	Bolting	18 Cr - 8 Ni	SA-320	B8 and B8A	S30400
304 SS	Forgings	18 Cr - 8 Ni	SA-336	F304	S30400
304 SS	Pipe, welded	18 Cr - 8 Ni	SA-358	304	S30400
304 SS	Pipe, seamless	18 Cr - 8 Ni	SA-376	TP304	S30400
304 SS	Fittings	18 Cr - 8 Ni	SA-403	WP304	S30400
304 SS	Pipe, welded	18 Cr - 8 Ni	SA-409	TP304	S30400

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
304 SS	Pipe, forged/bored	18 Cr - 8 Ni	SA-430	FP304	S30400
304 SS	Bars and shapes	18 Cr - 8 Ni	SA-479	Type 304	S30400
304 SS	Plate, sheet, strip	18 Cr - 8 Ni	SA-666	Type 304	S30400
304 SS	Tubes, welded	18 Cr - 8 Ni	SA-688	TP304	S30400
304 SS	Pipe, welded	18 Cr - 8 Ni	SA-813	TP304	S30400
304 SS	Pipe, welded	18 Cr - 8 Ni	SA-814	TP304	S30400
304H SS	Flanges, fittings, etc.	18 Cr - 8 Ni	SA-182	F304H	S30409
304H SS	Tubes, seamless	18 Cr - 8 Ni	SA-213	TP304H	S30409
304H SS	Plate, sheet, strip	18 Cr - 8 Ni	SA-240	Type 304H	S30409
304H SS	Tubes, welded	18 Cr - 8 Ni	SA-249	TP304H	S30409
304H SS	Pipe, seamless and welded	18 Cr - 8 Ni	SA-312	TP304H	S30409
304H SS	Forgings	18 Cr - 8 Ni	SA-336	F304H	S30409
304H SS	Pipe, welded	18 Cr - 8 Ni	SA-358	304H	S30409
304H SS	Pipe, seamless	18 Cr - 8 Ni	SA-376	TP304H	S30409
304H SS	Fittings	18 Cr - 8 Ni	SA-403	WP304H	S30409
304H SS	Pipe, forged/bored	18 Cr - 8 Ni	SA-430	FP304H	S30409
304H SS	Pipe, cast/worked	18 Cr - 8 Ni	SA-452	TP304H	S30409
304H SS	Bars and shapes	18 Cr - 8 Ni	SA-479	Type 304H	S30409
304H SS	Pipe, welded	18 Cr - 8 Ni	SA-813	TP304H	S30409
304H SS	Pipe, welded	18 Cr - 8 Ni	SA-814	TP304H	S30409
304L SS	Flanges, fittings, etc.	18 Cr - 8 Ni	SA-182	F304L	S30403
304L SS	Tubes, seamless	18 Cr - 8 Ni	SA-213	TP304L	S30403
304L SS	Plate, sheet, strip	18 Cr - 8 Ni	SA-240	Type 304L	S30403
304L SS	Tubes, welded	18 Cr - 8 Ni	SA-249	TP304L	S30403
304L SS	Pipe, seamless and welded	18 Cr - 8 Ni	SA-312	TP304L	S30403
304L SS	Forgings	18 Cr - 8 Ni	SA-336	F304L	S30403
304L SS	Pipe, welded	18 Cr - 8 Ni	SA-358	304L	S30403
304L SS	Fittings	18 Cr - 8 Ni	SA-403	WP304L	S30403
304L SS	Pipe, welded	18 Cr - 8 Ni	SA-409	TP304L	S30403
304L SS	Bars and shapes	18 Cr - 8 Ni	SA-479	Type 304L	S30403
304L SS	Plate, sheet, strip	18 Cr - 8 Ni	SA-666	Type 304L	S30403
304L SS	Tubes, welded	18 Cr - 8 Ni	SA-688	TP304L	S30403
304L SS	Pipe, welded	18 Cr - 8 Ni	SA-813	TP304L	S30403
304L SS	Pipe, welded	18 Cr - 8 Ni	SA-814	TP304L	S30403
304LN SS	Flanges, fittings, etc.	18 Cr - 8 Ni - N	SA-182	F304LN	S30453

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
304LN SS	Bolting	18 Cr - 8 Ni - N	SA-193	B8LN and B8LNA	S30453
304LN SS	Nuts	18 Cr - 8 Ni - N	SA-194	8LN and 8LNA	S30453
304LN SS	Tubes, seamless	18 Cr - 8 Ni - N	SA-213	TP304LN	S30453
304LN SS	Plate, sheet, strip	18 Cr - 8 Ni - N	SA-240	Type 304LN	S30453
304LN SS	Tubes, welded	18 Cr - 8 Ni - N	SA-249	TP304LN	S30453
304LN SS	Pipe, seamless and welded	18 Cr - 8 Ni - N	SA-312	TP304LN	S30453
304LN SS	Bolting	18 Cr - 8 Ni - N	SA-320	B8LN and B8LNA	S30453
304LN SS	Forgings	18 Cr - 8 Ni - N	SA-336	F304LN	S30453
304LN SS	Pipe, welded	18 Cr - 8 Ni - N	SA-358	304LN	S30453
304LN SS	Pipe, seamless	18 Cr - 8 Ni - N	SA-376	TP304LN	S30453
304LN SS	Fittings	18 Cr - 8 Ni - N	SA-403	304LN	S30453
304LN SS	Bars and shapes	18 Cr - 8 Ni - N	SA-479	Type 304LN	S30453
304LN SS	Plate, sheet, strip	18 Cr - 8 Ni - N	SA-666	Type 304LN	S30453
304LN SS	Tubes, welded	18 Cr - 8 Ni - N	SA-688	TP304LN	S30453
304LN SS	Pipe, welded	18 Cr - 8 Ni - N	SA-813	TP304LN	S30453
304LN SS	Pipe, welded	18 Cr - 8 Ni - N	SA-814	TP304LN	S30453
304N SS	Flanges, fittings, etc.	18 Cr - 8 Ni - N	SA-182	F304N	S30451
304N SS	Bolting	18 Cr - 8 Ni - N	SA-193	B8N and B8NA	S30451
304N SS	Nuts	18 Cr - 8 Ni - N	SA-194	8N and 8NA	S30451
304N SS	Tubes, seamless	18 Cr - 8 Ni - N	SA-213	TP304N	S30451
304N SS	Plate, sheet, strip	18 Cr - 8 Ni - N	SA-240	Type 304N	S30451
304N SS	Tubes, welded	18 Cr - 8 Ni - N	SA-249	TP304N	S30451
304N SS	Pipe, seamless and welded	18 Cr - 8 Ni - N	SA-312	TP304N	S30451
304N SS	Forgings	18 Cr - 8 Ni - N	SA-336	F304N	S30451
304N SS	Pipe, welded	18 Cr - 8 Ni - N	SA-358	304N	S30451
304N SS	Pipe, seamless	18 Cr - 8 Ni - N	SA-376	TP304N	S30451
304N SS	Fittings	18 Cr - 8 Ni - N	SA-403	WP304N	S30451
304N SS	Pipe, forged/bored	18 Cr - 8 Ni - N	SA-430	FP304N	S30451
304N SS	Bars and shapes	18 Cr - 8 Ni - N	SA-479	Type 304N	S30451
304N SS	Plate, sheet, strip	18 Cr - 8 Ni - N	SA-666	Type 304N	S30451
304N SS	Tubes, welded	18 Cr - 8 Ni - N	SA-688	TP304N	S30451
304N SS	Pipe, welded	18 Cr - 8 Ni - N	SA-813	TP304N	S30451
304N SS	Pipe, welded	18 Cr - 8 Ni - N	SA-814	TP304N	S30451
305 SS	Bolting	18 Cr - 11 Ni	SA-193	B8P and B8PA	S30500
305 SS	Nuts	18 Cr - 11 Ni	SA-194	8P and 8PA	S30500

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
305 SS	Plate, sheet, strip	18 Cr - 11 Ni	SA-240	Type 305	S30500
305 SS	Tubes, welded	18 Cr - 11 Ni	SA-249	TP305	S30500
305 SS	Bolting	18 Cr - 11 Ni	SA-320	B8P and B8PA	S30500
308 SS	Bars and shapes	20 Cr - 10 Ni	SA-479	Type ER308	S30880
309 SS	Fittings	23 Cr - 12 Ni	SA-403	WP309	S30900
309Cb SS	Tubes, seamless	23 Cr - 12 Ni - Cb	SA-213	TP309Cb	S30940
309Cb SS	Plate, sheet, strip	23 Cr - 12 Ni - Cb	SA-240	Type 309Cb	S30940
309Cb SS	Tubes, welded	23 Cr - 12 Ni - Cb	SA-249	TP309Cb	S30940
309Cb SS	Pipe, seamless and welded	23 Cr - 12 Ni - Cb	SA-312	TP309Cb	S30940
309Cb SS	Pipe, welded	23 Cr - 12 Ni - Cb	SA-358	309Cb	S30940
309Cb SS	Pipe, welded	23 Cr - 12 Ni - Cb	SA-409	TP309Cb	S30940
309Cb SS	Bars and shapes	23 Cr - 12 Ni - Cb	SA-479	Type 309Cb	S30940
309Cb SS	Pipe, welded	23 Cr - 12 Ni - Cb	SA-813	TP309Cb	S30940
309Cb SS	Pipe, welded	23 Cr - 12 Ni - Cb	SA-814	TP309Cb	S30940
309H Cb SS	Tubes, seamless	23 Cr - 12 Ni - Cb	SA-213	TP309H Cb	S30941
309H Cb SS	Plate, sheet, strip	23 Cr - 12 Ni - Cb	SA-240	Type 309H Cb	S30941
309H Cb SS	Tubes, welded	23 Cr - 12 Ni - Cb	SA-249	TP309H Cb	S30941
309H Cb SS	Pipe, seamless and welded	23 Cr - 12 Ni - Cb	SA-312	TP309H Cb	S30941
309H SS	Tubes, seamless	23 Cr - 12 Ni	SA-213	TP309H	S30909
309H SS	Plate, sheet, strip	23 Cr - 12 Ni	SA-240	Type 309H	S30909
309H SS	Tubes, welded	23 Cr - 12 Ni	SA-249	TP309H	S30909
309H SS	Pipe, seamless and welded	23 Cr - 12 Ni	SA-312	TP309H	S30909
309H SS	Bars and shapes	23 Cr - 12 Ni	SA-479	Type 309H	S30909
309H SS	Forgings	23 Cr - 12 Ni	SA-336	F309H	S30909
309S SS	Tubes, seamless	23 Cr - 12 Ni	SA-213	TP309S	S30908
309S SS	Plate, sheet, strip	23 Cr - 12 Ni	SA-240	Type 309S	S30908
309S SS	Tubes, welded	23 Cr - 12 Ni	SA-249	TP309S	S30908
309S SS	Pipe, seamless and welded	23 Cr - 12 Ni	SA-312	TP309S	S30908
309S SS	Pipe, welded	23 Cr - 12 Ni	SA-358	309S	S30908
309S SS	Pipe, welded	23 Cr - 12 Ni	SA-409	309S	S30908
309S SS	Bars and shapes	23 Cr - 12 Ni	SA-479	Type 309S	S30908
309S SS	Pipe, welded	23 Cr - 12 Ni	SA-813	TP309S	S30908
309S SS	Pipe, welded	23 Cr - 12 Ni	SA-814	TP309S	S30908
310 SS	Flanges, fittings, etc.	25 Cr - 20 Ni	SA-182	F310	S31000
310 SS	Forgings	25 Cr - 20 Ni	SA-336	F310	S31000

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
310 SS	Fittings	25 Cr - 20 Ni	SA-403	310	S31000
310Cb SS	Tubes, seamless	25 Cr - 20 Ni - Cb	SA-213	TP310Cb	S31040
310Cb SS	Plate, sheet, strip	25 Cr - 20 Ni - Cb	SA-240	Type 310Cb	S31040
310Cb SS	Tubes, welded	25 Cr - 20 Ni - Cb	SA-249	TP310Cb	S31040
310Cb SS	Pipe, seamless and welded	25 Cr - 20 Ni - Cb	SA-312	TP310Cb	S31040
310Cb SS	Pipe, welded	25 Cr - 20 Ni - Cb	SA-358	310Cb	S31040
310Cb SS	Pipe, welded	25 Cr - 20 Ni - Cb	SA-409	TP310Cb	S31040
310Cb SS	Bars and shapes	25 Cr - 20 Ni - Cb	SA-479	Type 310Cb	S31040
310Cb SS	Pipe, welded	25 Cr - 20 Ni - Cb	SA-813	TP310Cb	S31040
310Cb SS	Pipe, welded	25 Cr - 20 Ni - Cb	SA-814	TP310Cb	S31040
310H SS	Tubes, seamless	25 Cr - 20 Ni	SA-213	TP310H	S31009
310H SS	Plate, sheet, strip	25 Cr - 20 Ni	SA-240	Type 310H	S31009
310H SS	Tubes, welded	25 Cr - 20 Ni	SA-249	TP310H	S31009
310H SS	Pipe, seamless and welded	25 Cr - 20 Ni	SA-312	TP310H	S31009
310H SS	Forgings	25 Cr - 20 Ni	SA-336	F310H	S31009
310H SS	Bars and shapes	25 Cr - 20 Ni	SA-479	Type 310H	S31009
310HCb SS	Tubes, seamless	25 Cr - 20 Ni - Cb	SA-213	TP310H Cb	S31041
310HCb SS	Plate, sheet, strip	25 Cr - 20 Ni - Cb	SA-240	Type 310H Cb	S31041
310HCb SS	Tubes, welded	25 Cr - 20 Ni - Cb	SA-249	TP310H Cb	S31041
310HCb SS	Pipe, seamless and welded	25 Cr - 20 Ni - Cb	SA-312	TP310H Cb	S31041
310HCbN	Tubes, seamless	25 Cr - 20 Ni - Cb - N	SA-213	---	S31042
310Mo LN	Tubes, seamless	25 Cr - 20 Ni - 2 Mo - N	SA-213	S31050	S31050
310Mo LN	Plate, sheet, strip	25 Cr - 20 Ni - 2 Mo - N	SA-240	Type 310Mo LN	S31050
310Mo LN	Tubes, welded	25 Cr - 20 Ni - 2 Mo - N	SA-249	S31050	S31050
310Mo LN	Pipe, seamless and welded	25 Cr - 20 Ni - 2 Mo - N	SA-312	S31050	S31050
310MoLN	Flanges, fittings, etc.	25 Cr - 20 Ni - 2 Mo - N	(SA-182 CC)	---	S31050
310S SS	Tubes, seamless	25 Cr - 20 Ni	SA-213	TP310S	S31008
310S SS	Plate, sheet, strip	25 Cr - 20 Ni	SA-240	Type 310S	S31008
310S SS	Tubes, welded	25 Cr - 20 Ni	SA-249	TP310S	S31008
310S SS	Pipe, seamless and welded	25 Cr - 20 Ni	SA-312	TP310S	S31008
310S SS	Pipe, welded	25 Cr - 20 Ni	SA-358	310S	S31008
310S SS	Pipe, welded	25 Cr - 20 Ni	SA-409	TP310S	S31008
310S SS	Bars and shapes	25 Cr - 20 Ni	SA-479	Type 310S	S31008
310S SS	Pipe, welded	25 Cr - 20 Ni	SA-813	TP310S	S31008
310S SS	Pipe, welded	25 Cr - 20 Ni	SA-814	TP310S	S31008

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
316 SS	Flanges, fittings, etc.	16 Cr - 12 Ni - 2 Mo	SA-182	F316	S31600
316 SS	Bolting	16 Cr - 12 Ni - 2 Mo	SA-193	B8M, B8MA, B8M2 and B8M3	S31600
316 SS	Nuts	16 Cr - 12 Ni - 2 Mo	SA-194	8M, 8MA	S31600
316 SS	Tubes, seamless	16 Cr - 12 Ni - 2 Mo	SA-213	TP316	S31600
316 SS	Plate, sheet, strip	16 Cr - 12 Ni - 2 Mo	SA-240	Type 316	S31600
316 SS	Tubes, welded	16 Cr - 12 Ni - 2 Mo	SA-249	TP316	S31600
316 SS	Pipe, seamless and welded	16 Cr - 12 Ni - 2 Mo	SA-312	TP316	S31600
316 SS	Bolting	16 Cr - 12 Ni - 2 Mo	SA-320	B8M and B8MA	S31600
316 SS	Forgings	16 Cr - 12 Ni - 2 Mo	SA-336	F316	S31600
316 SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo	SA-358	316	S31600
316 SS	Pipe, seamless	16 Cr - 12 Ni - 2 Mo	SA-376	TP316	S31600
316 SS	Fittings	16 Cr - 12 Ni - 2 Mo	SA-403	WP316	S31600
316 SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo	SA-409	TP316	S31600
316 SS	Pipe, forged/bored	16 Cr - 12 Ni - 2 Mo	SA-430	FP316	S31600
316 SS	Bars and shapes	16 Cr - 12 Ni - 2 Mo	SA-479	Type 316	S31600
316 SS	Plate, sheet, strip	16 Cr - 12 Ni - 2 Mo	SA-666	Type 316	S31600
316 SS	Tubes, welded	16 Cr - 12 Ni - 2 Mo	SA-688	TP316	S31600
316 SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo	SA-813	TP316	S31600
316 SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo	SA-814	TP316	S31600
316Cb SS	Plate, sheet, strip	16 Cr - 12 Ni - 2 Mo - Cb	SA-240	Type 316Cb	S31640
316Cb SS	Bars and shapes	16 Cr - 12 Ni - 2 Mo - Cb	SA-479	Type 316Cb	S31640
316H SS	Flanges, fittings, etc.	16 Cr - 12 Ni - 2 Mo	SA-182	F316H	S31609
316H SS	Tubes, seamless	16 Cr - 12 Ni - 2 Mo	SA-213	TP316H	S31609
316H SS	Plate, sheet, strip	16 Cr - 12 Ni - 2 Mo	SA-240	Type 316H	S31609
316H SS	Tubes, welded	16 Cr - 12 Ni - 2 Mo	SA-249	TP316H	S31609
316H SS	Pipe, seamless and welded	16 Cr - 12 Ni - 2 Mo	SA-312	TP316H	S31609
316H SS	Forgings	16 Cr - 12 Ni - 2 Mo	SA-336	F316H	S31609
316H SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo	SA-358	316H	S31609
316H SS	Pipe, seamless	16 Cr - 12 Ni - 2 Mo	SA-376	TP316H	S31609
316H SS	Fittings	16 Cr - 12 Ni - 2 Mo	SA-403	WP316H	S31609
316H SS	Pipe, forged/bored	16 Cr - 12 Ni - 2 Mo	SA-430	FP316H	S31609
316H SS	Pipe, cast/worked	16 Cr - 12 Ni - 2 Mo	SA-452	TP316H	S31609
316H SS	Bars and shapes	16 Cr - 12 Ni - 2 Mo	SA-479	316H	S31609
316H SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo	SA-813	TP316H	S31609

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
316H SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo	SA-814	TP316H	S31609
316L SS	Flanges, fittings, etc.	16 Cr - 12 Ni - 2 Mo	SA-182	F316L	S31603
316L SS	Tubes, seamless	16 Cr - 12 Ni - 2 Mo	SA-213	TP316L	S31603
316L SS	Plate, sheet, strip	16 Cr - 12 Ni - 2 Mo	SA-240	Type 316L	S31603
316L SS	Tubes, welded	16 Cr - 12 Ni - 2 Mo	SA-249	TP316L	S31603
316L SS	Pipe, seamless and welded	16 Cr - 12 Ni - 2 Mo	SA-312	TP316L	S31603
316L SS	Forgings	16 Cr - 12 Ni - 2 Mo	SA-336	F316L	S31603
316L SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo	SA-358	316L	S31603
316L SS	Fittings	16 Cr - 12 Ni - 2 Mo	SA-403	WP316L	S31603
316L SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo	SA-409	TP316L	S31603
316L SS	Bars and shapes	16 Cr - 12 Ni - 2 Mo	SA-479	316L	S31603
316L SS	Plate, sheet, strip	16 Cr - 12 Ni - 2 Mo	SA-666	Type 316L	S31603
316L SS	Tubes, welded	16 Cr - 12 Ni - 2 Mo	SA-688	TP316L	S31603
316L SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo	SA-813	TP316L	S31603
316L SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo	SA-814	TP316L	S31603
316LN SS	Flanges, fittings, etc.	16 Cr - 12 Ni - 2 Mo - N	SA-182	F316LN	S31653
316LN SS	Bolting	16 Cr - 12 Ni - 2 Mo - N	SA-193	B8MLN/ B8MLNA	S31653
316LN SS	Nuts	16 Cr - 12 Ni - 2 Mo - N	SA-194	8MLN/8MLNA	S31653
316LN SS	Tubes, seamless	16 Cr - 12 Ni - 2 Mo - N	SA-213	TP316LN	S31653
316LN SS	Plate, sheet, strip	16 Cr - 12 Ni - 2 Mo - N	SA-240	Type 316LN	S31653
316LN SS	Tubes, welded	16 Cr - 12 Ni - 2 Mo - N	SA-249	TP316LN	S31653
316LN SS	Pipe, seamless and welded	16 Cr - 12 Ni - 2 Mo - N	SA-312	TP316LN	S31653
316LN SS	Bolting	16 Cr - 12 Ni - 2 Mo - N	SA-320	8MLN/8MLNA	S31653
316LN SS	Forgings	16 Cr - 12 Ni - 2 Mo - N	SA-336	F316LN	S31653
316LN SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo - N	SA-358	316LN	S31653
316LN SS	Pipe, seamless	16 Cr - 12 Ni - 2 Mo - N	SA-376	TP316LN	S31653
316LN SS	Fittings	16 Cr - 12 Ni - 2 Mo - N	SA-403	316LN	S31653
316LN SS	Bars and shapes	16 Cr - 12 Ni - 2 Mo - N	SA-479	Type 316LN	S31653
316LN SS	Tubes, welded	16 Cr - 12 Ni - 2 Mo - N	SA-688	TP316LN	S31653
316LN SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo - N	SA-813	TP316LN	S31653
316LN SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo - N	SA-814	TP316LN	S31653
316N SS	Flanges, fittings, etc.	16 Cr - 12 Ni - 2 Mo - N	SA-182	F316N	S31651
316N SS	Bolting	16 Cr - 12 Ni - 2 Mo - N	SA-193	B8MN and B8MNA	S31651
316N SS	Nuts	16 Cr - 12 Ni - 2 Mo - N	SA-194	8MN and 8MNA	S31651
316N SS	Tubes, seamless	16 Cr - 12 Ni - 2 Mo - N	SA-213	TP316N	S31651

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
316N SS	Plate, sheet, strip	16 Cr - 12 Ni - 2 Mo - N	SA-240	Type 316N	S31651
316N SS	Tubes, welded	16 Cr - 12 Ni - 2 Mo - N	SA-249	TP316N	S31651
316N SS	Pipes, seamless and welded	16 Cr - 12 Ni - 2 Mo - N	SA-312	TP316N	S31651
316N SS	Forgings	16 Cr - 12 Ni - 2 Mo - N	SA-336	F316N	S31651
316N SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo - N	SA-358	316N	S31651
316N SS	Pipe, seamless	16 Cr - 12 Ni - 2 Mo - N	SA-376	TP316N	S31651
316N SS	Fittings	16 Cr - 12 Ni - 2 Mo - N	SA-403	WP316N	S31651
316N SS	Pipe, forged/bored	16 Cr - 12 Ni - 2 Mo - N	SA-430	FP316N	S31651
316N SS	Bars and shapes	16 Cr - 12 Ni - 2 Mo - N	SA-479	Type 316N	S31651
316N SS	Plate, sheet, strip	16 Cr - 12 Ni - 2 Mo - N	SA-666	Type 316N	S31651
316N SS	Tubes, welded	16 Cr - 12 Ni - 2 Mo - N	SA-688	TP316N	S31651
316N SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo - N	SA-813	TP316N	S31651
316N SS	Pipe, welded	16 Cr - 12 Ni - 2 Mo - N	SA-814	TP316N	S31651
316Ti SS	Plate, sheet, strip	16 Cr - 12 Ni - 2 Mo - Ti	SA-240	Type 316Ti	S31635
316Ti SS	Bars and shapes	16 Cr - 12 Ni - 2 Mo - Ti	SA-479	Type 316Ti	S31635
317 SS	Flanges, fittings, etc.	18 Cr - 13 Ni - 3 Mo	SA-182	F317	S31700
317 SS	Plate, sheet, strip	18 Cr - 13 Ni - 3 Mo	SA-240	Type 317	S31700
317 SS	Tubes, welded	18 Cr - 13 Ni - 3 Mo	SA-249	TP317	S31700
317 SS	Tubes, seamless	18 Cr - 13 Ni - 3 Mo	SA-213	TP317	S31700
317 SS	Pipe, seamless and welded	18 Cr - 13 Ni - 3 Mo	SA-312	TP317	S31700
317 SS	Fittings	18 Cr - 13 Ni - 3 Mo	SA-403	317	S31700
317 SS	Pipe, welded	18 Cr - 13 Ni - 3 Mo	SA-409	TP317	S31700
317 SS	Bars and shapes	18 Cr - 13 Ni - 3 Mo	SA-479	Type 317	S31700
317 SS	Pipe, welded	18 Cr - 13 Ni - 3 Mo	SA-813	TP317	S31700
317 SS	Pipe, welded	18 Cr - 13 Ni - 3 Mo	SA-814	TP317	S31700
317L SS	Flanges, fittings, etc.	18 Cr - 13 Ni - 3 Mo	SA-182	F317L	S31703
317L SS	Tubes, seamless	18 Cr - 13 Ni - 3 Mo	SA-213	TP317L	S31703
317L SS	Plate, sheet, strip	18 Cr - 13 Ni - 3 Mo	SA-240	Type 317L	S31703
317L SS	Tubes, welded	18 Cr - 13 Ni - 3 Mo	SA-249	TP317L	S31703
317L SS	Pipe, seamless and welded	18 Cr - 13 Ni - 3 Mo	SA-312	TP317L	S31703
317L SS	Fittings	18 Cr - 13 Ni - 3 Mo	SA-403	317L	S31703
317L SS	Pipe, welded	18 Cr - 13 Ni - 3 Mo	SA-813	TP317L	S31703
317L SS	Pipe, welded	18 Cr - 13 Ni - 3 Mo	SA-814	TP317L	S31703
317L4 SS	Flanges, Fittings, Valves, Parts	19 Cr - 15½ Ni - 4 Mo	SA-182	F48	S31726
317L4 SS	Tubes, seamless	19 Cr - 15½ Ni - 4 Mo	SA-213	S31726	S31726

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
317L4 SS	Plate, sheet, strip	19 Cr - 15½ Ni - 4 Mo	SA-240	S31726	S31726
317L4 SS	Tubes, welded	19 Cr - 15½ Ni - 4 Mo	SA-249	S31726	S31726
317L4 SS	Pipe, seamless and welded	19 Cr - 15½ Ni - 4 Mo	SA-312	S31726	S31726
317L4 SS	Pipe, welded	19 Cr - 15½ Ni - 4 Mo	SA-358	S31726	S31726
317L4 SS	Pipe, seamless	19 Cr - 15½ Ni - 4 Mo	SA-376	S31726	S31726
317L4 SS	Pipe, welded	19 Cr - 15½ Ni - 4 Mo	SA-409	S31726	S31726
317L4 SS	Bars and shapes	19 Cr - 15½ Ni - 4 Mo	SA-479	Type S31726	S31726
317LM SS	Flanges, Fittings, Valves, Parts	19 Cr - 15 Ni - 4 Mo	SA-182	F47	S31725
317LM SS	Tubes, seamless	19 Cr - 15 Ni - 4 Mo	SA-213	S31725	S31725
317LM SS	Plate, sheet, strip	19 Cr - 15 Ni - 4 Mo	SA-240	S31725	S31725
317LM SS	Tubes, welded	19 Cr - 15 Ni - 4 Mo	SA-249	S31725	S31725
317LM SS	Pipe, seamless and welded	19 Cr - 15 Ni - 4 Mo	SA-312	S31725	S31725
317LM SS	Pipe, welded	19 Cr - 15 Ni - 4 Mo	SA-358	S31725	S31725
317LM SS	Pipe, seamless	19 Cr - 15 Ni - 4 Mo	SA-376	S31725	S31725
317LM SS	Pipe, welded	19 Cr - 15 Ni - 4 Mo	SA-409	S31725	S31725
317LM SS	Bars and shapes	19 Cr - 15 Ni - 4 Mo	SA-479	Type S31725	S31725
317LN SS	Plate, sheet, strip	18 Cr - 13 Ni - 3 Mo - N	SA-240	Type S31753	S31753
321 SS	Flanges, fittings, etc.	18 Cr - 10 Ni - Ti	SA-182	F321	S32100
321 SS	Bolting	18 Cr - 10 Ni - Ti	SA-193	B8T and B8TA	S32100
321 SS	Nuts	18 Cr - 10 Ni - Ti	SA-194	8T and 8TA	S32100
321 SS	Tubes, seamless	18 Cr - 10 Ni - Ti	SA-213	TP321	S32100
321 SS	Plate, sheet, strip	18 Cr - 10 Ni - Ti	SA-240	Type 321	S32100
321 SS	Tubes, welded	18 Cr - 10 Ni - Ti	SA-249	TP321	S32100
321 SS	Pipe, seamless and welded	18 Cr - 10 Ni - Ti	SA-312	TP321	S32100
321 SS	Bolting	18 Cr - 10 Ni - Ti	SA-320	B8T and B8TA	S32100
321 SS	Forgings	18 Cr - 10 Ni - Ti	SA-336	F321	S32100
321 SS	Pipe, welded	18 Cr - 10 Ni - Ti	SA-358	321	S32100
321 SS	Pipe, seamless	18 Cr - 10 Ni - Ti	SA-376	TP321	S32100
321 SS	Fittings	18 Cr - 10 Ni - Ti	SA-403	WP321	S32100
321 SS	Pipe, welded	18 Cr - 10 Ni - Ti	SA-409	TP321	S32100
321 SS	Pipe, forged/bored	18 Cr - 10 Ni - Ti	SA-430	FP321	S32100
321 SS	Bars and shapes	18 Cr - 10 Ni - Ti	SA-479	Type 321	S32100
321 SS	Pipe, welded	18 Cr - 10 Ni - Ti	SA-813	TP321	S32100
321 SS	Pipe, welded	18 Cr - 10 Ni - Ti	SA-814	TP321	S32100
321H SS	Flanges, fittings, etc.	18 Cr - 10 Ni - Ti	SA-182	F321H	S32109

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
321H SS	Tubes, seamless	18 Cr - 10 Ni - Ti	SA-213	TP321H	S32109
321H SS	Plate, sheet, strip	18 Cr - 10 Ni - Ti	SA-240	Type 321H	S32109
321H SS	Tubes, welded	18 Cr - 10 Ni - Ti	SA-249	TP321H	S32109
321H SS	Pipe, seamless and welded	18 Cr - 10 Ni - Ti	SA-312	TP321H	S32109
321H SS	Forgings	18 Cr - 10 Ni - Ti	SA-336	F321H	S32109
321H SS	Pipe, seamless	18 Cr - 10 Ni - Ti	SA-376	TP321H	S32109
321H SS	Fittings	18 Cr - 10 Ni - Ti	SA-403	WP321H	S32109
321H SS	Pipe, forged/bored	18 Cr - 10 Ni - Ti	SA-430	FP321H	S32109
321H SS	Bars and shapes	18 Cr - 10 Ni - Ti	SA-479	Type 321H	S32109
321H SS	Pipe, welded	18 Cr - 10 Ni - Ti	SA-813	TP321H	S32109
321H SS	Pipe, welded	18 Cr - 10 Ni - Ti	SA-814	TP321H	S32109
329 SS	Plate, sheet, strip	26 Cr - 4 Ni - Mo	SA-240	Type 329	S32900
329 SS	Tubes, seamless and welded	26 Cr - 4 Ni - Mo	SA-789	S32900	S32900
329 SS	Pipe, seamless and welded	26 Cr - 4 Ni - Mo	SA-790	S32900	S32900
347 SS	Flanges, fittings, etc.	18 Cr - 10 Ni - Cb	SA-182	F347	S34700
347 SS	Bolting	18 Cr - 10 Ni - Cb	SA-193	B8C and B8CA	S34700
347 SS	Nuts	18 Cr - 10 Ni - Cb	SA-194	8C and 8CA	S34700
347 SS	Tubes, seamless	18 Cr - 10 Ni - Cb	SA-213	TP347	S34700
347 SS	Plate, sheet, strip	18 Cr - 10 Ni - Cb	SA-240	Type 347	S34700
347 SS	Tubes, welded	18 Cr - 10 Ni - Cb	SA-249	TP347	S34700
347 SS	Pipe, seamless and welded	18 Cr - 10 Ni - Cb	SA-312	TP347	S34700
347 SS	Bolting	18 Cr - 10 Ni - Cb	SA-320	B8C and B8CA	S34700
347 SS	Forgings	18 Cr - 10 Ni - Cb	SA-336	F347	S34700
347 SS	Castings	18 Cr - 10 Ni - Cb	SA-351	CF8C	J92710
347 SS	Pipe, welded	18 Cr - 10 Ni - Cb	SA-358	347	S34700
347 SS	Pipe, seamless	18 Cr - 10 Ni - Cb	SA-376	TP347	S34700
347 SS	Fittings	18 Cr - 10 Ni - Cb	SA-403	WP347	S34700
347 SS	Pipe, welded	18 Cr - 10 Ni - Cb	SA-409	TP347	S34700
347 SS	Pipe, forged/bored	18 Cr - 10 Ni - Cb	SA-430	FP347	S34700
347 SS	Bars and shapes	18 Cr - 10 Ni - Cb	SA-479	Type 347	S34700
347 SS	Pipe, welded	18 Cr - 10 Ni - Cb	SA-813	TP347	S34700
347 SS	Pipe, welded	18 Cr - 10 Ni - Cb	SA-814	TP347	S34700
347H SS	Flanges, fittings, etc.	18 Cr - 10 Ni - Cb	SA-182	F347H	S34709
347H SS	Tubes, seamless	18 Cr - 10 Ni - Cb	SA-213	TP347H	S34709
347H SS	Plate, sheet, strip	18 Cr - 10 Ni - Cb	SA-240	Type 347H	S34709

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
347H SS	Tubes, welded	18 Cr - 10 Ni - Cb	SA-249	TP347H	S34709
347H SS	Pipe, seamless and welded	18 Cr - 10 Ni - Cb	SA-312	TP347H	S34709
347H SS	Forgings	18 Cr - 10 Ni - Cb	SA-336	F347H	S34709
347H SS	Pipe, seamless	18 Cr - 10 Ni - Cb	SA-376	TP347H	S34709
347H SS	Fittings	18 Cr - 10 Ni - Cb	SA-403	WP347H	S34709
347H SS	Pipe, forged/bored	18 Cr - 10 Ni - Cb	SA-430	FP347H	S34709
347H SS	Pipe, cast/worked	18 Cr - 10 Ni - Cb	SA-452	TP347H	S34709
347H SS	Bars and shapes	18 Cr - 10 Ni - Cb	SA-479	Type 347H	S34709
347H SS	Pipe, welded	18 Cr - 10 Ni - Cb	SA-813	TP347H	S34709
347H SS	Pipe, welded	18 Cr - 10 Ni - Cb	SA-814	TP347H	S34709
347HFG SS	Tubes, seamless	18 Cr - 10 Ni - Cb	SA-213	TP347HFG	---
347N SS	Tubes, seamless	18 Cr - 11 Ni - Cb - N	(SA-213 CC)	---	S34751
347N SS	Pipe, seamless and welded	18 Cr - 11 Ni - Cb - N	(SA-312 CC)	---	S34751
348 SS	Flanges, fittings, etc.	18 Cr - 10 Ni - Cb	SA-182	F348	S34800
348 SS	Tubes, seamless	18 Cr - 10 Ni - Cb	SA-213	TP348	S34800
348 SS	Plate, sheet, strip	18 Cr - 10 Ni - Cb	SA-240	Type 348	S34800
348 SS	Tubes, welded	18 Cr - 10 Ni - Cb	SA-249	TP348	S34800
348 SS	Pipe, seamless and welded	18 Cr - 10 Ni - Cb	SA-312	TP348	S34800
348 SS	Forgings	18 Cr - 10 Ni - Cb	SA-336	F348	S34800
348 SS	Pipe, welded	18 Cr - 10 Ni - Cb	SA-358	348	S34800
348 SS	Pipe, seamless	18 Cr - 10 Ni - Cb	SA-376	TP348	S34800
348 SS	Fittings	18 Cr - 10 Ni - Cb	SA-403	WP348	S34800
348 SS	Pipe, welded	18 Cr - 10 Ni - Cb	SA-409	TP348	S34800
348 SS	Bars and shapes	18 Cr - 10 Ni - Cb	SA-479	Type 348	S34800
348 SS	Pipe, welded	18 Cr - 10 Ni - Cb	SA-813	TP348	S34800
348 SS	Pipe, welded	18 Cr - 10 Ni - Cb	SA-814	TP348	S34800
348H SS	Flanges, fittings, etc.	18 Cr - 10 Ni - Cb	SA-182	F348H	S34809
348H SS	Tubes, seamless	18 Cr - 10 Ni - Cb	SA-213	TP348H	S34809
348H SS	Plate, sheet, strip	18 Cr - 10 Ni - Cb	SA-240	Type 348H	S34809
348H SS	Tubes, welded	18 Cr - 10 Ni - Cb	SA-249	TP348H	S34809
348H SS	Pipe, seamless and welded	18 Cr - 10 Ni - Cb	SA-312	TP348H	S34809
348H SS	Forgings	18 Cr - 10 Ni - Cb	SA-336	F348H	S34809
348H SS	Fittings	18 Cr - 10 Ni - Cb	SA-403	WP348H	S34809
348H SS	Bars and shapes	18 Cr - 10 Ni - Cb	SA-479	Type 348H	S34809
348H SS	Pipe, welded	18 Cr - 10 Ni - Cb	SA-813	TP348H	S34809

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
348H SS	Pipe, welded	18 Cr - 10 Ni - Cb	SA-814	TP348H	S34809
3RE60	Tubes, seamless and welded	18 Cr - 5 Ni - 3 Mo - N	SA-789	---	S31500
3RE60	Pipe, seamless and welded	18 Cr - 5 Ni - 3 Mo - N	SA-790	---	S31500
403 SS	Bars and shapes	12 Cr	SA-479	Type 403	S40300
405 SS	Plate, sheet, strip	12 Cr - 1 Al	SA-240	Type 405	S40500
405 SS	Tubes, seamless and welded	12 Cr - 1 Al	SA-268	TP405	S40500
405 SS	Bars and shapes	12 Cr- 1 Al	SA-479	Type 405	S40500
409 SS	Plate, sheet, strip	11 Cr - Ti	SA-240	Type 409	S40900
409 SS	Tubes, seamless and welded	11 Cr - Ti	SA-268	TP409	S40900
409 SS	Tubes welded	11 Cr - Ti	SA-803	TP409	S40900
410 SS	Plate, sheet, strip	13 Cr	SA-240	410	S41000
410 SS	Tubes, seamless and welded	13 Cr	SA-268	410	S41000
410 SS	Bars and shapes	13 Cr	SA-479	Type 410	S41000
410 SS	Fittings	13 Cr	SA-815	WP410	S41000
410S SS	Plate, sheet, strip	13 Cr	SA-240	410S	S41008
414 SS	Bars and shapes	12½ Cr - 2 Ni - Si	SA-479	Type 414	S41400
429 SS	Flanges, fittings, etc.	15 Cr	SA-182	F429	S42900
429 SS	Plate, sheet, strip	15 Cr	SA-240	429	S42900
429 SS	Tubes, seamless and welded	15 Cr	SA-268	TP429	S42900
429 SS	Fittings	15 Cr	SA-815	WP429	S42900
430 SS	Flanges, fittings, etc.	17 Cr	SA-182	F430	S43000
430 SS	Plate, sheet, strip	17 Cr	SA-240	Type 430	S43000
430 SS	Tubes, seamless and welded	17 Cr	SA-268	TP430	S43000
430 SS	Bars and shapes	17 Cr	SA-479	Type 430	S43000
430 SS	Fittings	17 Cr	SA-815	WP430	S43000
430 Ti SS	Tubes, seamless and welded	18 Cr - Ti - Cb	SA-268	TP430Ti	S43036
430 Ti SS	Fittings	18 Cr - Ti - Cb	SA-815	WP430Ti	S43036
431 SS	Bars and shapes	16 Cr - 2 Ni	SA-479	Type 431	---
439 (formerly XM-8)	Plate, sheet, strip	17 Cr - Ti	SA-240	Type 439	S43035
439 (formerly XM-8)	Bars and shapes	17 Cr - Ti	SA-479	Type 439	S43035
439 (formerly XM-8)	Pipe, seamless and welded	17 Cr - Ti	SA-731	TP439	S43035
439 (formerly XM-8)	Tubes, welded	17 Cr - Ti	SA-803	TP439	S43035
443 SS	Tubes, seamless and welded	27 Cr - 1 Cu	SA-268	TP443	S44300
446 SS	Tubes, seamless and welded	27 Cr	SA-268	TP446	S44600
446 SS	Fittings	27 Cr	SA-815	WP446	S44600

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
44LN	Flanges, fittings, etc.	25 Cr - 6 Ni - Mo - N	SA-182	F50	S31200
44LN	Plate, sheet, strip	25 Cr - 6 Ni - Mo - N	SA-240	S31200	S31200
44LN	Tubes, seamless and welded	25 Cr - 6 Ni - Mo - N	SA-789	S31200	S31200
44LN	Pipe, seamless and welded	25 Cr - 6 Ni - Mo - N	SA-790	S31200	S31200
4565S	Flanges, fittings, etc.	24 Cr-17 Ni-6 Mn-4.5 Mo-N	(SA-182 CC)	S34565	S34565
4565S	Tubes, seamless	24 Cr-17 Ni-6 Mn-4.5 Mo-N	(SA-213 CC)	S34565	S34565
4565S	Plate, sheet, strip	24 Cr-17 Ni-6 Mn-4.5 Mo-N	SA-240	S34565	S34565
4565S	Tubes, welded	24 Cr-17 Ni-6 Mn-4.5 Mo-N	SA-249	S34565	S34565
4565S	Pipe, seamless and welded	24 Cr-17 Ni-6 Mn-4.5 Mo-N	SA-312	S34565	S34565
4565S	Pipe, welded	24 Cr-17 Ni-6 Mn-4.5 Mo-N	SA-358	S34565	S34565
4565S	Pipe, seamless	24 Cr-17 Ni-6 Mn-4.5 Mo-N	(SA-376 CC)	S34565	S34565
4565S	Fittings	24 Cr-17 Ni-6 Mn-4.5 Mo-N	SA-403	S34565	S34565
4565S	Pipe, welded	24 Cr-17 Ni-6 Mn-4.5 Mo-N	SA-409	S34565	S34565
4565S	Bars and shapes	24 Cr-17 Ni-6 Mn-4.5 Mo-N	SA-479	S34565	S34565
654 SMO	Flanges, fittings, etc.	24 Cr - 22 Ni - 7.5 Mo	(SA-182 CC)		S32654
654 SMO	Plate, sheet, strip	24 Cr - 22 Ni - 7.5 Mo	SA-240		S32654
654 SMO	Tubes, welded	24 Cr - 22 Ni - 7.5 Mo	(SA-249 CC)		S32654
654 SMO	Pipe, seamless and welded	24 Cr - 22 Ni - 7.5 Mo	SA-312		S32654
654 SMO	Pipe, welded	24 Cr - 22 Ni - 7.5 Mo	SA-358		S32654
654 SMO	Fittings	24 Cr - 22 Ni - 7.5 Mo	(SA-403 CC)		S32654
7 Mo Plus	Flanges, fittings, etc.	26 Cr - 4 Ni - Mn - N	SA-182	F52	S32950
7 Mo Plus	Plate, sheet, strip	26 Cr - 4 Ni - Mn - N	SA-240	Type S32950	S32950
7 Mo Plus	Tubes, seamless and welded	26 Cr - 4 Ni - Mn - N	SA-789	S32950	S32950
7 Mo Plus	Pipe, seamless and welded	26 Cr - 4 Ni - Mn - N	SA-790	S32950	S32950
7 Mo Plus	Fittings	26 Cr - 4 Ni - Mn - N	SA-815	S32950	S32950
7 Mo Plus	Bars and shapes	26 Cr - 4 Ni - Mn - N	SA-479	S32950	S32950
A286 SS	Bolting	25 Ni - 15 Cr - 2 Ti	SA-453	660	S66286
A286 SS	Bars	25 Ni - 15 Cr - 2 Ti	SA-638	660	S66286
AF 918	Bars and shapes	25 Cr - 7 N - 3.5 Mo - Cu - W - N	SA-479	---	S39277
AISI Type 410	Flanges, fittings, etc.	13 Cr	SA-182	F6a	S41000
AISI Type 410	Bolting	13 Cr	SA-193	B6/B6X	S41000
Almar 362 or XM-9	Plate, sheet, strip	14 Cr - 6 Ni - Ti	SA-693	XM-9	S36200
AM-350	Plate, sheet, strip	16 Cr - 4 Ni - 3 Mo	SA-693	Type 633	S35000
AM-355	Bars and shapes	15 Cr - 4 Ni - 3 Mo	SA-564	Type 634	S35500
AM-355	Plate, sheet, strip	15 Cr - 4 Ni - 3 Mo	SA-693	Type 634	S35500

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
AM-355	Forgings	15 Cr - 4 Ni - 3 Mo	SA-705	Type 634	S35500
B22	Bolting	1 Cr - 1 Mn - ¼ Mo	SA-540	B22	---
B23	Bolting	2 Ni - ¾ Cr - ¼ Mo	SA-540	B23	H43400
B24	Bolting	2 Ni - ¾ Cr - ⅓ Mo	SA-540	B24	K24064
B24V	Bolting	2 Ni -¾ Cr - ⅓ Mo - V	SA-540	B24V	K24070
B4B and B4C	Bolting	12 Cr - 1 Mo - V - W	SA-437	B4B and B4C	K91352
B6/B6X	Bolting	13 Cr	SA-193	B6/B6X	S41000
B7 and B7M	Bolting	1 Cr - ⅕ Mo	SA-193	B7 and B7M	G41400
B8 and B8A	Bolting	18 Cr - 8 Ni	SA-193	B8 and B8A	S30400
B8C and B8CA	Bolting	18 Cr - 10 Ni - Cb	SA-193	B8C and B8CA	S34700
B8C and B8CA	Bolting	18 Cr - 10 Ni - Cb	SA-320	B8C and B8CA	S34700
B8F and B8FA	Bolting	18 Cr - 8 Ni	SA-320	B8F and B8FA	---
B8LN and B8LNA	Bolting	18 Cr - 8 Ni - N	SA-193	B8LN and B8LNA	S30453
B8M and B8MA	Bolting	16 Cr - 12 Ni - 2 Mo	SA-320	B8M and B8MA	S31600
B8MLCuN/B8MLCuNA	Bolting	20 Cr - 18 Ni - 6 Mo - Cu - N	SA-193	---	S31254
B8M, B8MA, B8M2 and B8M3	Bolting	16 Cr - 12 Ni - 2 Mo	SA-193	B8M, B8MA, B8M2 and B8M3	S31600
B8MLN/B8MLNA	Bolting	16 Cr - 12 Ni - 2 Mo - N	SA-320	B8MLN/B8MLNA	S31653
B8MLN/ B8MLNA	Bolting	16 Cr - 12 Ni - 2 Mo - N	SA-193	B8MLN/ B8MLNA	S31653
B8MN and B8MNA	Bolting	16 Cr - 12 Ni - 2 Mo - N	SA-193	B8MN and B8MNA	S31651
B8N and B8NA	Bolting	18 Cr - 8 Ni - N	SA-193	B8N and B8NA	S30451
B8P and B8PA	Bolting	18 Cr - 11 Ni	SA-193	B8P and B8PA	S30500
B8S and B8SA	Bolting	18 Cr - 8 Ni - 4 Si - N	SA-193	B8S and B8SA	S21800
B8T and B8TA	Bolting	18 Cr - 10 Ni - Ti	SA-193	B8T and B8TA	S32100
B8T and B8TA	Bolting	18 Cr - 10 Ni - Ti	SA-320	B8T and B8TA	S32100
CA-15 (A-B)	Castings	13 Cr	SA-487	CA-15 (A-B)	J91150
CA-15 (C-D)	Castings	13 Cr	SA-487	CA-15 (C-D)	J91171
CA-15M-A	Castings	13 Cr - Mo	SA-487	CA-15M-A	J91151
CA15	Castings	13 Cr	SA-217	CA15	J91150
CA6NM	Castings	13 Cr - 4 Ni	SA-352	CA6NM	J91540
CA6NM-Aand B	Castings	13 Cr - 4 Ni	SA-487	CA6NM-Aand B	J91540
CB7Cu-1	Castings	16 Cr - 4 Ni - 3 Cu	SA-747	CB7Cu-1	J92180
CD4MCu, Ferralium 255	Castings	25 Cr - 5 Ni - 3 Cu - 2 Mo	SA-351	CD4MCu	J93370
CE8MN	Castings	24 Cr - 10 Ni - 3 Mo - N	SA-351	CE8MN	J93345

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
CF10	Castings	19 Cr - 9 Ni - ½ Mo	SA-351	CF10	---
CF10M	Castings	19 Cr - 9 Ni - 2 Mo	SA-351	CF10M	---
CF10MC	Castings	16 Cr - 14 Ni - 2 Mo	SA-351	CF10MC	J92971
CF3 and CF3A	Castings	18 Cr - 8 Ni	SA-351	CF3 and CF3A	J92500
CF3M and CF3MA	Castings	16 Cr - 12 Ni - 2 Mo	SA-351	CF3M and CF3MA	J92800
CF3MN	Casting	16 Cr - 12 Ni - 2 Mo - N	SA-351	CF3MN	---
CF8 and CF8A	Castings	18 Cr - 8 Ni	SA-351	CF8 and CF8A	J92600
CF8M	Castings	16 Cr - 12 Ni - 2 Mo	SA-351	CF8M	J92900
CG3M	Castings	19 Cr - 11 Ni - 3 Mo	SA-351	CG3M	---
CG8M	Castings	19 Cr - 10 Ni - 3 Mo	SA-351	CG8M	---
CH10	Castings	25 Cr - 12 Ni	SA-351	CH10	J93401
CH20	Castings	25 Cr - 12 Ni	SA-351	CH20	J93402
CH8	Castings	25 Cr - 12 Ni	SA-351	CH8	J93400
CK20	Castings	25 Cr - 20 Ni	SA-351	CK20	J94202
CK3MCuN or 254 SMO	Castings	20 Cr - 18 Ni - 6 Mo - Cu - N	SA-351	CK3MCuN	J93254
CN7M	Castings	29 Ni - 20 Cr - 3 Cu - 2 Mo	SA-351	CN7M	N08007
CPCA15	Pipe, centrifugal cast	13 Cr	SA-426	CPCA15	J91150
CPF10MC	Pipe, cast	16 Cr - 14 Ni - 2 Mo	SA-451	CPF10MC	---
CPF3 and CPF3A	Pipe, centrifugal cast	18 Cr - 8 Ni	SA-451	CPF3 and CPF3A	J92500
CPF3M	Pipe, centrifugal cast	16 Cr - 12 Ni - 2 Mo	SA-451	CPF3M	---
CPF8 and CPF8A	Pipe, centrifugal cast	18 Cr - 8 Ni	SA-451	CPF8 and CPF8A	J92600
CPF8C	Pipe, centrifugal cast	18 Cr - 10 Ni - Cb	SA-451	CPF8C	J92710
CPF8C	Pipe, centrifugal cast	18 Cr - 10 Ni - Cb	SA-451	CPF8C	J92710
CPF8M	Pipe, centrifugal cast	16 Cr - 12 Ni - 2 Mo	SA-451	CPF8M	J92900
CPH10	Pipe, centrifugal cast	25 Cr - 12 Ni	SA-451	CPH10	J93401
CPH20	Pipe, centrifugal cast	25 Cr - 12 Ni	SA-451	CPH20	J93402
CPH8	Pipe, centrifugal cast	25 Cr - 12 Ni	SA-451	CPH8	J93400
CPK20	Pipe, centrifugal cast	25 Cr - 20 Ni	SA-451	CPK20	J94202
Cronifer 2803	Plate, sheet, strip	28 Cr - 3 Ni - 2 Mo - Cb	SA-240	---	S32803
Cronifer 2803	Tubes, seamless and welded	28 Cr - 3 Ni - 2 Mo - Cb	SA-268	---	S32803
CT15C	Castings	20 Cr - 32 Ni - 1 Cb	SA-351	CT15C	---
Custom 450 or XM-25	Bars and shapes	15 Cr - 6 Ni - Cu - Mo	SA-564	Type XM-25	S45000
Custom 450 or XM-25	Plate, sheet and strip	15 Cr - 6 Ni - Cu - Mo	SA-693	Type XM-25	S45000
Custom 450 or XM-25	Forgings	15 Cr - 6 Ni - Cu - Mo	SA-705	Type XM-25	S45000
Custom 455 or XM-16	Bars and shapes	12 Cr - 8 Ni - Cu - Ti	SA-564	Type XM-16	S45500

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
Custom 455 or XM-16	Plate, sheet, strip	12 Cr - 8 Ni - Cu - Ti	SA-693	Type XM-16	S45500
Custom 455 or XM-16	Forgings	12 Cr - 8 Ni - Cu - Ti	SA-705	Type XM-16	S45500
Discaloy	Bolting	26 Ni - 14 Cr - Mo - Ti	SA-453	662	S66220
Discaloy	Bars	26 Ni - 14 Cr - Mo - Ti	SA-638	662	S66220
DP-3	Plate, sheet, strip	25 Cr - 6 Ni - 3 Mo - N	SA-240	S31260	S31260
DP-3	Tubes, seamless and welded	25 Cr - 6 Ni - 3 Mo - N	SA-789	S31260	S31260
DP-3	Pipe, seamless and welded	25 Cr - 6 Ni - 3 Mo - N	SA-790	S31260	S31260
DP3W	Fittings	25 Cr - 7 Ni - 3 Mo - 2 W - N	SA-815	S39274	S39274
E-4	Plate, sheet, strip	11½ Cr - 1 Ni	SA-240	---	S41050
Esshete 1250	Tubes, seamless	15 Cr - 10 Ni - 6 Mn	SA-213	---	S21500
Ferralium 255	Plate, sheet, strip	25 Cr - 5 Ni - 3 Cu - 2 Mo	SA-240	S32550	S32550
Ferralium 255	Bars and shapes	25 Cr - 5 Ni - 3 Cu - 2 Mo	SA-479	F255	S32550
Ferralium 255	Tubes, seamless and welded	25 Cr - 5 Ni - 3 Cu - 2 Mo	SA-789	S32550	S32550
Ferralium 255	Pipe, seamless and welded	25 Cr - 5 Ni - 3 Cu - 2 Mo	SA-790	S32550	S32550
Ferralium 255, CD4MCu	Castings	25 Cr - 5 Ni - 3 Cu - 2 Mo	SA-351	CD4MCu	J93370
Gall Tough	Plate, sheet, strip	16½ Cr - 5 Ni - 5 Mn - 3½ Si	SA-240	S20161	S20161
Gall Tough	Bars and shapes	16½ Cr - 5 Ni - 5 Mn - 3½ Si	SA-479	S20161	S20161
HK30	Castings	25 Cr - 20 Ni - ½ Mo	SA-351	HK30	J94203
HK40	Castings	25 Cr - 20 Ni - ½ Mo	SA-351	HK40	J94204
HT-30	Castings	15 Cr - 35 Ni - ½ Mo	SA-351	HT-30	N08603
LF1, Class 1	Forgings	C - Mn - Si Steel	SA-350	LF1, Class 1	K03009
LF2	Forgings	C - Mn - Si Steel	SA-350	LF2	K03011
LF3, Class 2	Forgings	3½ Ni	SA-350	LF3, Class 2	K32025
LF5, Classes 1 and 2	Forgings	1½ Ni	SA-350	LF5, Classes 1 and 2	K13050
LF6, Classes 1 and 2	Forgings	C - Mn - Si - V - N	SA-350	LF6, Classes 1 and 2	---
LF787, Classes 2 and 3	Forgings	¾ Ni - 1 Cu - ¾ Cr	SA-350	LF787, Classes 2 and 3	---
LF9	Forgings	2 Ni - 1 Cu	SA-350	LF9	K22036
L43	Bolting	1¾ Ni - ¾ Cr - ¼Mo	SA-320	L43	G43400
L7	Bolting	1 Cr - ⅕ Mo	SA-320	L7	G41400
L70	Bolting	1 Cr - ⅕ Mo	SA-320	L70	---
L71	Bolting	C - ¼ Mo	SA-320	L71	G40370
L72	Bolting	1 Cr - ⅕ Mo	SA-320	L72	G41370
L73	Bolting	½ Cr - ½ Ni - ¼ Mo	SA-320	L73	G87400
L7A	Bolting	C - ¼ Mo	SA-320	L7A	G40370

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
L7B	Bolting	1 Cr - ⅕ Mo	SA-320	L7B	G41370
L7C	Bolting	½ Cr - ½ Ni - ¼ Mo	SA-320	L7C	G87400
L7M	Bolting	1 Cr - ⅕ Mo	SA-320	L7M	G41400
Nicrofer 3228 NbCe or Alloy AC66	Tubes, seamless	27 Cr - 32 Ni - Cb	SA-213	---	S33228
Nicrofer 3228 NbCe or Alloy AC66	Plate, sheet, strip	27 Cr - 32 Ni - Cb	SA-240	---	S33228
Nicrofer 3228 NbCe or Alloy AC66	Pipe, seamless and welded	27 Cr - 32 Ni - Cb	SA-312	---	S33228
Nicrofer 3228 NbCe or Alloy AC66	Bars and shapes	27 Cr - 32 Ni - Cb	SA-479	---	S33228
Nitronic 30	Plate, sheet, strip	16 Cr - 2 Ni - 8 Mn - N	SA-240	---	S20400
Nitronic 30	Sheet, strip, plate and bar	16 Cr - 2 Ni - 8 Mn - N	SA-666	---	S20400
Nitronic 40 or XM-11 or 21-6-9 LC	Flanges, fittings, etc.	21 Cr - 6 Ni - 9 Mn	SA-182	FXM-11	S21904
Nitronic 40 or XM-11 or 21-6-9 LC	Pipe, seamless and welded	21 Cr - 6 Ni - 9 Mn	SA-312	TPXM-11	S21904
Nitronic 40 or XM-11 or 21-6-9 LC	Forgings	21 Cr - 6 Ni - 9 Mn	SA-336	FXM-11	S21904
Nitronic 40 or XM-11 or 21-6-9 LC	Bars and shapes	21 Cr - 6 Ni - 9 Mn	SA-479	Type XM-11	S21904
Nitronic 40 or XM-11 or 21-6-9 LC	Plate, sheet, strip	21 Cr - 6 Ni - 9 Mn	SA-666	Type XM-11	S21904
Nitronic 40 or XM-11 or 21-6-9 LC	Pipe, welded	21 Cr - 6 Ni - 9 Mn	SA-813	TPXM-11	S21904
Nitronic 40 or XM-11 or 21-6-9 LC	Pipe, welded	21 Cr - 6 Ni - 9 Mn	SA-814	TPXM-11	S21904
Nitronic 50 or 22-13-5	Flanges, fittings, etc.	22 Cr - 13 Ni - 5 Mn	SA-182	FXM-19	S20910
Nitronic 50 or 22-13-5	Bolting	22 Cr - 13 Ni - 5 Mn	SA-193	B8R and B8RA	S20910
Nitronic 50 or 22-13-5	Nuts	22 Cr - 13 Ni - 5 Mn	SA-194	8R and 8RA	S20910
Nitronic 50 or 22-13-5	Tubes, seamless	22 Cr - 13 Ni - 5 Mn	SA-213	XM-19	S20910
Nitronic 50 or 22-13-5	Plate, sheet, strip	22 Cr - 13 Ni - 5 Mn	SA-240	Type XM-19	S20910
Nitronic 50 or 22-13-5	Tubes, welded	22 Cr - 13 Ni - 5 Mn	SA-249	TPXM-19	S20910
Nitronic 50 or 22-13-5	Pipe, seamless and welded	22 Cr - 13 Ni - 5 Mn	SA-312	TPXM-19	S20910
Nitronic 50 or 22-13-5	Forgings	22 Cr - 13 Ni - 5 Mn	SA-336	FXM-19	S20910

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
Nitronic 50 or 22-13-5	Pipe, welded	22 Cr - 13 Ni - 5 Mn	SA-358	XM-19	S20910
Nitronic 50 or 22-13-5	Fittings	22 Cr - 13 Ni - 5 Mn	SA-403	XM-19	S20910
Nitronic 50 or 22-13-5	Bars and shapes	22 Cr - 13 Ni - 5 Mn	SA-479	Type XM-19	S20910
Nitronic 50 or 22-13-5	Pipe, welded	22 Cr - 13 Ni - 5 Mn	SA-813	TPXM-19	S20910
Nitronic 50 or 22-13-5	Pipe, welded	22 Cr - 13 Ni - 5 Mn	SA-814	TPXM-19	S20910
Nitronic 50 or CG6MMN	Castings	22 Cr - 13 Ni - 5 Mn	SA-351	CG6MMN	J93790
Nitronic 60	Bolting	18 Cr - 8 Ni - 4 Si - N	SA-193	B8S and B8SA	S21800
Nitronic 60	Nuts	18 Cr - 8 Ni - 4 Si - N	SA-194	8S and 8SA	S21800
Nitronic 60	Plate, sheet, strip	18 Cr - 8 Ni - 4 Si - N	SA-240	Type S21800	S21800
Nitronic 60	Castings	18 Cr - 8 Ni - 4 Si - N	SA-351	CF10SMnN	S21800
Nitronic 60	Bars and shapes	18 Cr - 8 Ni - 4 Si - N	SA-479	Type S21800	S21800
RA85H	Tubes, seamless	18 Cr - 15 Ni - 3.7 Si	SA-213	---	S30615
RA85H	Plate, sheet, strip	18 Cr - 15 Ni - 3.7 Si	SA-240	---	S30615
RA85H	Pipe, seamless and welded	18 Cr - 15 Ni - 3.7 Si	SA-312	---	S30615
SAF 2507	Plate, sheet, strip	25 Cr - 7 Ni - 4 Mo - N	SA-240	---	S32750
SAF 2507	Flanges, fittings, etc.	25 Cr - 7 Ni - 4 Mo - N	SA-182	F53	S32750
SAF 2507	Bars and shapes	25 Cr - 7 Ni - 4 Mo - N	SA-479	---	S32750
SAF 2507	Tubes, seamless and welded	25 Cr - 7 Ni - 4 Mo - N	SA-789	S32750	S32750
SAF 2507	Pipe, seamless and welded	25 Cr - 7 Ni - 4 Mo - N	SA-790	S32750	S32750
SC-1 or 26-3-3	Plate, sheet, strip	26 Cr - 3 Ni - 3 Mo	SA-240	Type S44660	S44660
SC-1 or 26-3-3	Tubes, seamless and welded	26 Cr - 3 Ni - 3 Mo	SA-268	26-3-3	S44660
SC-1 or 26-3-3	Pipe, seamless and welded	26 Cr - 3 Ni - 3 Mo	SA-731	26-3-3	S44660
SC-1 or 26-3-3	Tubes, welded	26 Cr - 3 Ni - 3 Mo	SA-803	26-3-3	S44660
Stainless W	Bars and shapes	17 Cr - 7 Ni - Al - Ti	SA-564	Type 635	S17600
Stainless W	Plate, sheet, strip	17 Cr - 7 Ni - Al - Ti	SA-693	Type 635	S17600
Stainless W	Forgings	17 Cr - 7 Ni - Al - Ti	SA-705	Type 635	S17600
SX	Tubes, seamless	18 Cr - 20 Ni - 5.5 Si	SA-213	S32615	S32615
SX	Plate, sheet, strip	18 Cr - 20 Ni - 5.5 Si	SA-240	Type S32615	S32615
SX	Pipe, seamless and welded	18 Cr - 20 Ni - 5.5 Si	SA-312	S32615	S32615
SX	Bars and shapes	18 Cr - 20 Ni - 5.5 Si	SA-479	Type S32615	S32615
Tenelon	Plate, sheet, strip	18 Cr - 15 Mn - N	SA-240	Type XM-31	S21400
W545	Bars	26 Ni - 14 Cr - Mo - Ti	SA-453	665	S66545
XM-8 (see 439)	Tubes, seamless and welded	17 Cr - Ti	SA-268	TP439	S43035
XM-9 or Almar 362	Plate, sheet, strip	14 Cr - 6 Ni - Ti	SA-693	XM-9	S36200
XM-10 or 21-6-9	Pipe, seamless and welded	21 Cr - 6 Ni - 9 Mn	SA-312	TPXM10	S21900

CODE FERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)					
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Spec. No.**	**Grade Designation**	**UNS No.**
XM-10 or 21-6-9	Pipe, welded	21 Cr - 6 Ni - 9 Mn	SA-813	TPXM10	S21900
XM-10 or 21-6-9	Pipe, welded	21 Cr - 6 Ni - 9 Mn	SA-814	TPXM10	S21900
XM-11 or 21-6-9 LC or Nitronic 40	Flanges, fittings, etc.	21 Cr - 6 Ni - 9 Mn	SA-182	FXM-11	S21904
XM-11 or 21-6-9 LC or Nitronic 40	Pipe, seamless and welded	21 Cr - 6 Ni - 9 Mn	SA-312	TPXM-11	S21904
XM-11 or 21-6-9 LC or Nitronic 40	Forgings	21 Cr - 6 Ni - 9 Mn	SA-336	FXM-11	S21904
XM-11 or 21-6-9 LC or Nitronic 40	Bars and shapes	21 Cr - 6 Ni - 9 Mn	SA-479	Type XM-11	S21904
XM-11 or 21-6-9 LC or Nitronic 40	Plate, sheet, strip	21 Cr - 6 Ni - 9 Mn	SA-666	Type XM-11	S21904
XM-11 or 21-6-9 LC or Nitronic 40	Pipe, welded	21 Cr - 6 Ni - 9 Mn	SA-813	TPXM-11	S21904
XM-11 or 21-6-9 LC or Nitronic 40	Pipe, welded	21 Cr - 6 Ni - 9 Mn	SA-814	TPXM-11	S21904
XM-14, Tenelon	Plate, sheet, strip	18 Cr - 5½ Ni - 15 Mn	SA-666	---	S21460
XM-17	Plate, sheet, strip	19 Cr - 8 Mn - 6 Ni - Mo/N	SA-240	TypeXM-17	S21600
XM-17	Bars and shapes	19 Cr - 8 Mn - 6 Ni - Mo/N	SA-479	TypeXM-17	S21600
XM-18	Plate, sheet, strip	19 Cr - 8 Mn - 6 Ni - Mo/N	SA-240	TypeXM-18	S21603
XM-18	Bars and shapes	19 Cr - 8 Mn - 6 Ni - Mo/N	SA-479	Type XM-18	S21603
XM-21	Plate, sheet, strip	18 Cr - 8 Ni - N	SA-240	Type XM-21	S30452
XM-21	Plate, sheet, strip	18 Cr - 8 Ni - N	SA-240	Type XM-21	S30452
XM-27	Flanges, fittings, etc.	27 Cr - 1 Mo	SA-182	FXM-27Cb	S44627
XM-27	Plate, sheet, strip	27 Cr - 1 Mo	SA-240	Type XM-27	S44627
XM-27	Tubes, seamless and welded	27 Cr - 1 Mo	SA-268	TPXM-27	S44627
XM-27	Bars and shapes	27 Cr - 1 Mo	SA-479	Type XM-27	S44627
XM-27	Pipe, seamless and welded	27 Cr - 1 Mo	SA-731	TPXM-27	S44627
XM-27	Tubes, welded	27 Cr - 1 Mo	SA-803	TPXM-27	S44627
XM-27	Fittings	27 Cr - 1 Mo	SA-815	WP-27	S44627
XM-30	Bars and shapes	12½ Cr - Cb	SA-479	Type XM-30	S41040
Zeron 100	Plate, sheet, strip	25 Cr - 7 Ni - 3 Mo - Cu - W	SA-240	---	S32760
Zeron 100	Tubes, seamless and welded	25 Cr - 7 Ni - 3 Mo - Cu - W	SA-789	---	S32760
Zeron 100	Pipe, seamless and welded	25 Cr - 7 Ni - 3 Mo - Cu - W	SA-790	---	S32760
Zeron 100	Fittings	25 Cr - 7 Ni - 3 Mo - Cu - W	SA-815	S32760	S32760

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
20 - Cb 3	Fittings	35 Ni - 35 Fe - 20 Cr - Cb	SB-366	N08020
20 - Cb 3	Forgings	35 Ni - 35 Fe - 20 Cr - Cb	SB-462	N08020
20 - Cb 3	Plate, sheet, strip	35 Ni - 35 Fe - 20 Cr - Cb	SB-463	N08020
20 - Cb 3	Pipe, seamless and welded	35 Ni - 35 Fe - 20 Cr - Cb	SB-464	N08020
20 - Cb 3	Tubes, seamless and welded	35 Ni - 35 Fe - 20 Cr - Cb	SB-468	N08020
20 - Cb 3	Bar and wire	35 Ni - 35 Fe - 20 Cr - Cb	SB-473	N08020
20 - Cb 3	Pipe and tube, seamless	35 Ni - 35 Fe - 20 Cr - Cb	SB-729	N08020
20 - Mo 4	Forgings	37 Ni - 33 Fe - 23 Cr - 4 Mo - 1 Cu	SB-462	N08024
20 - Mo 4	Plate, sheet, strip	37 Ni - 33 Fe - 23 Cr - 4 Mo - 1 Cu	SB-463	N08024
20 - Mo 4	Pipe, seamless and welded	37 Ni - 33 Fe - 23 Cr - 4 Mo - 1 Cu	SB-464	N08024
20 - Mo 4	Tubes, seamless and welded	37 Ni - 33 Fe - 23 Cr - 4 Mo - 1 Cu	SB-468	N08024
20 - Mo 4	Bar and wire	37 Ni - 33 Fe - 23 Cr - 4 Mo - 1 Cu	SB-473	N08024
20 - Mo 4	Pipe and tube, seamless	37 Ni - 33 Fe - 23 Cr - 4 Mo - 1 Cu	SB-729	N08024
20 - Mo 6	Forgings	35 Ni - 30 Fe - 24 Cr - 6 Mo - Cu	SB-462	N08026
20 - Mo 6	Plate, sheet, strip	35 Ni - 30 Fe - 24 Cr - 6 Mo - Cu	SB-463	N08026
20 - Mo 6	Pipe, seamless and welded	35 Ni - 30 Fe - 24 Cr - 6 Mo - Cu	SB-464	N08026
20 - Mo 6	Tubes, seamless and welded	35 Ni - 30 Fe - 24 Cr - 6 Mo - Cu	SB-468	N08026
20 - Mo 6	Bar and wire	35 Ni - 30 Fe - 24 Cr - 6 Mo - Cu	SB-473	N08026
20 - Mo 6	Pipe and tube, seamless	35 Ni - 30 Fe - 24 Cr - 6 Mo - Cu	SB-729	N08026
20 Mod.	Pipe, welded	26 Ni - 43 Fe - 22 Cr - 5 Mo	SB-619	N08320
20 Mod.	Plate, sheet, strip	26 Ni - 43 Fe - 22 Cr - 5 Mo	SB-620	N08320
20 Mod.	Rod	26 Ni - 43 Fe - 22 Cr - 5 Mo	SB-621	N08320
20 Mod.	Pipe and tube, seamless	26 Ni - 43 Fe - 22 Cr - 5 Mo	SB-622	N08320
20 Mod.	Tubes, welded	26 Ni - 43 Fe - 22 Cr - 5 Mo	SB-626	N08320
20 or Beta C	Plate, sheet, strip	Ti - 8 V - 6 Cr - Mo - Zr -Al -Pd	SB-265	R58645
2014	Bars, rod and wire	Al - 4 Cu - Si - Mn	SB-211	A92014
2014	Forgings	Al - 4 Cu - Si - Mn	SB-247	A92014
2024	Bars, rod and wire	Al - 4 Cu - Mg	SB-211	A92024
2024	Bars, rods and shapes	Al - 4 Cu - Mg	SB-221	A92024
204.0	Castings	Al - Cu - Mg	SB-26	A02040
204.0	Castings	Al - Cu - Mg	SB-108	A02040
21	Plate, sheet, strip	Ti - 15 Mo - 3 Al- Cb	SB-265	---
23	Plate, sheet, strip	Ti - 6 Al - 4V	SB-265	---
25-6 Mo	Forgings	28 Ni - 39 Fe - 16 Cr - 4 Cu	(SB-462 CC)	N08926
25-6 Mo	Plate, sheet, strip	28 Ni - 39 Fe - 16 Cr - 4 Cu	SB-625	N08926

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
25-6 Mo	Bar and wire	28 Ni - 39 Fe - 16 Cr - 4 Cu	SB-649	N08926
25-6 Mo	Pipe, welded	28 Ni - 39 Fe - 16 Cr - 4 Cu	SB-673	N08926
25-6 Mo	Tubes, welded	28 Ni - 39 Fe - 16 Cr - 4 Cu	SB-674	N08926
25-6 Mo	Pipe and tube, seamless	28 Ni - 39 Fe - 16 Cr - 4 Cu	SB-677	N08926
25-6 Mo	Pipe, welded	28 Ni - 39 Fe - 16 Cr - 4 Cu	SB-804	N08926
25-6 Mo/CR1925N/WP1925N	Fittings	28 Ni - 39 Fe - 16 Cr - 4 Cu	SB-366	N08926
904L, AL4X	Plate, sheet, strip	44 Fe - 25 Ni - 21 Cr - Mo	SA-240	N08904
904L, AL4X	Plate, sheet, strip	44 Fe - 25 Ni - 21 Cr - Mo	SB-625	N08904
904L, AL4X	Bar and wire	44 Fe - 25 Ni - 21 Cr - Mo	SB-649	N08904
904L, AL4X	Pipe, welded	44 Fe - 25 Ni - 21 Cr - Mo	SB-673	N08904
904L, AL4X	Tubes, welded	44 Fe - 25 Ni - 21 Cr - Mo	SB-674	N08904
904L, AL4X	Pipe and tube, seamless	44 Fe - 25 Ni - 21 Cr - Mo	SB-677	N08904
925	Pipe and tube, seamless	42 Ni-22 Fe-21 Cr-Mo-Ti-Cu	(SB-423 CC)	N09925
925	Plate, sheet, strip	42 Ni-22 Fe-21 Cr-Mo-Ti-Cu	(SB-424 CC)	N09925
925	Rod and bar	42 Ni-22 Fe-21 Cr-Mo-Ti-Cu	(SB-425 CC)	N09925
925	Forgings	42 Ni-22 Fe-21 Cr-Mo-Ti-Cu	(SB-564 CC)	N09925
A286 SS, Grade 660	Bars and forgings	25 Ni - 15 Cr - 2 Ti	SA-638	S66286
A286 SS, Grade 660	Bolting	25 Ni - 15 Cr - 2 Ti	SA-453	S66286
Admiralty metal, antimonial	Tubes, seamless	71 Cu - 28 Zn - 1 Sn	SB-111	C44400
Admiralty metal, antimonial	Plates	71 Cu - 28 Zn - 1 Sn	SB-171	C44400
Admiralty metal, antimonial	Tubes, seamless with fins	71 Cu - 28 Zn - 1 Sn	SB-359	C44400
Admiralty metal, antimonial	Tubes, seamless - U	71 Cu - 28 Zn - 1 Sn	SB-395	C44400
Admiralty metal, antimonial	Tubes, welded	71 Cu - 28 Zn - 1 Sn	SB-543	C44400
Admiralty metal, arsenical	Tubes, seamless	71 Cu - 28 Zn - 1 Sn	SB-111	C44300
Admiralty metal, arsenical	Plates	71 Cu - 28 Zn - 1 Sn	SB-171	C44300
Admiralty metal, arsenical	Tubes, seamless with fins	71 Cu - 28 Zn - 1 Sn	SB-359	C44300
Admiralty metal, arsenical	Tubes, seamless - U	71 Cu - 28 Zn - 1 Sn	SB-395	C44300
Admiralty metal, arsenical	Tubes, welded	71 Cu - 28 Zn - 1 Sn	SB-543	C44300
Admiralty metal, phosphorized	Tubes, seamless	71 Cu - 28 Zn - 1 Sn	SB-111	C44500
Admiralty metal, phosphorized	Plates	71 Cu - 28 Zn - 1 Sn	SB-171	C44500
Admiralty metal, phosphorized	Tubes, seamless with fins	71 Cu - 28 Zn - 1 Sn	SB-359	C44500
Admiralty metal, phosphorized	Tubes, seamless - U	71 Cu - 28 Zn - 1 Sn	SB-395	C44500
Admiralty metal, phosphorized	Tubes, welded	71 Cu - 28 Zn - 1 Sn	SB-543	C44500
AL-6X	Pipe, welded	46 Fe - 24 Ni - 21 Cr - 6 Mo	SB-675	N08366
AL-6X	Tubes, welded	46 Fe - 24 Ni - 21 Cr - 6 Mo	SB-676	N08366

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
AL-6X	Plate, sheet, strip	46 Fe - 24 Ni - 21 Cr - 6 Mo	SB-688	N08366
AL-6X	Pipe and tube, seamless	46 Fe - 24 Ni - 21 Cr - 6 Mo	SB-690	N08366
AL-6X	Rod, bar and wire	46 Fe - 24 Ni - 21 Cr - 6 Mo	SB-691	N08366
AL-6XN	Castings	46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SA-351	(N08367)
AL-6XN	Plate, sheet, strip	46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SA-240	N08367
AL-6XN	Fittings	46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-366	N08367
AL-6XN	Forgings	46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-462	N08367
AL-6XN	Forgings	46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-564	N08367
AL-6XN	Pipe, welded	46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-675	N08367
AL-6XN	Tubes, welded	46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-676	N08367
AL-6XN	Plate, sheet, strip	46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-688	N08367
AL-6XN	Pipe and tube, seamless	46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-690	N08367
AL-6XN	Rod, bar and wire	46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-691	N08367
AL-6XN	Pipe, welded	46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N	SB-804	N08367
Alclad 3003	Sheet and plate	---	SB-209	A83003
Alclad 3003	Tubes, seamless	---	SB-210	A83003
Alclad 3003	Tubes, seamless	---	SB-234	A83003
Alclad 3003	Pipe and tubes, seamless	---	SB-241	A83003
Alclad 3004	Sheet and plate	---	SB-209	A83004
Alclad 6061	Sheet and plate	---	SB-209	A86061
Allcor	Forgings	51 Ni - 31 Cr - 10 Mo - W	SB-564	N06110
Alloy 230	Welding fittings	53 Ni - 22 Cr - 14 W - Co - Fe - Mo	SB-366	N06230
Alloy 230	Sheet and plate	53 Ni - 22 Cr - 14 W - Co - Fe - Mo	SB-435	N06230
Alloy 230	Forgings	53 Ni - 22 Cr - 14 W - Co - Fe - Mo	SB-564	N06230
Alloy 230	Rod	53 Ni - 22 Cr - 14 W - Co - Fe - Mo	SB-572	N06230
Alloy 230	Pipe, welded	53 Ni - 22 Cr - 14 W - Co - Fe - Mo	SB-619	N06230
Alloy 230	Pipe and tube, seamless	53 Ni - 22 Cr - 14 W - Co - Fe - Mo	SB-622	N06230
Alloy 230	Tubes, welded	53 Ni - 22 Cr - 14 W - Co - Fe - Mo	SB-626	N06230
Alloy 31	Welding fittings	31 Ni - 31 Fe - 27 Cr - 7 Mo	SB-366	N08031
Alloy 31	Forgings	31 Ni - 31 Fe - 27 Cr - 7 Mo	SB-564	N08031
Alloy 31	Rods	31 Ni - 31 Fe - 27 Cr - 7 Mo	(SB-581 CC)	N08031
Alloy 31	Pipe, welded	31 Ni - 31 Fe - 27 Cr - 7 Mo	SB-619	N08031
Alloy 31	Pipe and tube, seamless	31 Ni - 31 Fe - 27 Cr - 7 Mo	SB-622	N08031
Alloy 31	Plate, sheet, strip	31 Ni - 31 Fe - 27 Cr - 7 Mo	SB-625	N08031
Alloy 31	Tubes, welded	31 Ni - 31 Fe - 27 Cr - 7 Mo	SB-626	N08031

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
Alloy 31	Bar and wire	31 Ni - 31 Fe - 27 Cr - 7 Mo	SB-649	N08031
Aluminum 1060	Sheet and plate	99.60 Al	SB-209	A91060
Aluminum 1060	Tubes, seamless	99.60 Al	SB-210	A91060
Aluminum 1060	Bars, rods and shapes	99.60 Al	SB-221	A91060
Aluminum 1060	Tubes, seamless	99.60 Al	SB-234	A91060
Aluminum 1060	Pipe and tubes, seamless	99.60 Al	SB-241	A91060
Aluminum 3003	Sheet and plate	Al - Mn - Cu	SB-209	A93003
Aluminum 3003	Tubes, seamless	Al - Mn - Cu	SB-210	A93003
Aluminum 3003	Bars, rods and shapes	Al - Mn - Cu	SB-221	A93003
Aluminum 3003	Tubes, seamless	Al - Mn - Cu	SB-234	A93003
Aluminum 3003	Pipe and tubes, seamless	Al - Mn - Cu	SB-241	A93003
Aluminum 3003	Forgings	Al - Mn - Cu	SB-247	A93003
Aluminum 3004	Sheet and plate	Al - Mn - Mg	SB-209	A93004
Aluminum 5052	Sheet and plate	Al - 2.5 Mg	SB-209	A95052
Aluminum 5052	Tubes, seamless	Al - 2.5 Mg	SB-210	A95052
Aluminum 5052	Tubes, seamless	Al - 2.5 Mg	SB-234	A95052
Aluminum 5052	Pipe and tubes, seamless	Al - 2.5 Mg	SB-241	A95052
Aluminum 5083	Sheet and plate	Al - 4.4 Mg - Mn	SB-209	A95083
Aluminum 5083	Bars, rods and shapes	Al - 4.4 Mg - Mn	SB-221	A95083
Aluminum 5083	Pipe and tubes, seamless	Al - 4.4 Mg - Mn	SB-241	A95083
Aluminum 5083	Forgings	Al - 4.4 Mg - Mn	SB-247	A95083
Aluminum 5086	Sheet and plate	Al - 4.0 Mg - Mn	SB-209	A95086
Aluminum 5086	Bars, rods and shapes	Al - 4.0 Mg - Mn	SB-221	A95086
Aluminum 5086	Pipe and tubes, seamless	Al - 4.0 Mg - Mn	SB-241	A95086
Aluminum 5154	Sheet and plate	Al - 3.5 Mg	SB-209	A95154
Aluminum 5154	Tubes, seamless	Al - 3.5 Mg	SB-210	A95154
Aluminum 5154	Bars, rods and shapes	Al - 3.5 Mg	SB-221	A95154
Aluminum 5254	Sheet and plate	Al - 3.5 Mg	SB-209	A95254
Aluminum 5454	Sheet and plate	Al - 2.7 Mg - Mn	SB-209	A95454
Aluminum 5454	Bars, rods and shapes	Al - 2.7 Mg - Mn	SB-221	A95454
Aluminum 5454	Tubes, seamless	Al - 2.7 Mg - Mn	SB-234	A95454
Aluminum 5454	Pipe and tubes, seamless	Al - 2.7 Mg - Mn	SB-241	A95454
Aluminum 5456	Sheet and plate	Al - 5.1 Mg - Mn	SB-209	A95456
Aluminum 5456	Bars, rods and shapes	Al - 5.1 Mg - Mn	SB-221	A95456
Aluminum 5456	Pipe and tubes, seamless	Al - 5.1 Mg - Mn	SB-241	A95456

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
Aluminum 5652	Sheet and plate	Al - 2.5 Mg	SB-209	A95652
Aluminum 6061	Sheet and plate	Al - Mg - Si - Cu	SB-209	A96061
Aluminum 6061	Tubes, seamless	Al - Mg - Si - Cu	SB-210	A96061
Aluminum 6061	Bars, rod and wire	Al - Mg - Si - Cu	SB-211	A96061
Aluminum 6061	Bars, rods and shapes	Al - Mg - Si - Cu	SB-221	A96061
Aluminum 6061	Tubes, seamless	Al - Mg - Si - Cu	SB-234	A96061
Aluminum 6061	Pipe and tubes, seamless	Al - Mg - Si - Cu	SB-241	A96061
Aluminum 6061	Forgings	Al - Mg - Si - Cu	SB-247	A96061
Aluminum 6061	Shapes	Al - Mg - Si - Cu	SB-308	A96061
Aluminum 6063	Tubes, seamless	Al - Mg - Si	SB-210	A96063
Aluminum 6063	Bars, rods and shapes	Al - Mg - Si	SB-221	A96063
Aluminum 6063	Pipe and tubes, seamless	Al - Mg - Si	SB-241	A96063
Aluminum brass arsenical	Tubes, seamless	78 Cu - 20 Zn - 2 Al	SB-111	C68700
Aluminum brass arsenical	Tubes, seamless with fins	78 Cu - 20 Zn - 2 Al	SB-359	C68700
Aluminum brass arsenical	Tubes, seamless - U	78 Cu - 20 Zn - 2 Al	SB-395	C68700
Aluminum brass arsenical	Tubes, welded	78 Cu - 20 Zn - 2 Al	SB-543	C68700
Aluminum bronze	Tubes, seamless	95 Cu - 5 Al	SB-111	C60800
Aluminum bronze	Tubes, seamless with fins	95 Cu - 5 Al	SB-359	C60800
Aluminum bronze	Tubes, seamless - U	95 Cu - 5 Al	SB-395	C60800
Aluminum bronze	Rods, bars and shapes	88 Cu - 9 Al - 3 Fe	SB-150	C62300
Aluminum bronze 9A, cast	Castings	88 Cu - 9 Al - 3 Fe	SB-148	C95200
Aluminum bronze 9A, cast	Castings	88 Cu - 9 Al - 3 Fe	SB-271	C95200
Aluminum bronze 9A, cast	Castings	88 Cu - 9 Al - 3 Fe	SB-505	C95200
Aluminum bronze 9C, cast	Castings	85 Cu - 11 Al - 4 Fe	SB-148	C95400
Aluminum bronze 9C, cast	Castings	85 Cu - 11 Al - 4 Fe	SB-271	C95400
Aluminum bronze D	Rods, bars and shapes	90 Cu - 7 Al - 3 Fe	SB-150	C61400
Aluminum bronze D	Plate, sheet, etc.	90 Cu - 7 Al - 3 Fe	SB-169	C61400
Aluminum bronze D	Plates	90 Cu - 7 Al - 3 Fe	SB-171	C61400
Aluminum bronze No. 1	Rods, bars and shapes	91 Cu - 7 Al - 2 Si	SB-150	C64200
Aluminum bronze No. 1	Forgings	91 Cu - 7 Al - 2 Si	SB-283	C64200
Aluminum bronze No. 2	Rods, bars and shapes	81 Cu - 10 Al - 3 Fe	SB-150	C63000
Aluminum bronze No. 2	Plates	81 Cu - 10 Al - 3 Fe	SB-171	C63000
Aluminum casting 356.0	Castings	Al - Si - Mg	SB-26	A03560
Aluminum casting 356.0	Castings	Al - Si - Mg	SB-108	A03560
Aluminum casting 443.0	Castings	Al - Si	SB-26	A24430

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
Brass forging 377	Forgings	60 Cu - 37 Zn - 2 Pb	SB-283	C37700
Bronze, high silicon, A	Plate and sheet	97 Cu - 3 Si	SB-96	C65500
Bronze, high silicon, A	Rods, bars and shapes	97 Cu - 3 Si	SB-98	C65500
Bronze, high silicon, A	Pipe and tube, seamless	97 Cu - 3 Si	SB-315	C65500
Bronze, low silicon, B	Rods, bars and shapes	98.5 Cu - 1.5 Si	SB-98	C65100
Bronze, silicon	Rods, bars and shapes	94 Cu - 3 Si - Pb	SB-98	C66100
CN7M	Castings	29 Ni - 20 Cr - 3 Cu - 2 Mo	SA-351	N08007
Coper 194, Cu-Fe	Tubes, welded	97.4 Cu + Fe	SB-543	C19400
Copper 102, OF	Pipe, seamless	99.95 Cu	SB-42	C10200
Copper 102, OF	Tubes, seamless	99.95 Cu	SB-75	C10200
Copper 102, OF	Tubes, seamless	99.95 Cu	SB-111	C10200
Copper 102, OF	Sheet, strip, etc.	99.95 Cu	SB-152	C10200
Copper 102, OF	Bar, rod and shapes	99.95 Cu	SB-187	C10200
Copper 102, OF	Tubes, seamless with fins	99.95 Cu	SB-359	C10200
Copper 102, OF	Tubes, seamless - U	99.95 Cu	SB-395	C10200
Copper 104, OFS	Sheet, strip, etc.	99.95 Cu + Ag	SB-152	C10400
Copper 105, OFS	Sheet, strip, e tc.	99.95 Cu + Ag	SB-152	C10500
Copper 107, OFS	Sheet, strip, etc.	99.95 Cu + Ag	SB-152	C10700
Copper 110, ETP	Sheet, strip, etc.	99.90 Cu	SB-152	C11000
Copper 110, ETP	Bar, rod and shapes	99.90 Cu	SB-187	C11000
Copper 1100	Sheet and plate	99.0 Al - Cu	SB-209	A91100
Copper 1100	Rods, bars and shapes	99.0 Al - Cu	SB-221	A91100
Copper 1100	Pipe and tubes, seamless	99.0 Al - Cu	SB-241	A91100
Copper 120, DLP	Pipe, seamless	99.90 Cu + P	SB-42	C12000
Copper 120, DLP	Tubes, seamless	99.90 Cu + P	SB-75	C12000
Copper 120, DLP	Tubes, seamless	99.90 Cu + P	SB-111	C12000
Copper 120, DLP	Tubes, seamless with fins	99.90 Cu + P	SB-359	C12000
Copper 120, DLP	Tubes, seamless - U	99.90 Cu + P	SB-395	C12000
Copper 122, DHP	Pipe, seamless	99.9 Cu + P	SB-42	C12200
Copper 122, DHP	Tubes, seamless	99.9 Cu + P	SB-75	C12200
Copper 122, DHP	Tubes, seamless	99.9 Cu + P	SB-111	C12200
Copper 122, DHP	Sheet, strip, etc.	99.9 Cu + P	SB-152	C12200
Copper 122, DHP	Tubes, seamless with fins	99.9 Cu + P	SB-359	C12200
Copper 122, DHP	Tubes, seamless - U	99.9 Cu + P	SB-395	C12200
Copper 122, DHP	Tubes, welded	99.9 Cu + P	SB-543	C12200

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
Copper 123, DPS	Sheet, strip, etc.	99.90 Cu + Ag + P	SB-152	C12300
Copper 125, FRTP	Sheet, strip, etc.	99.88 Cu	SB-152	C12500
Copper 142, DPA	Tubes, seamless	99.40 Cu + As + P	SB-75	C14200
Copper 142, DPA	Tubes, seamless	99.40 Cu + As + P	SB-111	C14200
Copper 142, DPA	Sheet, strip, etc.	99.40 Cu + As + P	SB-152	C14200
Copper 142, DPA	Tubes, seamless with fins	99.40 Cu + As + P	SB-359	C14200
Copper 142, DPA	Tubes, seamless - U	99.40 Cu + As + P	SB-395	C14200
Copper 192, 1% Fe, 0.03% P	Tubes, seamless	98.7 Cu + Fe + P	SB-111	C19200
Copper 192, 1% Fe, 0.03% P	Tubes, seamless with fins	98.7 Cu + Fe + P	SB-359	C19200
Copper 192, 1% Fe, 0.03% P	Tubes, seamless - U	98.7 Cu + Fe + P	SB-395	C19200
Copper-nickel 10%	Tubes, seamless	90 Cu - 10 Ni	SB-111	C70600
Copper-nickel 10%	Rods and bars	90 Cu - 10 Ni	SB-151	C70600
Copper-nickel 10%	Plates	90 Cu - 10 Ni	SB-171	C70600
Copper-nickel 10%	Tubes, seamless with fins	90 Cu - 10 Ni	SB-359	C70600
Copper-nickel 10%	Tubes, seamless - U	90 Cu - 10 Ni	SB-395	C70600
Copper-nickel 10%	Pipe and tube, seamless	90 Cu - 10 Ni	SB-466	C70600
Copper-nickel 10%	Pipe and tube, welded	90 Cu - 10 Ni	SB-467	C70600
Copper-nickel 10%	Tubes, welded	90 Cu - 10 Ni	SB-543	C70600
Copper-nickel 20%	Tubes, seamless	80 Cu - 20 Ni	SB-111	C71000
Copper-nickel 20%	Tubes, seamless with fins	80 Cu - 20 Ni	SB-359	C71000
Copper-nickel 20%	Tubes, seamless - U	80 Cu - 20 Ni	SB-395	C71000
Copper-nickel 20%	Pipe and tube, seamless	80 Cu - 20 Ni	SB-466	C71000
Copper-nickel 30%	Tubes, seamless	70 Cu - 30 Ni	SB-111	C71500
Copper-nickel 30%	Rods and bars	70 Cu - 30 Ni	SB-151	C71500
Copper-nickel 30%	Plates	70 Cu - 30 Ni	SB-171	C71500
Copper-nickel 30%	Tubes, seamless with fins	70 Cu - 30 Ni	SB-359	C71500
Copper-nickel 30%	Tubes, seamless - U	70 Cu - 30 Ni	SB-395	C71500
Copper-nickel 30%	Pipe and tube, seamless	70 Cu - 30 Ni	SB-466	C71500
Copper-nickel 30%	Pipe and tube, welded	70 Cu - 30 Ni	SB-467	C71500
Copper-nickel 30%	Tubes, welded	70 Cu - 30 Ni	SB-543	C71500
Copper-nickel 5%	Tubes, seamless	95 Cu - 5 Ni	SB-111	C70400
Copper-nickel 5%	Tubes, seamless with fins	95 Cu - 5 Ni	SB-359	C70400
Copper-nickel 5%	Tubes, welded	95 Cu - 5 Ni	SB-543	C70400
Copper-nickel, cast	Castings	87.5 Cu - 10 Ni - Fe - Mn	SB-369	C96200
Copper-nickel, chromium	Tubes, seamless	80 Cu - 16 Ni - Mn - Zn - Cr	SB-111	C72200

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
Cu5MCuC	Castings	41 Ni-29 Fe-21 Cr-3 Mo-Cb	SA-494	---
CW-12MW	Castings	53 Ni - 17 Mo - 16 Cr - 6 Fe - 5 W	SA-494 (CW-12MW)	N30002
CW-2M	Castings	63 Ni - 16 Cr - 16 Mo	SA-494	---
CW-6M	Castings	59 Ni - 18 Cr - 18 Mo	SA-494	---
CW-6MC	Castings	58 Ni - 21 Cr - 9 Mo - 4 Cb	SA-494	---
CX2MW	Castings	57 Ni-21 Cr-13 Mo-4 Fe-3 W	SA-494	---
CY-40	Castings	68 Ni - 16 Cr - 11 Fe	SA-494	N06040
CY5SnBiM	Castings	69 Ni - 12 Cr - 4 Bi - 4 Sn	SA-494	---
CZ100	Castings	95 Ni	SA-494	N02100
Discaloy, Grade 662	Bolting	26 Ni - 14 Cr - Mo - Ti	SA-453	S66220
Discaloy, Grade 662	Bars and forgings	26 Ni - 14 Cr - Mo - Ti	SA-638	S66220
Hastelloy B	Plate and strip	62 Ni - 28 Mo - 5 Fe	SB-333	N10001
Hastelloy B	Rod	62 Ni - 28 Mo - 5 Fe	SB-335	N10001
Hastelloy B	Fittings	62 Ni - 28 Mo - 5 Fe	SB-366	N10001
Hastelloy B	Pipe, welded	62 Ni - 28 Mo - 5 Fe	SB-619	N10001
Hastelloy B	Pipe and tube, seamless	62 Ni - 28 Mo - 5 Fe	SB-622	N10001
Hastelloy B	Tubes, welded	62 Ni - 28 Mo - 5 Fe	SB-626	N10001
Hastelloy B	Castings	62 Ni - 28 Mo - 5 Fe	SA-494 (N12-MV)	N30012
Hastelloy B-2	Plate and strip	65 Ni - 28 Mo - 2 Fe	SB-333	N10665
Hastelloy B-2	Rod	65 Ni - 28 Mo - 2 Fe	SB-335	N10665
Hastelloy B-2	Fittings	65 Ni - 28 Mo - 2 Fe	SB-366	N10665
Hastelloy B-2	Pipe, welded	65 Ni - 28 Mo - 2 Fe	SB-619	N10665
Hastelloy B-2	Pipe and tube, seamless	65 Ni - 28 Mo - 2 Fe	SB-622	N10665
Hastelloy B-2	Tubes, welded	65 Ni - 28 Mo - 2 Fe	SB-626	N10665
Hastelloy B-3	Plate, sheet, strip	64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W	(SB-333 CC)	N10675
Hastelloy B-3	Rod	64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W	SB-335	N10675
Hastelloy B-3	Forgings	64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W	SB-564	N10675
Hastelloy B-3	Pipe, welded	64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W	SB-619	N10675
Hastelloy B-3	Pipe and tube, seamless	64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W	SB-622	N10675
Hastelloy B-3	Tubes, welded	64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W	SB-626	N10675
Hastelloy B-3	Fittings	64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W	SB-366	N10675
Hastelloy C-22	Fittings	55 Ni - 21 Cr - 13.5 Mo	SB-366	N06022
Hastelloy C-22	Forgings	55 Ni - 21 Cr - 13.5 Mo	SB-564	N06022
Hastelloy C-22	Rod	55 Ni - 21 Cr - 13.5 Mo	SB-574	N06022
Hastelloy C-22	Plate, sheet, strip	55 Ni - 21 Cr - 13.5 Mo	SB-575	N06022

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
Hastelloy C-22	Pipe, welded	55 Ni - 21 Cr - 13.5 Mo	SB-619	N06022
Hastelloy C-22	Pipe and tube, seamless	55 Ni - 21 Cr - 13.5 Mo	SB-622	N06022
Hastelloy C-22	Tubes, welded	55 Ni - 21 Cr - 13.5 Mo	SB-626	N06022
Hastelloy C-276	Fittings	54 Ni - 16 Mo - 15 Cr	SB-366	N10276
Hastelloy C-276	Forgings	54 Ni - 16 Mo - 15 Cr	SB-564	N10276
Hastelloy C-276	Rod	54 Ni - 16 Mo - 15 Cr	SB-574	N10276
Hastelloy C-276	Plate, sheet, strip	54 Ni - 16 Mo - 15 Cr	SB-575	N10276
Hastelloy C-276	Pipe, welded	54 Ni - 16 Mo - 15 Cr	SB-619	N10276
Hastelloy C-276	Pipe and tube, seamless	54 Ni - 16 Mo - 15 Cr	SB-622	N10276
Hastelloy C-276	Tubes, welded	54 Ni - 16 Mo - 15 Cr	SB-626	N10276
Hastelloy C-4	Fittings	61 Ni - 16 Mo - 16 Cr	SB-366	N06455
Hastelloy C-4	Rod	61 Ni - 16 Mo - 16 Cr	SB-574	N06455
Hastelloy C-4	Plate, sheet, strip	61 Ni - 16 Mo - 16 Cr	SB-575	N06455
Hastelloy C-4	Pipe, welded	61 Ni - 16 Mo - 16 Cr	SB-619	N06455
Hastelloy C-4	Pipe and tube, welded	61 Ni - 16 Mo - 16 Cr	SB-622	N06455
Hastelloy C-4	Tubes, welded	61 Ni - 16 Mo - 16 Cr	SB-626	N06455
Hastelloy G	Fittings	47 Ni - 22 Cr - 19 Fe - 6 Mo	SB-366	N06007
Hastelloy G	Rod	47 Ni - 22 Cr - 19 Fe - 6 Mo	SB-581	N06007
Hastelloy G	Plate, sheet, strip	47 Ni - 22 Cr - 19 Fe - 6 Mo	SB-582	N06007
Hastelloy G	Pipe, welded	47 Ni - 22 Cr - 19 Fe - 6 Mo	SB-619	N06007
Hastelloy G	Pipe and tube, seamless	47 Ni - 22 Cr - 19 Fe - 6 Mo	SB-622	N06007
Hastelloy G	Tubes, welded	47 Ni - 22 Cr - 19 Fe - 6 Mo	SB-626	N06007
Hastelloy G-2	Rod	49 Ni - 25 Cr - 18 Fe - 6 Mo	SB-581	N06975
Hastelloy G-2	Plate, sheet, strip	49 Ni - 25 Cr - 18 Fe - 6 Mo	SB-582	N06975
Hastelloy G-2	Pipe, welded	49 Ni - 25 Cr - 18 Fe - 6 Mo	SB-619	N06975
Hastelloy G-2	Pipe and tube, seamless	49 Ni - 25 Cr - 18 Fe - 6 Mo	SB-622	N06975
Hastelloy G-2	Tubes, welded	49 Ni - 25 Cr - 18 Fe - 6 Mo	SB-626	N06975
Hastelloy G-3	Fittings	47 Ni - 22 Cr - 20 Fe - 7 Mo	SB-366	N06985
Hastelloy G-3	Rod	47 Ni - 22 Cr - 20 Fe - 7 Mo	SB-581	N06985
Hastelloy G-3	Plate, sheet, strip	47 Ni - 22 Cr - 20 Fe - 7 Mo	SB-582	N06985
Hastelloy G-3	Pipe, welded	47 Ni - 22 Cr - 20 Fe - 7 Mo	SB-619	N06985
Hastelloy G-3	Pipe and tube, seamless	47 Ni - 22 Cr - 20 Fe - 7 Mo	SB-622	N06985
Hastelloy G-3	Tubes, welded	47 Ni - 22 Cr - 20 Fe - 7 Mo	SB-626	N06985
Hastelloy G-30	Welding fittings	40 Ni - 29 Cr - 15 Fe - 5 Mo	SB-366	N06030
Hastelloy G-30	Rod	40 Ni - 29 Cr - 15 Fe - 5 Mo	SB-581	N06030

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
Hastelloy G-30	Plate, sheet, strip	40 Ni - 29 Cr - 15 Fe - 5 Mo	SB-582	N06030
Hastelloy G-30	Pipe, welded	40 Ni - 29 Cr - 15 Fe - 5 Mo	SB-619	N06030
Hastelloy G-30	Pipe and tube, seamless	40 Ni - 29 Cr - 15 Fe - 5 Mo	SB-622	N06030
Hastelloy G-30	Tubes, welded	40 Ni - 29 Cr - 15 Fe - 5 Mo	SB-626	N06030
Hastelloy N	Fittings	70 Ni - 16 Mo - 7 Cr - 5 Fe	SB-366	N10003
Hastelloy N	Plate, sheet, strip	70 Ni - 16 Mo - 7 Cr - 5 Fe	SB-434	N10003
Hastelloy N	Rod	70 Ni - 16 Mo - 7 Cr - 5 Fe	SB-573	N10003
Hastelloy X	Fittings	47 Ni - 22 Cr - 9 Mo - 18 Fe	SB-366	N06002
Hastelloy X	Sheet and plate	47 Ni - 22 Cr - 9 Mo - 18 Fe	SB-435	N06002
Hastelloy X	Rod	47 Ni - 22 Cr - 9 Mo - 18 Fe	SB-572	N06002
Hastelloy X	Pipe, welded	47 Ni - 22 Cr - 9 Mo - 18 Fe	SB-619	N06002
Hastelloy X	Pipe and tube, seamless	47 Ni - 22 Cr - 9 Mo - 18 Fe	SB-622	N06002
Hastelloy X	Tubes, welded	47 Ni - 22 Cr - 9 Mo - 18 Fe	SB-626	N06002
HR160	Fittings	29 Ni - 30 Co - 28 Cr - 2.75 Si	(SB-366 CC)	N12160
HR160	Plate, sheet, strip	29 Ni - 30 Co - 28 Cr - 2.75 Si	(SB-435 CC)	N12160
HR160	Forgings	29 Ni - 30 Co - 28 Cr - 2.75 Si	SB-564	N12160
HR160	Rod	29 Ni - 30 Co - 28 Cr - 2.75 Si	SB-572	N12160
HR160	Pipe, welded	29 Ni - 30 Co - 28 Cr - 2.75 Si	SB-619	N12160
HR160	Pipe and tube, seamless	29 Ni - 30 Co - 28 Cr - 2.75 Si	SB-622	N12160
HR160	Tubes, welded	29 Ni - 30 Co - 28 Cr - 2.75 Si	SB-626	N12160
HS-566	Plate, sheet, strip	21 Ni - 30 Fe - 22 Cr - 18 Co - 3 Mo - 3 W	SB-435	R30566
HS-566	Rod	21 Ni - 30 Fe - 22 Cr - 18 Co - 3 Mo - 3 W	SB-572	R30566
HS-566	Pipe, welded	21 Ni - 30 Fe - 22 Cr - 18 Co - 3 Mo - 3 W	SB-619	R30566
HS-566	Pipe and tube, seamless	21 Ni - 30 Fe - 22 Cr - 18 Co - 3 Mo - 3 W	SB-622	R30566
HS-566	Tubes, welded	21 Ni - 30 Fe - 22 Cr - 18 Co - 3 Mo - 3 W	SB-626	R30566
HS-566	Welded fittings	21 Ni - 30 Fe - 22 Cr - 18 Co - 3 Mo - 3 W	SB-366	R30566
Inconel 600	Tubes, seamless	72 Ni - 15 Cr - 8 Fe	SB-163	N06600
Inconel 600	Rod and bar	72 Ni - 15 Cr - 8 Fe	SB-166	N06600
Inconel 600	Pipe and tube, seamless	72 Ni - 15 Cr - 8 Fe	SB-167	N06600
Inconel 600	Plate, sheet, strip	72 Ni - 15 Cr - 8 Fe	SB-168	N06600
Inconel 600	Fittings	72 Ni - 15 Cr - 8 Fe	SB-366	N06600
Inconel 600	Tubes, welded	72 Ni - 15 Cr - 8 Fe	SB-516	N06600
Inconel 600	Pipe, welded	72 Ni - 15 Cr - 8 Fe	SB-517	N06600
Inconel 600	Forgings	72 Ni - 15 Cr - 8 Fe	SB-564	N06600
Inconel 601	Tubes, seamless	60 Ni - 23 Cr - Fe - 1.3 Al	(SB-163 CC)	N06601

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
Inconel 601	Rod and bar	60 Ni - 23 Cr - Fe - 1.3 Al	SB-166	N06601
Inconel 601	Pipe and tube, seamless	60 Ni - 23 Cr - Fe - 1.3 Al	SB-167	N06601
Inconel 601	Plate, sheet, strip	60 Ni - 23 Cr - Fe - 1.3 Al	SB-168	N06601
Inconel 617	Rod and bar	45 Ni - 22 Cr - 12 Co - 9 Mo	SB-166	N06617
Inconel 617	Plate, sheet, strip	45 Ni - 22 Cr - 12 Co - 9 Mo	SB-168	N06617
Inconel 617	Plate, sheet, strip	45 Ni - 22 Cr - 12 Co - 9 Mo	(SB-443 CC)	N06617
Inconel 617	Pipe and tube, seamless	45 Ni - 22 Cr - 12 Co - 9 Mo	(SB-444 CC)	N06617
Inconel 617	Forgings	45 Ni - 22 Cr - 12 Co - 9 Mo	SB-564	N06617
Inconel 625	Fittings	60 Ni - 22 Cr - 9 Mo - 3.5 Cb	SB-366	N06625
Inconel 625	Plate, sheet, strip	60 Ni - 22 Cr - 9 Mo - 3.5 Cb	SB-443	N06625
Inconel 625	Pipe and tube, seamless	60 Ni - 22 Cr - 9 Mo - 3.5 Cb	SB-444	N06625
Inconel 625	Rod and bar	60 Ni - 22 Cr - 9 Mo - 3.5 Cb	SB-446	N06625
Inconel 625	Forgings	60 Ni - 22 Cr - 9 Mo - 3.5 Cb	SB-564	N06625
Inconel 625	Tubes, welded	60 Ni - 22 Cr - 9 Mo - 3.5 Cb	SB-704	N06625
Inconel 625	Pipe, welded	60 Ni - 22 Cr - 9 Mo - 3.5 Cb	SB-705	N06625
Inconel 686	Forgings	50 Ni-25 Cr-15 Fe-6 Mo-Ti	SB-564	N06686
Inconel 686	Rod	50 Ni-25 Cr-15 Fe-6 Mo-Ti	SB-574	N06686
Inconel 686	Plate, sheet, strip	50 Ni-25 Cr-15 Fe-6 Mo-Ti	SB-575	N06686
Inconel 686	Pipe, welded	50 Ni-25 Cr-15 Fe-6 Mo-Ti	SB-619	N06686
Inconel 686	Pipe and tube, seamless	50 Ni-25 Cr-15 Fe-6 Mo-Ti	SB-622	N06686
Inconel 686	Tubes, welded	50 Ni-25 Cr-15 Fe-6 Mo-Ti	SB-626	N06686
Inconel 690	Tubes, seamless	58 Ni - 29 Cr - 9 Fe	SB-163	N06690
Inconel 690	Rod and bar	58 Ni - 29 Cr - 9 Fe	SB-166	N06690
Inconel 690	Pipe and tube, seamless	58 Ni - 29 Cr - 9 Fe	SB-167	N06690
Inconel 690	Plate, sheet, strip	58 Ni - 29 Cr - 9 Fe	SB-168	N06690
Inconel 690	Forgings	58 Ni - 29 Cr - 9 Fe	SB-564	N06690
Inconel 718	Bars and forgings	53 Ni - 19 Cr - 19 Fe - Cb - Mo	SB-637	N07718
Inconel 725	Plate, sheet, strip	57 Ni - 21 Cr - 8 Mo - 3 Cb	(SB-443 CC)	N07725
Inconel 725	Pipe and tube, seamless	57 Ni - 21 Cr - 8 Mo - 3 Cb	(SB-444 CC)	N07725
Inconel 725	Rod and bar	57 Ni - 21 Cr - 8 Mo - 3 Cb	(SB-446 CC)	N07725
Inconel 725	Forgings	57 Ni - 21 Cr - 8 Mo - 3 Cb	(SB-564 CC)	N07725
Inconel 800	Tubes, seamless	33 Ni - 42 Fe - 21 Cr	SB-163	N08800
Inconel 800	Fittings	33 Ni - 42 Fe - 21 Cr	SB-366	N08800
Inconel 800	Pipe and tube, seamless	33 Ni - 42 Fe - 21 Cr	SB-407	N08800
Inconel 800	Rod and bar	33 Ni - 42 Fe - 21 Cr	SB-408	N08800

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
Inconel 800	Plate, sheet, strip	33 Ni - 42 Fe - 21 Cr	SB-409	N08800
Inconel 800	Pipe, welded	33 Ni - 42 Fe - 21 Cr	SB-514	N08800
Inconel 800	Tubes, welded	33 Ni - 42 Fe - 21 Cr	SB-515	N08800
Inconel 800	Forgings	33 Ni - 42 Fe - 21 Cr	SB-564	N08800
Inconel 800H	Tubes, seamless	33 Ni - 42 Fe - 21 Cr	SB-163	N08810
Inconel 800H	Pipe and tube, seamless	33 Ni - 42 Fe - 21 Cr	SB-407	N08810
Inconel 800H	Rod and bar	33 Ni - 42 Fe - 21 Cr	SB-408	N08810
Inconel 800H	Plate, sheet, strip	33 Ni - 42 Fe - 21 Cr	SB-409	N08810
Inconel 800H	Pipe, welded	33 Ni - 42 Fe - 21 Cr	SB-514	N08810
Inconel 800H	Tubes, welded	33 Ni - 42 Fe - 21 Cr	SB-515	N08810
Inconel 800H	Forgings	33 Ni - 42 Fe - 21 Cr	SB-564	N08810
Inconel 800H	Fittings	33 Ni - 42 Fe - 21 Cr	SB-366	N08810
Inconel 800HT	Fittings	33 Ni - 42 Fe - 21 Cr - Al - Ti	SB-366	N08811
Inconel 800HT	Pipe and tube, seamless	33 Ni - 42 Fe - 21 Cr - Al - Ti	SB-407	N08811
Inconel 800HT	Rod and bar	33 Ni - 42 Fe - 21 Cr - Al - Ti	SB-408	N08811
Inconel 800HT	Plate, sheet, strip	33 Ni - 42 Fe - 21 Cr - Al - Ti	SB-409	N08811
Inconel 800HT	Tubes, welded	33 Ni - 42 Fe - 21 Cr - Al - Ti	(SB-515 CC)	N08811
Inconel 800HT	Tubes, seamless	33 Ni - 42 Fe - 21 Cr - Al - Ti	SB-163	N08811
Inconel 800HT	Forgings	33 Ni - 42 Fe - 21 Cr - Al - Ti	SB-564	N08811
Inconel 801	Tubes, seamless	32 Ni - 45 Fe - 20.5 Cr - Ti	SB-163	N08801
Inconel 801	Pipe and tube, seamless	32 Ni - 45 Fe - 20.5 Cr - Ti	SB-407	N08801
Inconel 825	Tubes, seamless	42 Ni - 21.5 Cr - 5.5 Mo - 2.3 Cu	SB-163	N08825
Inconel 825	Fittings	42 Ni - 21.5 Cr - 5.5 Mo - 2.3 Cu	SB-366	N08825
Inconel 825	Pipe and tube, seamless	42 Ni - 21.5 Cr - 5.5 Mo - 2.3 Cu	SB-423	N08825
Inconel 825	Plate, sheet, strip	42 Ni - 21.5 Cr - 5.5 Mo - 2.3 Cu	SB-424	N08825
Inconel 825	Rod and bar	42 Ni - 21.5 Cr - 5.5 Mo - 2.3 Cu	SB-425	N08825
Inconel 825	Forgings	42 Ni - 21.5 Cr - 5.5 Mo - 2.3 Cu	SB-564	N08825
Inconel 825	Tubes, welded	42 Ni - 21.5 Cr - 5.5 Mo - 2.3 Cu	SB-704	N08825
Inconel 825	Pipe, welded	42 Ni - 21.5 Cr - 5.5 Mo - 2.3 Cu	SB-705	N08825
Inconel X-750	Bars and forgings	70 Ni - 16 Cr - 7 Fe - Ti - Al	SB-637	N07750
JS700	Plate, sheet, strip	25 Ni - 47 Fe - 21 Cr - 5 Mo	SB-599	N8700
JS700	Bar and wire	25 Ni - 47 Fe - 21 Cr - 5 Mo	SB-672	N8700
M-25S	Castings	61 Ni - 30 Cu - 4 Si	SA-494	---
M-30C	Castings	63 Ni - 29 Cu - 2 Cb - Si	SA-494	---
M-30H	Castings	62 Ni - 30 Cu - 3 Si	SA-494	---

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
M-35-1	Castings	65 Ni - 29 Cu	SA-494	---
M-35-2	Castings	65 Ni - 29 Cu	SA-494	N04020
Monel 400, Ni - Cu	Plate, sheet, strip	67 Ni - 30 Cu	SB-127	N04400
Monel 400, Ni - Cu	Tubes, seamless	67 Ni - 30 Cu	SB-163	N04400
Monel 400, Ni - Cu	Rod and bar	67 Ni - 30 Cu	SB-164	N04400
Monel 400, Ni - Cu	Pipe and tube, seamless	67 Ni - 30 Cu	SB-165	N04400
Monel 400, Ni - Cu	Fittings	67 Ni - 30 Cu	SB-366	N04400
Monel 400, Ni - Cu	Forgings	67 Ni - 30 Cu	SB-564	N04400
Monel 405, Ni - Cu	Rod and bar	67 Ni - 30 Cu - S	SB-164	N04405
Muntz metal 280	Tubes, seamless	60 Cu - 40 Zn	SB-111	C28000
Muntz metal leaded 365	Plates	60 Cu - 39 Zn - Pb	SB-171	C36500
Naval brass arsenical	Plates	60 Cu - 39 Zn - Sn - As	SB-171	C46500
Naval brass uninhibited	Plates	60 Cu - 39 Zn - Sn	SB-171	C46400
Nickel 200	Rod and bar	99.0 Ni	SB-160	N02200
Nickel 200	Pipe and tube, seamless	99.0 Ni	SB-161	N02200
Nickel 200	Plate, sheet, strip	99.0 Ni	SB-162	N02200
Nickel 200	Tubes, seamless	99.0 Ni	SB-163	N02200
Nickel 200	Fittings	99.0 Ni	SB-366	N02200
Nickel 200	Forgings	99.0 Ni	SB-564	N02200
Nickel 201	Rod and bar	99.0 Ni - Low C	SB-160	N02201
Nickel 201	Pipe and tube, seamless	99.0 Ni - Low C	SB-161	N02201
Nickel 201	Plate, sheet, strip	99.0 Ni - Low C	SB-162	N02201
Nickel 201	Tubes, seamless	99.0 Ni - Low C	SB-163	N02201
Nickel 201	Fittings	99.0 Ni - Low C	SB-366	N02201
Nickel alloy casting N-7M	Castings	63 Ni - 31 Mo - 1 Cr - Si	SA-494	---
Nickel-bronze, leaded (dairy metal)	Castings	65 Cu - 20 Ni - 8 Zn	SB-584	C97600
Nickel-Molybdenum B-4	Welding fittings	62 Ni - 28 Mo - 4 Fe - 1 Cu	SB-366	N10629
Nicrofer 45	Tubes, seamless	46 Ni - 27 Cr - 23 Fe - 2.75 Si	SB-163	N06045
Nicrofer 45	Pipe and tube, seamless	46 Ni - 27 Cr - 23 Fe - 2.75 Si	SB-167	N06045
Nicrofer 45	Rod and bar	46 Ni - 27 Cr - 23 Fe - 2.75 Si	(SB-166 CC)	N06045
Nicrofer 45	Plate, sheet, strip	46 Ni - 27 Cr - 23 Fe - 2.75 Si	SB-168	N06045
Nicrofer 45	Tubes, welded	46 Ni - 27 Cr - 23 Fe - 2.75 Si	SB-516	N06045
Nicrofer 45	Pipe, welded	46 Ni - 27 Cr - 23 Fe - 2.75 Si	SB-517	N06045
Nicrofer 45	Forgings	46 Ni - 27 Cr - 23 Fe - 2.75 Si	(SB-564 CC)	N06045

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
Nicrofer 45/CRV45TM/WPV45TM	Welding fittings	46 Ni - 27 Cr - 23 Fe - 2.75 Si	SB-366	N06045
Nicrofer 6025 HT	Plate, sheet, strip	62 Ni - 25 Cr - 10 Fe - Al	SB-168	N06025
Nicrofer 6025 HT	Pipe and tube, seamless	62 Ni - 25 Cr - 10 Fe - Al	SB-167	N06025
Nicrofer 6025 HT	Tubes, seamless	62 Ni - 25 Cr - 10 Fe - Al	SB-163	N06025
Nicrofer 6025 HT	Tubes, welded	62 Ni - 25 Cr - 10 Fe - Al	SB-516	N06025
Nicrofer 6025 HT	Pipe, welded	62 Ni - 25 Cr - 10 Fe - Al	SB-517	N06025
Nicrofer 6025 HT/CRV 602/WPV 602	Welding fittings	62 Ni - 25 Cr - 10 Fe - Al	SB-366	N06025
Nimonic 80A, old Gr 804	Bars and forgings	70 Ni - 19 Cr - Fe - Ti - Al	SB-637	N07080
Old Gr 689, M252	Bars and forgings	51 Ni - 19 Cr - 10 Mo - 10 Co	SB-637	N07252
RA-330	Fittings	35 Ni - 19 Cr - 1¼ Si	SB-366	N08330
RA-330	Bars	35 Ni - 19 Cr - 1¼ Si	SB-511	N08330
RA-330	Pipe, seamless and welded	35 Ni - 19 Cr - 1¼ Si	SB-535	N08330
RA-330	Plate, sheet, strip	35 Ni - 19 Cr - 1¼ Si	SB-536	N08330
RA-330	Pipe, welded	35 Ni - 19 Cr - 1¼ Si	SB-710	N08330
RA-330TX	Bars	35 Ni - 19 Cr - 1¼ Si	SB-511	N08332
RA-330TX	Pipe, seamless and welded	35 Ni - 19 Cr - 1¼ Si	SB-535	N08332
RA-330TX	Plate, sheet, strip	35 Ni - 19 Cr - 1¼ Si	SB-536	N08332
Red brass 230	Pipe, seamless	85 Cu - 15 Zn	SB-43	C23000
Red brass 230	Tubes, seamless	85 Cu - 15 Zn	SB-111	C23000
Red brass 230	Tubes, seamless	85 Cu - 15 Zn	SB-135	C23000
Red brass 230	Tubes, seamless with fins	85 Cu - 15 Zn	SB-359	C23000
Red brass 230	Tubes, seamless - U	85 Cu - 15 Zn	SB-395	C23000
Red brass 230	Tubes, welded	85 Cu - 15 Zn	SB-543	C23000
Red brass, leaded, cast (ounce metal)	Castings	85 Cu - 5 Sn - 5 Zn - 5 Pb	SB-62	C83600
Sanicro 28	Tubes, seamless	31 Ni - 31 Fe - 29 Cr - Mo	SB-668	N08028
Sanicro 28	Plate, sheet, strip	31 Ni - 31 Fe - 29 Cr - Mo	SB-709	N08028
Semi-red brass, leaded, cast (valve metal)	Castings	81 Cu - 9 Zn - 7 Pb - 3 Sn	SB-584	C84400
SM-2035	Pipe and tube, seamless	36 Ni - 35 Fe - 22 Cr - 4 Mo	SB-622	N08135
SM2050	Pipe and tube, welded	52 Ni - 21 Cr - 13 Fe - 11 Mo	SB-622	N06250
SM2060	Pipe and tube, seamless	57 Ni-20 Cr-13 Mo-6 Fe-Ti-Cu	SB-622	N06060
SM2550	Pipe and tube, welded	49 Ni - 24 Cr - 14 Fe - 7 Mo	SB-622	N06255
Tin bronze	Castings	87 Cu - 8 Sn - 4 Zn	(SB-584 CC)	C90300

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
Tin bronze, high leaded (bushing and bearing bronze)	Castings	80 Cu - 10 Sn - 10 Pb	SB-584	C93700
Tin bronze, leaded, cast (Navy "M" bronze, steam bronze)	Castings	88 Cu - Sn - Zn - Pb	SB-61	C92200
Tin bronze, leaded, cast (Navy "M" bronze, steam bronze)	Castings	88 Cu - Sn - Zn - Pb	SB-584	C92200
Titanium Grade 1	Plate, sheet, strip	Ti, unalloyed	SB-265	R50250
Titanium Grade 1	Pipe, seamless and welded	Ti, unalloyed	SB-337	R50250
Titanium Grade 1	Tubes, seamless and welded	Ti, unalloyed	SB-338	R50250
Titanium Grade 1	Bars and billets	Ti, unalloyed	SB-348	R50250
Titanium Grade 11	Plate, sheet, strip	Ti - 0.2 Pd	SB-265	R52250
Titanium Grade 11	Tubes, seamless and welded	Ti - 0.2 Pd	SB-338	R52250
Titanium Grade 11	Bars and billets	Ti - 0.2 Pd	SB-348	R52250
Titanium Grade 12	Plate, sheet, strip	Ti + 0.3 Mo + 0.8 Ni	SB-265	R53400
Titanium Grade 12	Pipe, seamless and welded	Ti + 0.3 Mo + 0.8 Ni	SB-337	R53400
Titanium Grade 12	Tubes, seamless and welded	Ti + 0.3 Mo + 0.8 Ni	SB-338	R53400
Titanium Grade 12	Bars and billets	Ti + 0.3 Mo + 0.8 Ni	SB-348	R53400
Titanium Grade 13	Plate, sheet, strip	Ti - 0.5 Ni - Ru	SB-265	R53413
Titanium Grade 13	Bars and billets	Ti - 0.5 Ni - Ru	SB-348	R53413
Titanium Grade 14	Plate, sheet, strip	Ti - 0.5 Ni - Ru	SB-265	R53414
Titanium Grade 14	Bars and billets	Ti - 0.5 Ni - Ru	SB-348	R53414
Titanium Grade 15	Plate, sheet, strip	Ti - 0.5 Ni - Ru	SB-265	R53415
Titanium Grade 15	Bars and billets	Ti - 0.5 Ni - Ru	SB-348	R53415
Titanium Grade 16	Plate, sheet, strip	Ti - 0.06 Pd	SB-265	R52402
Titanium Grade 16	Bars and billets	Ti - 0.06 Pd	SB-348	R52402
Titanium Grade 17	Plate, sheet, strip	Ti - 0.06 Pd	SB-265	R52252
Titanium Grade 17	Bars and billets	Ti - 0.06 Pd	SB-348	R52252
Titanium Grade 18	Plate, shhet, strip	Ti - 3 Al - 2.5 V - 0.05 Pd	SB-265	R56322
Titanium Grade 18	Bars and billets	Ti - 3 Al - 2.5 V - 0.05 Pd	SB-348	R56322
Titanium Grade 19	Plate, sheet, strip	Ti - 8 V - 6 Cr - Mo - Zr - Al	SB-265	---
Titanium Grade 2	Plate, sheet, strip	Ti, unalloyed	SB-265	R50400
Titanium Grade 2	Pipe, seamless and welded	Ti, unalloyed	SB-337	R50400
Titanium Grade 2	Tubes, seamless and welded	Ti, unalloyed	SB-338	R50400
Titanium Grade 2	Bars and billets	Ti, unalloyed	SB-348	R50400
Titanium Grade 3	Plate, sheet, strip	Ti, unalloyed	SB-265	R50550

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
Titanium Grade 3	Pipe, seamless and welded	Ti, unalloyed	SB-337	R50550
Titanium Grade 3	Tubes, seamless and welded	Ti, unalloyed	SB-338	R50550
Titanium Grade 3	Bars and billets	Ti, unalloyed	SB-348	R50550
Titanium Grade 4	Plate, sheet, strip	Ti, unalloyed	SB-265	R50700
Titanium Grade 4	Bars and billets	Ti, unalloyed	SB-348	R50700
Titanium Grade 5	Plate, sheet, strip	Ti - 6 Al - 4V	SB-265	R56400
Titanium Grade 5	Bars and billets	Ti - 6 Al - 4V	SB-348	R56400
Titanium Grade 6	Plate, sheet, strip	Ti - 5 Al - 2.5 Sn	SB-265	R54520
Titanium Grade 6	Bars and billets	Ti - 5 Al - 2.5 Sn	SB-348	R54520
Titanium Grade 7	Plate, sheet, strip	Ti - 0.2 Pd	SB-265	R52400
Titanium Grade 7	Pipe, seamless and welded	Ti - 0.2 Pd	SB-337	R52400
Titanium Grade 7	Tubes, seamless and welded	Ti - 0.2 Pd	SB-338	R52400
Titanium Grade 7	Bars and billets	Ti - 0.2 Pd	SB-348	R52400
Titanium Grade 9	Plate, sheet, strip	Ti + 3 Al + 2.5 V	SB-265	R56320
Titanium Grade 9	Pipe, seamless and welded	Ti + 3 Al + 2.5 V	SB-337	R56320
Titanium Grade 9	Tubes, seamless and welded	Ti + 3 Al + 2.5 V	SB-338	R56320
Titanium Grade 9	Bars and billets	Ti + 3 Al + 2.5 V	SB-348	R56320
Titanium Grade C-2, cast	Castings	Ti, unalloyed	SB-367	R50400
Titanium Grade C-3, cast	Castings	Ti, unalloyed	SB-367	R50550
Titanium Grade C-5, cast	Castings	Ti - 6 Al - 4V	SB-367	(R56400)
Titanium Grade C-6, cast	Castings	Ti - 5 Al - 2.5 Sn	SB-367	(R54520)
Titanium Grade F1	Forgings	Ti, unalloyed	SB-381	R50250
Titanium Grade F11	Forgings	Ti - 0.2 Pd	SB-381	R52250
Titanium Grade F12	Forgings	Ti + 0.3 Mo + 0.8 Ni	SB-381	R53400
Titanium Grade F13	Forgings	Ti - 0.5 Ni - Ru	SB-381	R53413
Titanium Grade F14	Forgings	Ti - 0.5 Ni - Ru	SB-381	R53414
Titanium Grade F15	Forgings	Ti - 0.5 Ni - Ru	SB-381	R53415
Titanium Grade F16	Forgings	Ti - 0.06 Pd	SB-381	R52402
Titanium Grade F17	Forgings	Ti - 0.06 Pd	SB-381	R52252
Titanium Grade F18	Forgings	Ti - 3 Al - 2.5 V - 0.05 Pd	SB-381	R56322
Titanium Grade F2	Forgings	Ti, unalloyed	SB-381	R50400
Titanium Grade F3	Forgings	Ti, unalloyed	SB-381	R50550
Titanium Grade F4	Forgings	Ti, unalloyed	SB-381	R50700
Titanium Grade F5	Forgings	Ti - 6 Al - 4V	SB-381	R56400
Titanium Grade F6	Forgings	Ti - 5 Al - 2.5 Sn	SB-381	R54520

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
Titanium Grade F7	Forgings	Ti - 0.2 Pd	SB-381	R52400
Titanium Grade F9	Forgings	Ti + 3 Al + 2.5 V	SB-381	R56320
Titanium Grade Ti-Pd16	Castings	Ti - 0.06 Pd	SB-367	(R52402)
Titanium Grade Ti-Pd17	Castings	Ti - 0.06 Pd	SB-367	(R52252)
Titanium Grade Ti-Pd18	Castings	Ti - 3 Al - 2.5 V - 0.05 Pd	SB-367	(R56322)
Titanium Grade Ti-Pd7B and Ti-Pd8A	Castings	Ti - 0.2 Pd	SB-367	(R52400)
Titanium Grade WPT1	Fittings	Ti, unalloyed	SB-363	(R50250)
Titanium Grade WPT11	Fittings	Ti - 0.2 Pd	SB-363	(R52250)
Titanium Grade WPT12	Fittings	Ti + 0.3 Mo + 0.8 Ni	SB-363	(R53400)
Titanium Grade WPT13	Fittings	Ti - 0.5 Ni - Ru	SB-363	(R53413)
Titanium Grade WPT14	Fittings	Ti - 0.5 Ni - Ru	SB-363	(R53414)
Titanium Grade WPT15	Fittings	Ti - 0.5 Ni - Ru	SB-363	(R53415)
Titanium Grade WPT16	Fittings	Ti - 0.06 Pd	SB-363	(R52402)
Titanium Grade WPT17	Fittings	Ti - 0.06 Pd	SB-363	(R52252)
Titanium Grade WPT18	Fittings	Ti - 3 Al - 2.5 V - 0.05 Pd	SB-363	(R56322)
Titanium Grade WPT19	Fittings	Ti - 8 V - 6 Cr - Mo - Zr - Al	SB-363	---
Titanium Grade WPT2	Fittings	Ti, unalloyed	SB-363	(R50400)
Titanium Grade WPT20	Fittings	Ti - 8 V - 6 Cr - Mo - Zr -Al -P	SB-363	(R58645)
Titanium Grade WPT23	Fittings	Ti - 6 Al - 4V	SB-363	---
Titanium Grade WPT3	Fittings	Ti, unalloyed	SB-363	(R50550)
Titanium Grade WPT7	Fittings	Ti - 0.2 Pd	SB-363	(R52400)
Titanium Grade WPT9	Fittings	Ti + 3 Al + 2.5 V	SB-363	(R56320)
Udimet	Plate, sheet, strip	Co - 26 Cr - 9 Ni - 5 Mo - 3 Fe - 2 W	(SB-435 CC)	R31233
Udimet	Rod	Co - 26 Cr - 9 Ni - 5 Mo - 3 Fe - 2 W	(SB-572 CC)	R31233
Udimet 500, old Gr 684	Bars and forgings	50 Ni - 17 Cr - 17 Co - Mo - Fe	SB-637	N07500
UR - SB 8	Plate, sheet, strip	25 Cr - 25 Ni - 5.5 Mo	SB-625	N08932
VDM 1925	Fittings	25 Ni - 20 Cr - 6 Mo - Cu - N	SB-366	N08925
VDM 1925	Plate, sheet, strip	25 Ni - 20 Cr - 6 Mo - Cu - N	SB-625	N08925
VDM 1925	Bar and wire	25 Ni - 20 Cr - 6 Mo - Cu - N	SB-649	N08925
VDM 1925	Pipe, welded	25 Ni - 20 Cr - 6 Mo - Cu - N	SB-673	N08925
VDM 1925	Tubes, welded	25 Ni - 20 Cr - 6 Mo - Cu - N	SB-674	N08925
VDM 1925	Pipe and tube, seamless	25 Ni - 20 Cr - 6 Mo - Cu - N	SB-677	N08925
VDM59	Forgings	59 Ni - 23 Cr - 16 Mo - Fe - Al	SB-564	N06059
VDM59	Rod	59 Ni - 23 Cr - 16 Mo - Fe - Al	SB-574	N06059

CODE NONFERROUS ALLOYS BY COMMON NAME OR TRADE NAME (Continued)				
Common Name or Trade Name	**Product Form**	**Nominal Composition**	**Specification No.**	**UNS No.**
VDM59	Plate, sheet, strip	59 Ni - 23 Cr - 16 Mo - Fe - Al	SB-575	N06059
VDM59	Pipe, welded	59 Ni - 23 Cr - 16 Mo - Fe - Al	SB-619	N06059
VDM59	Pipe and tube, seamless	59 Ni - 23 Cr - 16 Mo - Fe - Al	SB-622	N06059
VDM59	Tubes, welded	59 Ni - 23 Cr - 16 Mo - Fe - Al	SB-626	N06059
VDM59/CR5923/WP5923	Welding fittings	59 Ni - 23 Cr - 16 Mo - Fe - Al	SB-366	N06059
W545, Grade 665	Bolting	26 Ni - 14 Cr - Mo - Ti	SA-453	S66545
Waspaloy , old Gr 685	Bars and forgings	53 Ni - 20 Cr - 14 Co - 4 Mo	SB-637	N07001
Zirconium 702	Forgings	99.2 Zr	SB-493	R60702
Zirconium 702	Tubes, seamless and welded	99.2 Zr	SB-523	R60702
Zirconium 702	Bars and wire	99.2 Zr	SB-550	R60702
Zirconium 702	Plate	99.2 Zr	SB-551	R60702
Zirconium 702	Pipe, seamless and welded	99.2 Zr	SB-658	R60702
Zirconium 704	Forgings	97.5 Zr + Sn	SB-493	R60704
Zirconium 704	Tubes, seamless and welded	97.5 Zr + Sn	SB-523	R60704
Zirconium 704	Bars and wire	97.5 Zr + Sn	SB-550	R60704
Zirconium 704	Strip, sheet and plate	97.5 Zr + Sn	SB-551	R60704
Zirconium 704	Pipe, seamless and we;ded	97.5 Zr + Sn	SB-658	R60704
Zirconium 705	Forgings	95.5 Zr + Cb	SB-493	R60705
Zirconium 705	Tubes, seamless and welded	95.5 Zr + Cb	SB-523	R60705
Zirconium 705	Bars and wire	95.5 Zr + Cb	SB-550	R60705
Zirconium 705	Plate	95.5 Zr + Cb	SB-551	R60705
Zirconium 705	Pipe, seamless and welded	95.5 Zr + Cb	SB-658	R60705
Zirconium 706	Strip, sheet and plate	95.5 Zr + Cb	SB-551	R60706

Chapter 7

FERROUS MATERIALS SPECIFICATIONS BY CODE SECTION USE

Including:

- Heat treatment condition/temper
- Nominal composition designation
- Product form
- Size limits
- Welding P number and Group number
- UNS number
- Trade name or common designation
- Strength level (ultimate tensile strength and yield strength)
- Inclusion in ASME Section IX's QW-422
- Code case coverage (by number)

PRODUCT FORM ABBREVIATIONS

Abbreviation	Product Form	Abbreviation	Product Form
Ba	Bars	Pl Co	Plates for Coating
Bi	Bars and Billets	Ro	Rods
Bo	Bolting	RP	Rolled Products
Ca	Castings	Sa	Shapes
CC	Centrifugal Castings	Sd	Studs
CCP	Centrifugal Cast Pipe	Sh	Sheet
CR	Cold Rolled	SHS	Socket Head Screws
CR Sh Dr	CR Sheet for Drawing	Sm	Seamless
CWP	Cast/Worked Pipe	SP	Seamless Pipe
CWWP	Cold worked welded pipe	St	Structural
Fa	Fasteners	ST	Seamless Tube
FBP	Forged and Bored Pipe	Std	Standard
FFP	Forged Fittings and Parts	Std Fa	Standard Fasteners
Fi	Fittings	Stl	Steel
Fl	Flanges	Str	Strip
Fo	Forgings	Va	Valves
Fo Cor Ro	Forged Corrugated Rolls	W and SP	Welded and Seamless Pipe
Gen. Reqs.	General Requirements	W Fi	Welded Fittings
Pa	Parts	WP	Welded Pipe
PF	Piping Fittings	WT	Welded Tubes
Pl	Plates	Wi	Wire

HEAT TREAT CONDITIONS & OTHER ABBREVIATIONS

Abbreviation	Term
Sol'n (Treated)	Solution (Treated)
ST	Solution Treated
Norm'd	Normalized
Q & T	Quench and Tempered
N & T	Nomalized and Tempered
Cond'n (Heat Treated)	Condition (Heat Treated)
CR	Cold Rolled
HR	Hot Rolled
IS	Intermediate Strength
HS	High Strength
incl.	inclusive

TESTING SPECIFICATIONS	
Spec. No.	**Title**
SA-275	Test Method for Magnetic Particle Examination of Steel Forgings
SA-370	Test Methods and Definitions for Mechanical Testing of Steel Products
SA-388	Practice for Ultrasonic Examination of Heavy Steel Forgings
SA-435	Specification for Straight-Beam Ultrasonic Examination of Steel Plates for Pressure Vessels
SA-450	Specification for General Requirements for Carbon, Ferritic Alloy, Austenitic Alloy Steel Tubes
SA-480	Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
SA-484	Specification for General Requirements for Stainless and Heat-Resisting Steel Bars, Billets, and Forgings
SA-530	Specification for General Requirements for Specialized Carbon and Alloy Steel Pipe
SA-577	Specification for Ultrasonic Angle-Beam Examination of Steel Plates
SA-578	Specification for Straight-Beam Ultrasonic Examination of Plain and Clad Steel Plates for Special Applications
SA-609	Practice for Castings, Carbon, Low-Alloy, and Martensitic Stainless Steel, Ultrasonic Examination Thereof
SA-703	Specification for Steel Castings, General Requirements, for Pressure-Containing Parts
SA-745	Practice for Ultrasonic Examination of Austenitic Steel Forgings
SA-751	Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products
SA-770	Specification for Through-Thickness Tension Testing of Steel Plates for Special Applications
SA-781	Specification for Castings, Steel, and Alloy, Common Requirements for General Industrial Use
SA-788	Specification for Steel Forgings, General Requirements
SA-834	Specification for Common Requirements for Iron Castings for General Industrial Use

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-36			C-Mn-Si Stl	St		1	1	K02600		58-80	YP=36	√	√	√				√	√								√		N71, 249	
SA-47	Gr 32510		Malleable iron	Ca				F22200		50	32.5																			
SA-53	Ty S - Gr A		C Stl	W & SP		1	1	K02504		48	30	√	√	√				√									√			
	Ty S - Gr B		C-Mn Stl			1	1	K03005		60	35	√	√	√				√									√			
	Ty E - Gr A		C Stl			1	1	K02504		48	30	√	√	√				√									√			
	Ty E - Gr B		C-Mn Stl			1	1	K03005		60	35	√	√	√				√									√	2042		
	Ty F		C Stl			1	1			48	30	√															√			
SA-105			C-Si Stl	Fl, Fi, Va & Pa		1	2	K03504		70	36	√	√	√				√	√								√	1876	N253	187 HB max.
SA-106	Gr A		C-Si Stl	SP		1	1	K02501		48	30	√	√	√				√	√								√			
	Gr B		C-Si Stl			1	1	K03006		60	35	√	√	√				√	√								√	1876	N253	
	Gr C		C-Si Stl			1	2	K03501		70	40	√	√	√				√	√								√	1876	N253	
SA-134			C Stl	WP	≥ NPS 16	1	1		A36, A283, A285, A570				√														√			
SA-135	Gr A		C Stl	WP		1	1			48	30			√													√			
	Gr B		C-Mn Stl			1	1			60	35			√													√			
SA-178	Gr A		C Stl	WT		1	1	K01200		(47)	(26)	√		√													√			
	Gr C		C Stl			1	1	K03503		60	37	√	√	√				√	√								√		N253	
	Gr D		C-Mn-Si Stl			1	2			70	40	√															√			
SA-179	---		C Stl	ST		1	1	K01200		(47)	(26)			√													√			<72HRB
SA-181	Cl 60		C-Si Stl	Fl, Fi, Va, Pa		1	1	K03502	Old Gr I	60	30	√	√	√				√	√								√	1876	N253	
	Cl 70		C-Si Stl			1	2	K03502	Old Gr II	70	36	√	√	√				√	√								√	1876	N253	
SA-182	Gr F1		C-½ Mo	Fl, Fi, Va, Pa		3	2	K12822		70	40	√	√	√				√	√								√		N253	
	Gr F2		½ Cr-½ Mo			3	2	K12122		70	40	√		√					√								√			
	Gr F3V		3 Cr-1 Mo-¼ V			5C	1	K31830		85-110	60			√					√								√	1961, 2151		
	Gr F5		5 Cr-½ Mo			5B	1	K41545		70	40	√	√	√				√	√								√			
	Gr F5a		5 Cr-½ Mo			5B	1	K42544		90	65	√		√					√								√			
	Gr F6a, Cl 1		13 Cr			6	1	S41000	(K91151)	70	40		√	√				√									√			
	Gr F6a, Cl 2		13 Cr			6	3	S41000	(K91151)	85	55		√	√				√	√								√			
	Gr F6a, Cl 3		13 Cr					S41000		110	85																			
	Gr F6a, Cl 4		13 Cr					S41000		130	110																			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-182 (Con't)	Gr F6b		13 Cr -½ Mo	Fl,Fi, Va, Pa (Con't)		6	3	S41026		110-135	90																√			
	Gr F6NM		13 Cr -4½ Ni-Mo			6	4	S41500		115	90		√					√									√			
	Gr F9		9 Cr-1 Mo			5B	1	K90941		85	55	√		√					√								√			
	Gr F91		9 Cr-1 Mo-V			5B	2			85	60	√	√	√				√									√	1973	N466, 253	
	Gr F10		20 Ni-8 Cr			8	2	S33100		80	30																√			
	Gr F11, Cl 1		1¼ Cr-½ Mo-Si			4	1	K11597	Old F11b	60	30	√		√					√								√			
	Gr F11, Cl 2		1¼ Cr-½ Mo-Si			4	1	K11572	Old F11	70	40	√	√	√				√	√								√	1876	N201	
	Gr F11, Cl 3		1¼ Cr-½ Mo-Si			4	1	K11572	Old F11a	75	45																√			
	Gr F12, Cl 1		1 Cr-½ Mo			4	1	K11562	Old F12a	60	30			√					√								√	2183		
	Gr F12, Cl 2		1 Cr-½ Mo			4	1	K11564	Old F12	70	40	√	√	√				√	√								√		N253	
	Gr F21		3 Cr-1 Mo			5A	1	K31545		75	45	√	√	√				√	√								√	1473		
	Gr F22, Cl 1		2¼ Cr-1 Mo			5A	1	K21590	Old F22a	60	30	√	√	√				√									√		N201	
	Gr F22, Cl 3		2¼ Cr-1 Mo			5A	1	K21590	Old F22	75	45	√	√	√				√	√								√	1473 1876	N253	
	Gr F44		20Cr-18Ni-6Mo-Cu-N			8	4	S31254	254 SMO	94	44			√													√		N439	
	Gr F45		21 Cr-11 Ni-N			8	2	S30815	253 MA	87	45			√													√	2033		
	Gr F46		18 Cr-15 Ni-4 Si			8	1	S30600	18-15 LC Si Old S01815	78	35																√	1953		
	Gr F47		19 Cr-15 Ni-4 Mo					S31725	317LM	75	30																			
	Gr F48		19 Cr-15½ Ni-4 Mo					S31726	317L4	80	35																			
	Gr F50		25 Cr-6 Ni-Mo-N			10H	1	S31200	44LN	100-130	65																√			
	Gr F51		22 Cr-5 Ni-3 Mo-N			10H	1	S31803	2205	90	65			√													√	2067		
	Gr FR		2 Ni-1 Cu			9A	1	K22035		63	46			√					√								√			
	Gr FXM-11		21 Cr-6 Ni-9 Mn			8	3	S21904	21-6-9 LC	90	50			√					√								√			
	Gr FXM-19		22 Cr-13 Ni-5 Mn			8	3	S20910	Nitronic 50 22-13-5	100	55		√	√				√	√								√			
	Gr FXM-27Cb		27 Cr - 1 Mo			10l	1	S44627		60	35			√													√			
	Gr F429		15 Cr			6	2	S42900		60	35																√			
	Gr F430		17 Cr			7	2	S43000		60	35																√			
	Gr F304		18 Cr-8 Ni		t ≤ 5	8	1	S30400		75	30	√	√	√				√	√								√	1896	N201, 253, 548	

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-182 (Con't)	Gr F304		18 Cr-8 Ni	Fl, Fi, Va, Pa (Con't)	t > 5	8	1	S30400		70	30	√	√	√				√	√								√	1896	N201, 253, 548	
	Gr F304H		18 Cr-8 Ni		t ≤ 5	8	1	S30409		75	30	√	√	√				√	√								√		N201, 253	
	Gr F304H		18 Cr-8 Ni		t > 5	8	1	S30409		70	30	√	√	√				√	√								√		N201, 253	
	Gr F304L		18 Cr-8 Ni		t ≤ 5	8	1	S30403		70	25		√					√									√	1896	N548	
	Gr F304L		18 Cr-8 Ni		t > 5	8	1	S30403		65	25		√	√				√	√								√	1896	N548	
	Gr F304N		18 Cr-8 Ni-N			8	1	S30451		80	35		√					√									√			
	Gr F304LN		18 Cr-8 Ni-N		t ≤ 5	8	1	S30453		75	30		√					√									√	2127		
	Gr F304LN		18 Cr-8 Ni-N		t > 5	8	1	S30453		70	30		√					√									√	2127		
	Gr F310		25 Cr-20 Ni		t ≤ 5	8	2	S31000		75	30		√	√					√								√			
	Gr F310		25 Cr-20 Ni		t > 5	8	2	S31000		70	30																√			
	Gr F316		16 Cr-12 Ni-2 Mo		t ≤ 5	8	1	S31600		75	30	√	√	√				√	√								√	1896	N201, 253, 548	
	Gr F316		16 Cr-12 Ni-2 Mo		t > 5	8	1	S31600		70	30	√	√	√				√	√								√	1896	N201, 253, 548	
	Gr F316H		16 Cr-12 Ni-2 Mo		t ≤ 5	8	1	S31609		75	30	√	√	√				√	√								√		N201, 253	
	Gr F316H		16 Cr-12 Ni-2 Mo		t > 5	8	1	S31609		70	30	√	√	√				√	√								√		N201, 253	
	Gr F316L		16 Cr-12 Ni-2 Mo		t ≤ 5	8	1	S31603		70	25		√					√									√	1896 2209	N548	
	Gr F316L		16 Cr-12 Ni-2 Mo		t > 5	8	1	S31603		65	25		√	√				√	√								√	1896 2209	N253, 548	
	Gr F316N		16 Cr-12 Ni-2 Mo-N			8	1	S31651		80	35		√					√									√			
	Gr F316LN		16 Cr-12 Ni-2 Mo-N		t ≤ 5	8	1	S31653		75	30		√					√									√			
	Gr F316LN		16 Cr-12 Ni-2 Mo-N		t > 5	8	1	S31653		70	30		√					√									√			
	Gr F317		18 Cr-13 Ni-3 Mo		t ≤ 5	8	1	S31700		75	30			√													√			
	Gr F317		18 Cr-13 Ni-3 Mo		t > 5	8	1	S31700		70	30																√			
	Gr F317L		18 Cr-13 Ni-3 Mo		t ≤ 5	8	1	S31703		70	25			√													√			
	Gr F317L		18 Cr-13 Ni-3 Mo		t > 5	8	1	S31703		65	25			√													√			
	Gr F321		18 Cr-10 Ni-Ti		t ≤ 5	8	1	S32100		75	30	√	√	√				√	√								√		N253	

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-182	Gr F321		18 Cr-10 Ni-Ti	Fl, Fi, Va, Pa	t > 5	8	1	S32100		70	30	√	√	√				√	√								√		N253	
(Con't)	Gr F321H		18 Cr-10 Ni-Ti	(Con't)	t ≤ 5	8	1	S32109		75	30	√	√	√				√	√								√		N253	
	Gr F321H		18 Cr-10 Ni-Ti		t > 5	8	1	S32109		70	30	√	√	√				√	√								√		N253	
	Gr F347		18 Cr-10 Ni-Cb		t ≤ 5	8	1	S34700		75	30	√	√	√				√	√								√		N60	
	Gr F347		18 Cr-10 Ni-Cb		t > 5	8	1	S34700		70	30	√	√	√				√	√								√			
	Gr F347H		18 Cr-10 Ni-Cb		t ≤ 5	8	1	S34709		75	30	√	√	√				√	√								√			
	Gr F347H		18 Cr-10 Ni-Cb		t > 5	8	1	S34709		70	30	√	√	√				√	√								√			
	Gr F348		18 Cr-10 Ni-Cb		t ≤ 5	8	1	S34800		75	30	√	√	√				√	√								√			
	Gr F348		18 Cr-10 Ni-Cb		t > 5	8	1	S34800		70	30	√	√	√					√								√			
	Gr F348H		18 Cr-10 Ni-Cb		t ≤ 5	8	1	S34809		75	30	√	√	√				√	√								√			
	Gr F348H		18 Cr-10 Ni-Cb		t > 5	8	1	S34809		70	30	√	√	√					√								√			
	Gr F22V		2¼ Cr-1 Mo-¼ V					K31835		85-110	60																	2098		
	Gr F52		26 Cr-4 Ni-Mn-N					S32950	7 Mo Plus	100	70																			
	Gr F53		25 Cr-7 Ni-4 Mo-N					S32750	SAF 2507	116	80																			
	(Case Only)		18 Cr-17 Ni-5.3 Si					S30601	18-17 LC	78-107	37																	2125		
	(Case Only)		25 Cr-20 Ni-2 Mo N					S31050	310MoLN	78	37																	2038		
	(Case Only)		24Cr-17Ni-6Mn-4.5Mo-N					S34565	4565S	110	60																	2146		
	(Case Only)		24 Cr-22 Ni-7.5 Mo					S32654	654 SMo	109	62																	2195		
SA-192			C-Si-Steel	ST		1	1	K01201		(47)	(26)	√		√													√			<77HRB
SA-193	Gr B5		5 Cr-½ Mo	Bo	≤ 4			S50100	B5 (AISI Type 501)	100	80											√	√	√					N253	
	Gr B6		13 Cr		≤ 4			S41000	B6 (AISI Type 410)	110	85											√	√	√	√					
	Gr B6X		13 Cr		≤ 4			S41000	B6X (AISI Type 410)	90	70																			
	Gr B7		1 Cr- ½ Mo		≤ 2½			G41400	B7, 4140, 4142, 4145 and H grades	125	105											√	√	√	√	√			N253	
	Gr B7		1 Cr- ½ Mo		> 2½ to 4			G41400	B7, 4140, 4142, 4145 and H grades	115	95											√	√	√	√	√			N253	
	Gr B7		1 Cr- ½ Mo		> 4 to 7			G41400	B7, 4140, 4142, 4145 and H grades	100	75											√	√	√	√	√			N253	
	Gr B7M		1 Cr- ½ Mo		≤ 2½			G41400	B7M, 4140, 4142, 4145 and H grades	100	80												√	√		√				
	Gr B7M		1 Cr- ½ Mo		≤ 4			G41400	B7M, 4140, 4142, 4145 and H grades	100	80																			
	Gr B7M		1 Cr- ½ Mo		> 4 to 7			G41400	B7M, 4140, 4142, 4145 and H grades	100	75																			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-193 (Con't)	Gr B16		1 Cr-½ Mo-V	Bo	≤ 2½			K14072	B16	125	105											√	√	√	√	√			N201, 253	
	Gr B16		1 Cr-½ Mo-V		> 2½ to 4			K14072	B16	110	95											√	√	√	√	√			N201, 253	
	Gr B16		1 Cr-½ Mo-V		> 4 to 7			K14072	B16	100	85											√	√	√	√	√			N201, 253	
	Gr B8, Cl 1 (Note 1)		18 Cr-8 Ni		All dia's			S30400	B8, Ty 304	75	30											√	√	√	√				See Notes	N60, 71, 201 and 253
	Gr B8, Cl 2		18 Cr-8 Ni		≤ ¾			S30400	B8, Ty 304	125	100												√							
	Gr B8, Cl 2		18 Cr-8 Ni		> ¾ to 1 incl.			S30400	B8, Ty 304	115	80												√							
	Gr B8, Cl 2		18 Cr-8 Ni		> 1 to 1¼ incl.			S30400	B8, Ty 304	105	65												√							
	Gr B8, Cl 2		18 Cr-8 Ni		> 1¼ to 1½ incl.			S30400	B8, Ty 304	100	50												√							
	Gr B8C, Cl 1 (Note 1)		18 Cr-10 Ni-Cb		All dia's			S34700	B8C, Ty 347	75	30											√	√	√	√				N60, 71	
	Gr B8C, Cl 2		18 Cr-10 Ni-Cb		≤ ¾			S34700	B8C, Ty 347	125	100												√							
	Gr B8C, Cl 2		18 Cr-10 Ni-Cb		> ¾ to 1 incl.			S34700	B8C, Ty 347	115	80												√							
	Gr B8C, Cl 2		18 Cr-10 Ni-Cb		> 1 to 1¼ incl.			S34700	B8C, Ty 347	105	65												√							
	Gr B8C, Cl 2		18 Cr-10 Ni-Cb		1¼ to 1½ incl.			S34700	B8C, Ty 347	100	50												√							
	Gr B8M, Cl 1 (Note 1)		16 Cr-12 Ni-2 Mo		All dia's			S31600	B8M, Ty 316	75	30											√	√	√	√				See Notes	N60, 71, 201, 253
	Gr B8M, Cl 2		16 Cr-12 Ni-2 Mo		≤ ¾			S31600	B8M, Ty 316	110	95																		N60	
	Gr B8M, Cl 2		16 Cr-12 Ni-2 Mo		> ¾ to 1 incl.			S31600	B8M, Ty 316	100	80																		N60	
	Gr B8M, Cl 2		16 Cr-12 Ni-2 Mo		> 1 to 1¼ incl.			S31600	B8M, Ty 316	95	65																			
	Gr B8M, Cl 2		16 Cr-12 Ni-2 Mo		> 1¼ to 1½ incl.			S31600	B8M, Ty 316	90	50																			
	Gr B8M2, Cl 2B		16 Cr-12 Ni-2 Mo		≤ 2			S31600	B8M2, Ty 316	95	75												√							
	Gr B8M2, Cl 2B		16 Cr-12 Ni-2 Mo		> 2 to 2½ incl.			S31600	B8M2, Ty 316	90	65												√						N60	

Note 1 - Rolled or forged bar (except for grades 321 and 347) may be cooled rapidly immediately following hot working while the temperature is above 1750°F (955°C), so that grain boundary carbides are in solution. Material so treated is identified as Class 1D and shall be restricted to applications at temperatures less than 850°F (455°C).

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-193 (Con't)	Gr B8M2, Cl 2B		16 Cr-12 Ni-2 Mo	Bo	> 2½ to 3 incl.			S31600	B8M2, Ty 316	80	55												√							
	Gr B8M3, Cl 2C		16 Cr-12 Ni-2 Mo		≤ 2			S31600	B8M3, Ty 316	85	65																			
	Gr B8M3, Cl 2C		16 Cr-12 Ni-2 Mo		> 2			S31600	B8M3, Ty 316	85	60																			
	Gr B8P, Cl 1 (Note 1)		18 Cr-11 Ni		All dia's			S30500	B8P, Ty 305	75	30												√							
	Gr B8P, Cl 2		18 Cr-11 Ni		≤ ¾			S30500	B8P, Ty 305	125	100												√							
	Gr B8P, Cl 2		18 Cr-11 Ni		> ¾ to 1 incl.			S30500	B8P, Ty 305	115	80												√							
	Gr B8P, Cl 2		18 Cr-11 Ni		> 1 to 1¼ incl.			S30500	B8P, Ty 305	105	65												√							
	Gr B8P, Cl 2		18 Cr-11 Ni		> 1¼ to 1½ incl.			S30500	B8P, Ty 305	100	50												√							
	Gr B8T, Cl 1 (Note 1)		18 Cr-10 Ni-Ti		All dia's			S32100	B8T, Ty 321	75	30											√	√	√	√				See Notes	N60, 71, 253
	Gr B8T, Cl 2		18 Cr-10 Ni-Ti		≤ ¾			S32100	B8T, Ty 321	125	100												√							
	Gr B8T, Cl 2		18 Cr-10 Ni-Ti		> ¾ to 1 incl.			S32100	B8T, Ty 321	115	80												√							
	Gr B8T, Cl 2		18 Cr-10 Ni-Ti		> 1 to 1¼ incl.			S32100	B8T, Ty 321	105	65												√							
	Gr B8T, Cl 2		18 Cr-10 Ni-Ti		> 1¼ to 1½ incl.			S32100	B8T, Ty 321	100	50												√							
	Gr B8N, Cl 1B (Note 1)		18 Cr-8 Ni-N		All dia's			S30451	B8N, Ty 304N	80	35																			
	Gr B8N, Cl 2		18 Cr-8 Ni-N		≤ ¾			S30451	B8N, Ty 304N	125	100																			
	Gr B8N, Cl 2		18 Cr-8 Ni-N		> ¾ to 1 incl.			S30451	B8N, Ty 304N	115	80																			
	Gr B8N, Cl 2		18 Cr-8 Ni-N		> 1 to 1¼ incl.			S30451	B8N, Ty 304N	105	65																			
	Gr B8N, Cl 2		18 Cr-8 Ni-N		> 1¼ to 1½ incl.			S30451	B8N, Ty 304N	100	50																			
	Gr B8R, Cl 1C (Note 1)		22 Cr-13 Ni-5 Mn		All dia's			S20910	B8R, XM-19, Nitronic 50	100	55														√					
	Gr B8RA		22 Cr-13 Ni-5 Mn		All dia's			S20910	B8RA, XM-19, Nitronic 50	100	55														√					
	Gr B8S		18 Cr-8 Ni-4 Si-N		All dia's			S21800	B8S, Nitronic 60	95	50												√		√					
	Gr B8SA		18 Cr-8 Ni-4 Si-N		All dia's			S21800	B8SA, Nitronic 60	95	50												√		√					

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SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-193 (Con't)	Gr B8MN, Cl 1B (Note 1)		16 Cr-12 Ni-2 Mo-N	Bo	All dia's			S31651	B8MN, Ty 316N	80	35																			
	Gr B8MN, Cl 2		16 Cr-12 Ni-2 Mo-N		≤ ¾			S31651	B8MN, Ty 316N	110	95																			
	Gr B8MN, Cl 2		16 Cr-12 Ni-2 Mo-N		> ¾ to 1 incl.			S31651	B8MN, Ty 316N	100	80																			
	Gr B8MN, Cl 2		16 Cr-12 Ni-2 Mo-N		> 1 to 1¼ incl.			S31651	B8MN, Ty 316N	95	65																			
	Gr B8MN, Cl 2		16 Cr-12 Ni-2 Mo-N		> 1¼ to 1½ incl.			S31651	B8MN, Ty 316N	90	50																			
	Gr B8LN, Cl 1 (Note 1)		18 Cr-8 Ni-N		All dia's			S30453	B8LN, Ty 304LN	75	30																			
	Gr B8MLN, Cl 1 (Note 1)		16 Cr-12 Ni-2 Mo-N		All dia's			S31653	B8MLN, Ty 316LN	75	30																			
	Gr B8A, Cl 1A		18 Cr-8 Ni		All dia's			S30400	B8A, Ty 304	75	30																		N71	
	Gr B8CA, Cl 1A		18 Cr-10 Ni-Cb		All dia's			S34700	B8CA, Ty 347	75	30																		N71	
	Gr B8MA, Cl 1A		16 Cr-12 Ni-2 Mo		All dia's			S31600	B8MA, Ty 316	75	30																		N71	
	Gr B8PA, Cl 1A		18 Cr-11 Ni		All dia's			S30500	B8PA, Ty 305	75	30																			
	Gr B8TA, Cl 1A		18 Cr-10 Ni-Ti		All dia's			S32100	B8TA, Ty 321	75	30																		N71	
	Gr B8LNA, Cl 1A		18 Cr-8 Ni-N		All dia's			S30453	B8LNA, Ty 304LN	75	30																			
	Gr B8MLNA, Cl 1A		16 Cr-12 Ni-2 Mo-N		All dia's			S31653	B8MLNA, Ty 316LN	75	30																			
	Gr B8NA, Cl 1A		18 Cr-8 Ni-N		All dia's			S30451	B8NA, Ty 304N	75	30											√	√	√	√					
	Gr B8MNA, Cl 1A		16 Cr-12 Ni-2 Mo-N		All dia's			S31651	B8MNA, Ty 316N	75	30											√	√	√	√					
	Gr B8MLCuNA, Cl 1A		20 Cr-18 Ni-6 Mo-Cu-N		All dia's			S31254	254 SMO	75	30																			
	Gr B8MLCuN, Cl 1B (Note 1)		20 Cr-18 Ni-6 Mo-Cu-N		All dia's			S31254	254 SMO	80	35																			
	Gr B8MLCuN, Cl 2		20 Cr-18 Ni-6 Mo-Cu-N		≤ ¾			S31254	254 SMO	125	100																			
	Gr B8MLCuN, Cl 2		20 Cr-18 Ni-6 Mo-Cu-N		> ¾ to 1 incl.			S31254	254 SMO	115	80																			
	Gr B8MLCuN, Cl 2		20 Cr-18 Ni-6 Mo-Cu-N		> 1 to 1¼ incl.			S31254	254 SMO	105	65																			
	Gr B8MLCuN, Cl 2		20 Cr-18 Ni-6 Mo-Cu-N		> 1¼ to 1½ incl.			S31254	254 SMO	100	50																			
SA-194	Gr 1		C Steel	Nuts				K01503	1																					121 HB min.
	Gr 2		C Steel					K04002	2																					159-352 HB

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SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-194 (Con't)	Gr 2H		C Steel	Nuts	≤ 1½			K04002	2H																				N249	248-352 HB
	Gr 2H		C Steel		> 1½			K04002	2H																					212-352 HB
	Gr 2HM		C Steel					K04002	2HM																					159-237 HB
	Gr 3		5 Cr-½ Mo					S50100	3, AISI 501																					248-352 HB
	Gr 4		C -¼ Mo					K14510	4																					248-352 HB
	Gr 6		13 Cr					S41000	6																					228-271 HB
	Gr 6F(S)		13 Cr					S41600	6F(S), AISI 416 W/S																					228-271 HB
	Gr 6F(Se)		13 Cr					S41623	6F(Se), AISI 416 W/Se																					228-271 HB
	Gr 7		1 Cr- ½ Mo					G40420 G41400 G41450	7, AISI 4042, 4140, 4145 and H grades																					248-352 HB
	Gr 7M		1 Cr- ½ Mo					G40420 G41400 G41450	7M, AISI 4042, 4140, 4145 and H grades																					159-237 HB
	Gr 16		1 Cr-½ Mo-V					K14072	16																					248-352 HB
	Gr 8		18 Cr-8 Ni					S30400	8, AISI 304																				N60, 71	126-300 HB
	Gr 8A		18 Cr-8 Ni					S30400	8A, AISI 304																				N71	126-192 HB
	Gr 8C		18 Cr-10 Ni-Cb					S34700	8C, AISI 347																				N60, 71	126-300 HB
	Gr 8CA		18 Cr-10 Ni-Cb					S34700	8CA, AISI 347																				N71	126-192 HB
	Gr 8M		16 Cr-12 Ni-2 Mo					S31600	8M, AISI 316																				N60, 71	126-300 HB
	Gr 8MA		16 Cr-12 Ni-2 Mo					S31600	8MA, AISI 316																				N71	126-192 HB
	Gr 8T		18 Cr-10 Ni-Ti					S32100	8T, AISI 321																				N71	126-300 HB
	Gr 8TA		18 Cr-10 Ni-Ti					S32100	8TA, AISI 321																				N71	126-192 HB

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-194 (Con't)	Gr 8F(S)		18 Cr-8 Ni-S	Nuts				S30300	8F(S), AISI 303 W/S																					126-300 HB
	Gr 8FA(S)		18 Cr-8 Ni-S					S30300	8FA(S), AISI 303 W/S																					126-192 HB
	Gr 8F(Se)		18 Cr-8 Ni-Se					S30323	8F(Se), AISI 303 W/Se																					126-300 HB
	Gr 8FA(Se)		18 Cr-8 Ni-Se					S30323	8FA(Se), AISI 303 W/Se																					126-192 HB
	Gr 8P		18 Cr-11 Ni					S30500	8P, AISI 305																					126-300 HB
	Gr 8PA		18 Cr-11 Ni					S30500	8PA, AISI 305																					126-192 HB
	Gr 8N		18 Cr-8 Ni-N					S30451	8N, AISI 304N																					126-300 HB
	Gr 8NA		18 Cr-8 Ni-N					S30451	8NA, AISI 304N																					126-192 HB
	Gr 8LN		18 Cr-8 Ni-N					S30453	8LN, AISI 304LN																					126-300 HB
	Gr 8LNA		18 Cr-8 Ni-N					S30453	8LNA, AISI 304LN																					126-192 HB
	Gr 8MN		16 Cr-12 Ni-2 Mo-N					S31651	8MN, AISI 316N																					126-300 HB
	Gr 8MNA		16 Cr-12 Ni-2 Mo-N					S31651	8MNA, AISI 316N																					126-192 HB
	Gr 8MLN		16 Cr-12 Ni-2 Mo-N					S31653	8MLN, AISI 316LN																					126-300 HB
	Gr 8MLNA		16 Cr-12 Ni-2 Mo-N					S31653	8MLNA, AISI 316LN																					126-192 HB
	Gr 8R		22 Cr-13 Ni-5 Mn					S20910	8R, XM-19																					183-271 HB
	Gr 8RA		22 Cr-13 Ni-5 Mn					S20910	8RA, XM-19																					183-271 HB
	Gr 8S		18 Cr-8 Ni-4 Si-N					S21800	8S, Nitronic 60																					183-271 HB
	Gr 8SA		18 Cr-8 Ni-4 Si-N					S21800	8SA, Nitronic 60																					183-271 HB
	Gr 8MLCuN		20Cr-18Ni-6Mo-Cu-N					S31254	254 SMO																					123-300 HB
	Gr 8MLCuNA		20Cr-18Ni-6Mo-Cu-N					S31254	254 SMO																					126-192 HB

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-199	Gr T4		2½ Cr-½ Mo-¾ Si	ST		5A	1	K31509		60	25																√			
	Gr T5		5 Cr-½ Mo			5B	1	K41545		60	25			√					√								√			
	Gr T9		9 Cr-1 Mo			5B	1	S50400		60	25			√					√								√			
	Gr T91		9 Cr-1 Mo-V			5B	2			85	60																√			
	Gr T11		1¼ Cr-½ Mo-Si			4	1	K11597		60	25			√					√								√			
	Gr T21		3 Cr-1 Mo			5A	1	K31545		60	25			√					√								√			
	Gr T22		2¼ Cr-1 Mo			5A	1	K21590		60	25			√					√								√			
SA-202	Gr A		½ Cr-1¼ Mn-Si	Pl		4	1	K11742		75-95	45	√		√													√			
	Gr B		½ Cr-1¼ Mn-Si			4	1	K12542		85-110	47	√		√													√			
SA-203	Gr A		2½ Ni	Pl		9A	1	K21703		65-85	37	√	√	√					√								√			
	Gr B		2½ Ni			9A	1	K22103		70-90	40	√	√	√					√								√			
	Gr D		3½ Ni			9B	1	K31718		65-85	37	√	√	√					√								√			
	Gr E		3½ Ni			9B	1	K32018		70-90	40	√	√	√				√	√								√		N559	
	Gr F		3½ Ni		≤ 2	9B	1			80-100	55			√					√								√			
	Gr F		3½ Ni		> 2	9B	1			75-95	50			√					√								√			
SA-204	Gr A		C-½ Mo	Pl		3	1	K11820		65-85	37	√	√	√				√	√								√		N253	
	Gr B		C-½ Mo			3	2	K12020		70-90	40	√	√	√				√	√								√		N253	
	Gr C		C-½ Mo			3	2	K12320		75-95	43	√	√	√				√	√								√		N253	
SA-209	Gr T1		C-½ Mo	ST		3	1	K11522		55	30	√		√					√								√			
	Gr T1a		C-½ Mo			3	1	K12023		60	32	√		√					√								√			
	Gr T1b		C-½ Mo			3	1	K11422		53	28	√		√					√								√			
SA-210	Gr A-1		C-Si-Steel	ST		1	1	K02707		60	37	√	√	√				√	√								√	1876	N253	
	Gr C		C-Mn-Si Steel			1	2	K03501		70	40	√		√					√								√	1876		
SA-213	Gr T2		½ Cr-½ Mo	ST		3	1	K11547		60	30	√	√	√				√	√								√			
	Gr T5		5 Cr-½ Mo			5B	1	K41545		60	30	√	√	√				√	√								√			
	Gr T5b		5 Cr-½ Mo-Si			5B	1	K51545		60	30	√		√					√								√			
	Gr T5c		5 Cr-½ Mo-Ti			5B	1	K41245		60	30	√		√					√								√			
	Gr T9		9 Cr-1 Mo			5B	1	S50400		60	30	√	√	√				√	√								√		N253	
	Gr T91		9 Cr-1 Mo-V			5B	2			85	60	√	√	√				√									√	1973	N253, 466	
	Gr T11		1¼ Cr-½ Mo-Si			4	1	K11597		60	30	√	√	√				√	√								√	1876		
	Gr T12		1 Cr-½ Mo			4	1	K11562		60	32	√	√	√				√	√								√		N253	
	Gr T17		1 Cr-V			10B	1	K12047		60	30			√													√			

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												TABLE 1A			TABLE 1B			TABLE 2A		TABLE 2B		TABLE 3			TABLE 4						
						P	Gr			UTS	YS	I	III 2/3	VIII 1	I	III 2/3	VIII 1	III 1	VIII 2	III 1	VIII 2	III 2/3	VIII 1	VIII 2	III 1	VIII 2	QW 422	NON-NUCL	NUCL	
SA-213	Gr T21		3 Cr- 1 Mo	ST		5A	1	K31545		60	30	√	√	√				√	√								√			
(Con't)	Gr T22		2¼ Cr- 1 Mo			5A	1	K21590		60	30	√	√	√				√	√								√	1876	N201, 253	
	Gr TP304		18 Cr-8 Ni			8	1	S30400		75	30	√	√	√				√	√								√	1896	N201, 253, 290	
	Gr TP304H		18 Cr-8 Ni			8	1	S30409		75	30	√	√	√				√	√								√		N201, 253, 290	
	Gr TP304L		18 Cr-8 Ni			8	1	S30403		70	25		√	√				√	√								√	1896	N290	
	Gr TP304N		18 Cr-8 Ni-N			8	1	S30451		80	35	√	√	√				√	√								√		N253	
	Gr TP304LN		18 Cr-8 Ni-N			8	1	S30453		75	30		√					√									√	2127		
	Gr TP316		16 Cr-12 Ni-2 Mo			8	1	S31600		75	30	√	√	√				√	√								√	1896	N201, 253, 290	
	Gr TP316H		16 Cr-12 Ni-2 Mo			8	1	S31609		75	30	√	√	√				√	√								√		N201, 253, 290	
	Gr TP316L		16 Cr-12 Ni-2 Mo			8	1	S31603		70	25		√	√				√	√								√	1896 2209	N253, 290	
	Gr TP316N		16 Cr-12 Ni-2 Mo-N			8	1	S31651		80	35	√	√	√				√	√								√		N253	
	Gr TP316LN		16 Cr-12 Ni-2 Mo-N			8	1	S31653		75	30		√					√	√								√			
	Gr TP321		18 Cr-10 Ni-Ti			8	1	S32100		75	30	√	√	√				√	√								√		N253, 290	
	Gr TP321H		18 Cr-10 Ni-Ti			8	1	S32109		75	30	√	√	√				√	√								√		N253, 290	
	Gr TP347		18 Cr-10 Ni-Cb			8	1	S34700		75	30	√	√	√				√	√								√			
	Gr TP347H		18 Cr-10 Ni-Cb			8	1	S34709		75	30	√	√	√				√	√								√			
	Gr TP348		18 Cr-10 Ni-Cb			8	1	S34800		75	30	√	√	√				√	√								√			
	Gr TP348H		18 Cr-10 Ni-Cb			8	1	S34809		75	30	√	√	√				√	√								√			
	Gr XM-15		18 Cr-18 Ni-2 Si			8	1	S38100	18-18-2	75	30			√					√								√			
	-----		18 Cr-15 Ni-3.7 Si					S30615	RA85H	90	40																			
	Gr TP201		17 Cr-4 Ni-6 Mn			8	3	S20100		95	38																√			
	Gr 18Cr-2Mo		18 Cr-2 Mo	ST				S44400	18-2	60	40																			
	Gr TP202		18 Cr-5 Ni-9 Mn			8	3	S20200		90	45																√			
	-----		21 Cr-11 Ni-N			8	2	S30815	253 MA	87	45			√													√	2033		
	-----		15 Cr-10 Ni-6 Mn					S21500	Esshete 1250	78	33																			

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SA-213	-----		19 Cr-15 Ni-4 Mo			8	4	S31725	317LM	75	30			√												√			
(Con't)	-----		19 Cr-15½ Ni-4 Mo			8	4	S31726	317L4	80	35															√			
	Gr TP309H		23 Cr-12 Ni			8	2	S30909		75	30	√		√					√							√			
	Gr TP309S		23 Cr-12 Ni			8	2	S30908		75	30	√		√					√							√			
	Gr TP309Cb		23 Cr-12 Ni-Cb			8	2	S30940		75	30			√					√							√			
	Gr TP309H Cb		23 Cr-12 Ni-Cb			8	2	S30941		75	30															√			
	Gr TP310H		25 Cr-20 Ni			8	2	S31009		75	30	√	√	√					√							√			
	Gr TP310S		25 Cr-20 Ni			8	2	S31008		75	30	√		√					√							√			
	Gr TP310Cb		25 Cr-20 Ni-Cb			8	2	S31040		75	30			√												√			
	Gr TP310H Cb		25 Cr-20 Ni-Cb			8	2	S31041		75	30															√			
	-----		25 Cr-20 Ni-2 Mo-N		t ≤ .25	8	2	S31050	310 Mo LN	84	39			√					√							√	2038		
	-----		25 Cr-20 Ni-2 Mo-N		t > .25	8	2	S31050	310 Mo LN	78	37			√					√							√	2038		
	-----		18 Cr-20 Ni-5.5 Si					S32615	Alloy SX	80	32																2029		
	Gr TP317		18 Cr-13 Ni-3 Mo					S31700		75	30																		
	Gr TP317L		18 Cr-13 Ni-3 Mo					S31703		75	30																		
	-----		15 Cr-15 Ni-Mo-Ti					S31272		65	29																		
	Gr TP310HCbN		25 Cr-20 Ni-Cb-N					S31042		95	43																2115		
	-----		27 Cr-32 Ni-Cb					S33228	Nicrofer 3228NbCe Alloy AC 66	73	27																		
	Gr XM-19		22 Cr-13 Ni-5 Mn			8	3	S20910	Nitronic 50, JS-50	100	55			√												√			
	(Case only)		18 Cr-17 Ni-5.3 Si					S30601	18-17 LC	78-107	37																2125		
	(Case only)		18 Cr-11 Ni-Cb-N					S34751	347 N	75	30																2196		
	(Case only)		9 Cr-2 W							90	64																2179		
	(Case only)		12 Cr-2 W							90	58																2180		
	Gr TP347HFG		18 Cr-10 Ni-Cb						347HFG	80	30																2159		
	(Case only)		18 Cr-15 Ni-4 Si					S30600	1815 LC Si	78-100	35																1953		
	(Case only)		24Cr-17Ni-6Mn-4.5Mo-N					S34565	4565S	115	60																2146		
	(Case only)		2¼ Cr-1.6 W-V-Cb							74	58																2199		
SA-214	-----		C Steel	WT		1	1	K01807		(47)	(26)			√												√			<72HRB
SA-216	Gr WCA		C-Si Steel	Ca		1	1	J02502		60-85	30	√	√	√				√	√							√	1876	N253	
	Gr WCB		C-Si Steel			1	2	J03002		70-95	36	√	√	√				√	√							√	1876, 2181	N253	

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SA-216	Gr WCC		C-Mn-Si Steel			1	2	J02503		70-95	40	√	√	√				√	√								√	1876	N253	
SA-217	Gr WC1		C-½ Mo	Ca		3	1	J12524		65-90	35	√	√	√				√	√								√		N253	
	Gr WC4		1 Ni-½ Cr-½ Mo			4	1	J12082		70-95	40	√	√	√				√	√								√			
	Gr WC5		¾ Ni-1 Mo-¾ Cr			4	1	J22000		70-95	40	√	√	√				√	√								√			
	Gr WC6		1¼ Cr-½ Mo			4	1	J12072		70-95	40	√	√	√				√	√								√	1876	N253	
	Gr WC9		2¼ Cr-1 Mo			5A	1	J21890		70-95	40	√	√	√				√	√								√	1876	N253	
	Gr WC11		1¼ Cr-½ Mo					J11872		80-105	50																			
	Gr C5		5 Cr-½ Mo			5B	1	J42045		90-115	60	√	√	√				√	√								√			
	Gr C12		9 Cr- 1 Mo			5B	1	J82090		90-115	60	√	√	√				√	√								√		N71, 249	
	Gr CA15		13 Cr			6	3	J91150		90-115	65		√	√				√	√								√			
	(Case only)		9 Cr-1 Mo-V							85	60																	2192		
SA-225	Gr C		Mn-½ Ni-V	Pl	All thicknesses	10A	1	K12524		105-135	70			√					√								√			
	Gr D		Mn-½ Ni-V		≤ 3	10A	1			80-105	60																√			
	Gr D		Mn-½ Ni-V		> 3	10A	1			75-100	55																√			
SA-226	-----		C-Si Steel	WT		1	1	K01201		(47)	(26)	√		√													√			≤125HB; ≤72HRB
SA-232			Cr-V Stel	Wi	0.020-0.500					190-300[b]																				
SA-234[a]	Gr WPB		C-Si Steel	PF		1	1	K03006		60-85	35	√	√	√				√	√								√			
	Gr WPC		C-Si Steel			1	2	K03501		70-95	40	√	√	√				√	√								√			
	Gr WP1		C-½ Mo			3	1	K12821		55-80	30	√	√	√				√	√								√			
	Gr WP5		5 Cr-½ Mo			5B	1	K41545		60-85	30	√	√	√				√	√								√			
	Gr WP7		7 Cr-½ Mo							60-85	30																			
	Gr WP9		9 Cr-1 Mo			5B	1	K90941		60-85	30	√		√					√								√			
	Gr WP11, Cl 1		1¼ Cr-½ Mo-Si	PF		4	1			60-85	30	√	√	√				√	√								√			
	Gr WP11, Cl 2		1¼ Cr-½ Mo-Si							70-95	40																			
	Gr WP11, Cl 3		1¼ Cr-½ Mo-Si							75-100	45																			
	Gr WP12, Cl 1		1 Cr-½ Mo			4	1	K12062		60-85	32	√	√	√				√	√								√			

a. When fittings are of welded construction, the grade or marking symbol will be supplemented by the letter W, e.g. WPBW, etc. b. Tensile strength is a function of wire size.

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SA-234[a]	Gr WP12, Cl 2		1 Cr-½ Mo							70-95	40			√															
(Con't)	Gr WP22, Cl 1		2¼ Cr-1 Mo			5A	1	K21590		60-85	30	√	√	√				√	√								√		N201, 253	
	Gr WP22, Cl 3		2¼ Cr-1 Mo							75-100	45																		
	Gr WP91		9 Cr-1 Mo-V			5B	2			85-110	60	√															√			
	Gr WPR		2 Ni-1 Cu			9A	1	K22035		63-88	46			√													√			
	-----		46 F e- 24 Ni - 21 Cr - 6 Mo - Cu - N		Sh & Str			N08367	AL6XN	104	46																			
SA-240	Ty 201-1		17 Cr-4 Ni-6 Mn	Pl, Sh & Str		8	3	S20100		95	38			√													√			
	Ty 201-2		17 Cr-4 Ni-6 Mn					S20100		95	45			√																
	Ty 201L		17 Cr - 4 Ni - 7 Mn					S20103		95	38																			
	-----		17 Cr-4 Ni-7 Mn-N					S20153	201LN	95	45																	2123		
	-----		16½ Cr-5 Ni-5Mn-3½ Si					S20161	Gall Tough	125	50																			
	Ty 202		18 Cr-5 Ni-9 Mn			8	3	S20200		90	38																√			
	-----		16 Cr-2 Ni-8 Mn-N			8	3	S20400	Nitronic 30	95	48			√													√	2207		
	Ty XM-19		22 Cr-13 Ni- 5 Mn		Sh & Str	8	3	S20910	Nitronic 50	105	60																√			
	Ty XM-19		22 Cr-13 Ni- 5 Mn		Pl	8	3	S20910	Nitronic 50	100	55		√	√				√	√								√		N60	
	Ty XM-31		18 Cr-15 Mn-N		Str			S21400	Tenelon	105	55																			
	Ty XM-31		18 Cr-15 Mn-N		Sh only			S21400		125	70																			
	Ty XM-17		19 Cr-8 Mn- 6 Ni-Mo/N		Sh & Str	8	3	S21600		100	60																√		N249	
	Ty XM-17		19 Cr-8 Mn- 6 Ni-Mo/N		Pl	8	3	S21600		90	50																√		N249	
	Ty XM-18		19 Cr-8 Mn- 6 Ni-Mo/N		Sh & Str	8	3	S21603		100	60																√			
	Ty XM-18		19 Cr-8 Mn- 6 Ni-Mo/N		Pl	8	3	S21603		90	50																√			
	-----		18 Cr-8 Ni-4 Si-N			8	3	S21800	Nitronic 60	95	50																√			
	Ty XM-29		18 Cr- 3 Ni-12 Mn		Sh & Str	8	3	S24000	18-3 Mn	100	60								√								√			
	Ty XM-29		18 Cr- 3 Ni-12 Mn		Pl	8	3	S24000	18-3 Mn	100	55			√					√								√			
	-----		17 Cr- 7 Ni					S30100		75	30																	2092		
	Ty 302		18 Cr-8 Ni			8	1	S30200		75	30			√					√								√			

a. When fittings are of welded construction, the grade or marking symbol will be supplemented by the letter W, e.g. WPBW, etc.

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-240 (Con't)	Ty 304		18 Cr-8 Ni			8	1	S30400		75	30	√	√	√				√	√								√	2161, 1896	N201, 253, 290	
	Ty 304L		18 Cr-8 Ni	Pl, Sh & Str		8	1	S30403		70	25		√	√				√	√								√	1896, 2161	N290	
	Ty 304H		18 Cr-8 Ni			8	1	S30409		75	30		√	√				√									√		N201, 253, 290	
	-----		18 Cr - 9 Ni - N - Ce					S30415	153MA	87	42																			
	Ty 304N		18 Cr-8 Ni-N			8	1	S30451		80	35		√	√				√	√								√		N253	
	Ty XM-21		18 Cr-8 Ni-N		Sh & Str	8	1	S30452		90	50																√			
	Ty XM-21		18 Cr-8 Ni-N		Pl	8	1	S30452		85	40																√			
	Ty 304LN		18 Cr-8 Ni-N			8	1	S30453		75	30		√					√									√	2127		
	Ty 305		18 Cr-11 Ni			8	1	S30500		75	30		√					√									√			
	-----		18 Cr-15 Ni-4 Si			8	1	S30600	Old S01815 1815 LC Si	78	35																√	1953		
	-----		18 Cr-17 Ni-5.3 Si					S30601	18-17LC	78	37																	2125		
	-----		18 Cr-15 Ni-3.7 Si					S30615	RA85H	90	40																			
	-----		21 Cr-11 Ni-N			8	2	S30815	253 MA	87	45			√													√	2033		
	Ty 309S		23 Cr-12 Ni			8	2	S30908		75	30	√	√	√					√								√			
	Ty 309H		23 Cr-12 Ni			8	2	S30909		75	30	√		√					√								√			
	Ty 309Cb		23 Cr-12 Ni-Cb			8	2	S30940		75	30			√					√								√			
	Ty 309H Cb		23 Cr-12 Ni-Cb			8	2	S30941		75	30																√			
	Ty 310S		25 Cr-20 Ni			8	2	S31008		75	30	√	√	√					√								√			
	Ty 310H		25 Cr-20 Ni			-	-	S31009		75	30	√		√					√											
	Ty 310Cb		25 Cr-20 Ni-Cb			8	2	S31040		75	30			√													√			
	Ty 310H Cb		25 Cr-20 Ni-Cb			8	2	S31041		75	30																√			
	Ty 310Mo LN		25 Cr- 20 Ni-2 Mo-N			8	2	S31050	310MoLN	80	35			√					√								√	2038		
	-----		25 Cr-6 Ni-Mo-N			10H	1	S31200	44LN	100	65			√					√								√			
	-----		20Cr-18Ni-6Mo-Cu-N			8	4	S31254	254SMO	94	44			√													√		N439, 441	
	-----		25 Cr-6 Ni-3 Mo			10H	1	S31260	Sumitomo DP-3	100	70			√													√			
	Ty 316		16 Cr-12 Ni- 2 Mo			8	1	S31600		75	30	√	√	√				√	√								√	2161, 1896	N201, 253, 290	

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-240 (Con't)	Ty 316L		16 Cr-12 Ni- 2 Mo			8	1	S31603		70	25		√	√				√	√								√	1896, 2161, 2209	N253, 290	
	Ty 316H		16 Cr-12 Ni- 2 Mo	Pl, Sh & Str		8	1	S31609		75	30		√	√				√									√		N201, 253, 290	
	Ty 316Ti		16 Cr-12 Ni-2 Mo-Ti			8	1	S31635		75	30			√													√	2135, 2174		
	Ty 316Cb		16 Cr-12 Ni-2 Mo-Cb			8	1	S31640		75	30			√													√			
	Ty 316N		16 Cr-12 Ni-2 Mo-N			8	1	S31651		80	35		√	√				√	√								√		N253	
	Ty 316LN		16 Cr-12 Ni-2 Mo-N			8	1	S31653		75	30		√					√									√			
	Ty 317		18 Cr-13 Ni-3 Mo			8	1	S31700		75	30			√					√								√			
	Ty 317L		18 Cr-13 Ni-3 Mo			8	1	S31703		75	30			√					√								√			
	-----		19 Cr-15 Ni-4 Mo			8	4	S31725	317LM	75	30			√													√			
	-----		19 Cr-15½ Ni-4 Mo			8	4	S31726	317L4	80	35																√	2197		
	-----		18 Cr-13 Ni-3 Mo-N			8	1	S31753	317LN	80	35																√			
	-----		22 Cr-5 Ni-3 Mo-N			10H	1	S31803	2205	90	65			√													√	2067, 2186		
	Ty 321		18 Cr-10 Ni-Ti			8	1	S32100		75	30	√	√	√				√	√								√		N253, 290	
	Ty 321H		18 Cr-10 Ni-Ti			8	1	S32109		75	30		√					√	√								√		N253, 290	
	-----		23 Cr-4 Ni-Mo-Cu					S32304	2304	87	58			√					√											
	-----		25 Cr-5 Ni-3 Cu -2 Mo			10H	1	S32550	Ferralium 255	110	80			√													√	2068		
	-----		18 Cr-20 Ni-5.5 Si					S32615	Alloy SX	80	32																	2029		
	-----		24 Cr-22 Ni-7.5 Mo					S32654	654 SMO	109	62																	2195		
	-----		25 Cr - 7 Ni - 4 Mo - N					S32750	SAF 2507	116	80																			
	-----		25Cr-7 Ni-3 Mo-Cu-W					S32760	Zeron 100	108	80																			
	-----		28 Cr-3 Ni-2 Mo-Cb					S32803	Cronifer 2803 Mo	87	72																			
	Ty 329		26 Cr-4 Ni-Mo			10H	1	S32900		90	70			√													√			
	-----		26 Cr-4 Ni-Mn-N			10H	1	S32950	7 Mo Plus	100	70			√													√			
	-----		27 Cr - 32 Ni - Cb					S33228	Nicrofer 3228NbCe Alloy AC66	73	27																			
	-----		24Cr-17Ni-6Mn-4.5Mo-N					S34565	4565S	115	60																	2146		
	Ty 347		18 Cr-10 Ni-Cb			8	1	S34700		75	30	√	√	√				√	√								√			
	Ty 347H		18 Cr-10 Ni-Cb			8	1	S34709		75	30		√	√				√	√								√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-240	Ty 348		18 Cr-10 Ni-Cb			8	1	S34800		75	30		√	√				√	√								√			
(Con't)	Ty 348H		18 Cr-10 Ni-Cb			8	1	S34809		75	30		√					√									√			
	-----		25 Cr - 35 Ni - N - Ce					S35315	353 MA	94	39																			
	Ty XM-15		18 Cr-18 Ni-2 Si			8	1	S38100	18-18-2	75	30			√					√								√			
	Ty 405		12 Cr-1 Al			7	1	S40500		60	25	√	√	√				√	√								√			
	Ty 409		11 Cr-Ti			7	1	S40900		55	25			√													√			
	-----		11 Cr - Cb - Ti					S40945		55	30																			
	Ty 410		13 Cr			6	1	S41000		65	30			√					√								√		N60	
	Ty 410S		13 Cr			7	1	S41008		60	30		√	√				√	√								√			
	-----		12½ Cr - Cb					S41045		55	30																			
	-----		11½ Cr-1 Ni					S41050	E4	60	30																			
	-----		13 Cr-4½ Ni-Mo			6	4	S41500		115	90																√			
	Ty 429		15 Cr			6	2	S42900		65	30			√					√								√			
	Ty 430		17 Cr			7	2	S43000		65	30			√					√								√			
	Ty 439		17 Cr-Ti	Pl, Sh, Str		7	2	S43035	XM-8	60	30																√			
	-----		18 Cr-2 Mo			7	2	S44400	18-2	60	40			√													√			
	-----		20 Cr - ½ Cu - Cb					S44500		62	30																			
	Ty XM-33		27 Cr- 1 Mo-Ti			10I	1	S44626	26-1	68	45			√													√			
	Ty XM-27		27 Cr- 1 Mo			10I	1	S44627		65	40		√	√				√									√			
	-----		25 Cr-4 Ni-4 Mo-Ti			10I	1	S44635	25-4-4	90	75			√													√			
	-----		26 Cr-3 Ni-3 Mo			10K	1	S44660	SC-1 or 26-3-3	85	65			√					√								√			
	-----		29 Cr- 4 Mo			10J	1	S44700	29-4	80	60			√													√			
	-----		29 Cr- 4 Mo-Ti					S44735	29-4C	80	60																			
	-----		29 Cr-4 Mo-2 Ni			10K	1	S44800	29-4-2	80	60			√													√			
	-----		19 Cr - Ti - Cb - N					S46800		60	30																			
	-----		46 Fe - 24 Ni- 21 Cr - 6 Mo - Cu - N		Pl			N08367	AL6XN	95	45																			
	-----		44 Fe-25 Ni-21 Cr-Mo					N08904	904L, AL4X	71	31																			
SA-249	Gr TP201		17 Cr-4 Ni-6 Mn	WT		8	3	S20100		95	38																√			
	Gr TP202		18 Cr-5 Ni-9 Mn			8	3	S20200		90	38																√			
	Gr TP304		18 Cr-8 Ni			8	1	S30400		75	30	√	√	√				√	√								√	1896	N201, 253	
	Gr TP304H		18 Cr-8 Ni			8	1	S30409		75	30	√	√	√				√	√								√		N201, 253	

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SA-249	Gr TP304L		18 Cr-8 Ni			8	1	S30403		70	25		√	√				√	√								√	1896		
(Con't)	Gr TP304N		18 Cr-8 Ni-N			8	1	S30451		80	35	√		√					√								√			
	Gr TP304LN		18 Cr-8 Ni-N			8	1	S30453		75	30		√					√									√			
	Gr TP305		18 Cr-11 Ni					S30500		75	30																			
	Gr TP309S		23 Cr-12 Ni			8	2	S30908		75	30			√					√								√			
	Gr TP309H		23 Cr-12 Ni	WT		8	2	S30909		75	30		√	√					√								√			
	Gr TP309Cb		23 Cr-12 Ni-Cb			8	2	S30940		75	30			√					√								√			
	Gr TP309H Cb		23 Cr-12 Ni-Cb			8	2	S30941		75	30																√			
	Gr TP310S		25 Cr-20 Ni			8	2	S31008		75	30			√					√								√			
	Gr TP310H		25 Cr-20 Ni			8	2	S31009		75	30		√	√					√								√			
	Gr TP310Cb		25 Cr-20 Ni-Cb			8	2	S31040		75	30			√					√								√			
	Gr TP310H Cb		25 Cr-20 Ni-Cb					S31041		75	30																			
	-----		25 Cr- 20 Ni-2 Mo-N		t ≤ .25	8	2	S31050	310 Mo LN	84	39			√					√								√	2038		
	-----		25 Cr- 20 Ni-2 Mo-N		t > .25	8	2	S31050	310 Mo LN	78	37			√					√								√	2038		
	Gr TP316		16 Cr-12 Ni-2 Mo			8	1	S31600		75	30	√	√	√				√	√								√	1896	N201, 253	
	Gr TP316H		16 Cr-12 Ni-2 Mo			8	1	S31609		75	30	√	√	√				√	√								√		N201, 253	
	Gr TP316L		16 Cr-12 Ni-2 Mo			8	1	S31603		70	25		√	√				√	√								√	1896	N253	
	Gr TP316N		16 Cr-12 Ni-2 Mo-N			8	1	S31651		80	35	√		√					√								√			
	Gr TP316LN		16 Cr-12 Ni-2 Mo-N			8	1	S31653		75	30		√					√									√			
	Gr TP317		18 Cr-13 Ni-3 Mo			8	1	S31700		75	30		√	√				√	√								√			
	Gr TP317L		18 Cr-13 Ni-3 Mo			8	1	S31703		75	30			√													√			
	-----		19 Cr-15 Ni-4 Mo			8	4	S31725	317LM	75	30			√													√			
	-----		19 Cr-15½ Ni-4 Mo			8	4	S31726	317L4	80	35																√			
	Gr TP321		18 Cr-10 Ni-Ti			8	1	S32100		75	30	√	√	√				√	√								√			
	Gr TP321H		18 Cr-10 Ni-Ti			8	1	S32109		75	30	√	√	√				√	√								√			
	Gr TP347		18 Cr-10 Ni-Cb			8	1	S34700		75	30	√	√	√				√	√								√			
	Gr TP347H		18 Cr-10 Ni-Cb			8	1	S34709		75	30	√	√	√				√	√								√			
	Gr TP348		18 Cr-10 Ni-Cb			8	1	S34800		75	30	√	√	√				√	√								√			
	Gr TP348H		18 Cr-10 Ni-Cb			8	1	S34809		75	30	√	√	√				√	√								√			
	Gr TP XM-15		18 Cr-18 Ni-2 Si			8	1	S38100	18-18-2	75	30			√					√								√			
	Gr TP XM-19		22 Cr-13 Ni-5 Mn			8	3	S20910	Nitronic 50	100	55		√	√				√	√								√			
	Gr TP XM-29		18 Cr-3 Ni-12 Mn			8	3	S24000	18-3 Mn or JS-33	100	55			√													√			

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SA-249	-----		20Cr-18Ni-6Mo-Cu-N			8	4	S31254	254SMO	94	44			√													√		N439	
(Con't)	-----		21 Cr-11 Ni-N			8	2	S30815	253MA	87	45			√													√	2033		
	-----		24 Cr-17 Ni-6 Mn-4.5 Mo-N					S34565	4565S	115	60																	2146		
	(Case only)		24 Cr-22 Ni-7.5 Mo	WT				S32654	654 SMO	109	62																	2195		
SA-250	Gr T1		C-½ Mo			3	1	K11522		55	30	√		√													√			
	Gr T1a		C-½ Mo			3	1	K12023		60	32	√		√													√			
	Gr T1b		C-½ Mo			3	1	K11422		53	28	√		√													√			
	Gr T2		½ Cr-½ Mo			3	1	K11547		60	30																√	1996		
	Gr T11		1¼ Cr-½ Mo-Si			4	1	K11597		60	30																√	1984, 2059		
	Gr T12		1 Cr-½ Mo					K11562		60	32																			
	Gr T22		2¼ Cr-1 Mo			5A	1	K21590		60	30																√	2026		
SA-263			Cr Stl Clad	Pl, Sh & Str																										
SA-264			Cr-Ni-Stl Clad	Pl, Sh & Str																										
SA-265			Ni Alloy Clad	Pl																										
SA-266	Gr 1		C-Si Stl	Fo		1	1	K03506		60-85	30	√	√	√				√	√								√	1876		
	Gr 2		C-Si Stl			1	2	K03506		70-95	36	√	√	√				√	√								√	1876	N253	
	Gr 3		C-Si Stl			1	2	K05001		75-100	37.5	√	√	√				√	√								√	1876		
	Gr 4		C-Mn-Si Stl			1	2	K03017		70-95	36			√					√								√	1876		
SA-268	Gr TP405		12 Cr-1 Al	Sm & WT		7	1	S40500		60	30	√		√					√								√			
	Gr TP410		13 Cr			6	1	S41000		60	30	√		√					√								√			
	Gr TP429		15 Cr			6	2	S42900		60	35	√		√					√								√			
	Gr TP430		17 Cr			7	2	S43000		60	35	√	√	√					√								√			
	Gr TP443		27 Cr-1 Cu					S44300		70	40																			
	Gr TP446-1		27 Cr			10l	1	S44600		70	40	√		√													√			
	-----		12 Cr-Ti			7	1	S40800		55	30			√													√			
	Gr TP409		11 Cr-Ti			7	1	S40900		55	30			√													√			
	Gr TP439		17 Cr-Ti			7	2	S43035	XM-8	60	30			√													√	2165		
	Gr TP430Ti		18 Cr-Ti-Cb			7	1	S43036		60	35																√			
	-----		13 Cr-4½ Ni-Mo			6	4	S41500	CA6NM	115	90																√			
	Gr TP446-2		27 Cr			10l	1	S44600	Low C version of 446-1	65	40																√			
	Gr TP XM-27		27 Cr-1 Mo			10l	1	S44627		65	40		√	√				√									√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-268	Gr TP XM-33		27 Cr-1 Mo-Ti			10I	1	S44626	26-1	68	45			√													√			
(Con't)	Gr 18 Cr-2 Mo		18 Cr-2 Mo			7	2	S44400	18-2	60	40			√													√			
	Gr 29-4		29 Cr-4 Mo			10J	1	S44700	29-4	80	60			√													√			
	Gr 29-4-2		29 Cr-4 Mo-2 Ni			10K	1	S44800	29-4-2	80	60			√													√			
	Gr 28-2-3.5		28 Cr-3 Ni-2 Mo-Cb	Sm & WT				S32803	Cronifer 2803 or 28-2-3.5	87	72																			
	Gr 26-3-3		26 Cr-3 Ni-3 Mo			10K	1	S44660	SC1	85	65			√					√								√		N502	
	Gr 25-4-4		25 Cr-4 Ni-4 Mo-Ti			10I	1	S44635	25-4-4	90	75			√													√			
	-----		29 Cr-4 Mo-Ti			10J	1	S44735	29-4C	75	60			√					√								√	2075		
	(Case only)		18 Cr-17 Ni-5.3 Si					S30601	18-17 LC	78-107	37																	2125		
SA-278	Cl 20		Cast iron	Ca				F11401		20																		1849		
	Cl 25		Cast iron					F11701		25																		1849		
	Cl 30		Cast iron					F12101		30																		1849		
	Cl 35		Cast iron					F12401		35																		1849		
	Cl 40		Cast Iron					F12803		40																				
	Cl 45		Cast Iron					F13102		45																				
	Cl 50		Cast Iron					F13502		50																				
	Cl 55		Cast Iron					F13802		55																				
	Cl 60		Cast Iron					F14102		60																				
SA-283	Gr A		C Stl	Pl		1	1			45-60	24		√	√													√			
	Gr B		C Stl			1	1			50-65	27		√	√					√								√			
	Gr C		C Stl			1	1	K02401		55-75	30		√	√													√		N71	
	Gr D		C Stl			1	1	K02702		60-80	33		√	√					√								√			
SA-285	Gr A		C Stl	Pl		1	1	K01700		45-65	24	√	√	√				√	√								√			
	Gr B		C Stl			1	1	K02200		50-70	27	√	√	√				√	√								√			
	Gr C		C Stl			1	1	K02801		55-75	30	√	√	√				√	√								√			
SA-299			C-Mn-Si Stl	Pl	≤ 1	1	2	K02803		75-95	42	√	√	√				√	√								√		N171	
			C-Mn-Si Stl		> 1	1	2	K02803		75-95	40	√	√	√				√	√								√		N171	
SA-302	Gr A		Mn-½ Mo	Pl		3	2	K12021		75-95	45	√	√	√				√	√								√			
	Gr B		Mn-½ Mo			3	3	K12022		80-100	50	√	√	√				√	√								√	1473	N253, 557	
	Gr C		Mn-½ Mo-½ Ni			3	3	K12039		80-100	50	√	√	√				√	√								√			
	Gr D		Mn-½ Mo-¾ Ni			3	3	K12054		80-100	50	√	√	√				√	√								√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-307	Gr A		C Stl	Std Fa						60																			N249	121-241 HB
	Gr B		C Stl							60-100												√	√							121-212 HB
	Gr C		C Stl							58-80	36 YP																			
SA-311	1018	Cl. A	C Stl	Ba	up to 7⁄8 incl.			G10180		70	60																			
					> 7⁄8 to 1¼ incl.					65	55																			
					> 1¼ to 2 incl.					60	50																			
					> 2 to 3 incl.					55	45																			
	1035	Cl. A	C Stl		up to 7⁄8 incl.			G10350		85	75																			
					> 7⁄8 to 1¼ incl.					80	70																			
					> 1¼ to 2 incl.					75	65																			
					> 2 to 3 incl.					70	60																			
	1045	Cl. A	C Stl		up to 7⁄8 incl.			G10450		95	85																			
					> 7⁄8 to 1¼ incl.					90	80																			
					> 1¼ to 2 incl.					85	75																			
					> 2 to 3 incl.					80	70																			
	1050	Cl. A	C Stl		up to 7⁄8 incl.			G10500		100	90																			
					> 7⁄8 to 1¼ incl.					95	85																			
					> 1¼ to 2 incl.					90	80																			
					> 2 to 3 incl.					85	75																			
	1117	Cl. A	C - Mn Stl		up to 7⁄8 incl.			G11170		75	65																			
					> 7⁄8 to 1¼ incl.					70	60																			
					> 1¼ to 2 incl.					65	55																			
					> 2 to 3 incl.					60	50																			
	1137	Cl. A	C - Mn Stl		up to 7⁄8 incl.			G11370		95	90																			
					> 7⁄8 to 1¼ incl.					90	85																			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-311 (Con't)	1137 (Con't)			Ba	> 1¼ to 2 incl.					85	80																			
					> 2 to 3 incl.					80	75																			
	1141	Cl. A	C - Mn Stl		up to ⅞ incl.			G11410		95	90																			
					> ⅞ to 1¼ incl.					90	85																			
					> 1¼ to 2 incl.					85	80																			
					> 2 to 3 incl.					80	75																			
	1144	Cl. A	C - Mn Stl		up to ⅞ incl.			G11440		105	95																			
					> ⅞ to 1¼ incl.					100	90																			
					> 1¼ to 2 incl.					95	85																			
					> 2 to 3 incl.					90	80																			
					> 3 to 4 incl.					85	75																			
	1541	Cl. A	C - Mn Stl		up to ⅞ incl.			G15410		100	90																			
					> ⅞ to 1¼ incl.					95	85																			
					> 1¼ to 2 incl.					90	80																			
					> 2 to 3 incl.					85	75																			
	1045	Cl. B	C Stl		up to 3 incl.			G10450		115	100																			
					> 3 to 4 incl.					105	90																			
	1050	Cl. B	C Stl		up to 4½ incl.			G10500		115	100																			
	1141	Cl. B	C - Mn Stl		up to 4½ incl.			G11410		115	100																			
	1144	Cl. B	C - Mn Stl		up to 4½ incl.			G11440		115	100																			
	1541	Cl. B	C - Mn Stl		up to 4½ incl.			G15410		115	100																			
SA-312	Gr TP304		18 Cr-8 Ni	Sm & WP		8	1	S30400		75	30	√	√	√				√	√								√	2042, 1896	N201, 253	
	Gr TP304H		18 Cr-8 Ni			8	1	S30409		75	30	√	√	√				√	√								√		N201, 253	
	Gr TP304L		18 Cr-8 Ni			8	1	S30403		70	25		√	√				√	√								√	1896		
	-----		18 Cr-9 Ni-N-Ce					S30415	153MA	87	42																			

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SA-312	Gr TP304N		18 Cr-8 Ni-N			8	1	S30451		80	35	√	√	√				√	√								√		N253	
(Con't)	Gr TP304LN		18 Cr-8 Ni-N			8	1	S30453		75	30		√					√									√	2127		
	Gr TP309H		23 Cr-12 Ni			8	2	S30909		75	30	√		√					√								√			
	Gr TP309S		23 Cr-12 Ni			8	2	S30908		75	30	√	√	√					√								√			
	Gr TP309Cb		23 Cr-12 Ni-Cb			8	2	S30940		75	30		√	√					√								√			
	Gr TP309H Cb		23 Cr-12 Ni-Cb			8	2	S30941		75	30																√			
	Gr TP310H		25 Cr-20 Ni			8	2	S31009		75	30	√		√					√								√			
	Gr TP310S		25 Cr-20 Ni			8	2	S31008		75	30	√	√	√					√								√			
	Gr TP310Cb		25 Cr-20 Ni-Cb			8	2	S31040		75	30		√	√					√								√			
	Gr TP310H Cb		25 Cr-20 Ni-Cb			8	2	S31041		75	30																√			
	-----		15 Cr-15 Ni-Mo-Ti					S31272		65	29																			
	Gr TP316		16 Cr-12 Ni-2 Mo			8	1	S31600		75	30	√	√	√				√	√								√	2042, 1896	N201, 253	
	Gr TP316H		16 Cr-12 Ni-2 Mo			8	1	S31609		75	30	√	√	√				√	√								√		N201, 253	
	Gr TP316L		16 Cr-12 Ni-2 Mo			8	1	S31603		70	25		√	√				√	√								√	1896 2209	N253	
	Gr TP316N		16 Cr-12 Ni-2 Mo-N			8	1	S31651		80	35	√	√	√				√	√								√		N253	
	Gr TP316LN		16 Cr-12 Ni-2 Mo-N			8	1	S31653		75	30		√					√									√			
	Gr TP317		18 Cr-13 Ni-3 Mo			8	1	S31700		75	30		√	√				√	√								√			
	Gr TP317L		18 Cr-13 Ni-3 Mo			8	1	S31703		75	30			√													√			
	Gr TP321		18 Cr-10 Ni-Ti		Welded	8	1	S32100		75	30	√		√				√	√								√		N253	
	Gr TP321		18 Cr-10 Ni-Ti		Sm; ≤ ⅜	8	1	S32100		75	30	√	√	√				√	√								√		N253	
	Gr TP321		18 Cr-10 Ni-Ti		Sm; > ⅜	8	1	S32100		70	25								√								√			
	Gr TP321H		18 Cr-10 Ni-Ti		Welded	8	1	S32109		75	30	√		√				√	√								√		N253	
	Gr TP321H		18 Cr-10 Ni-Ti		Sm; ≤ ⅜	8	1	S32109		75	30	√	√	√				√	√								√		N253	
	Gr TP321H		18 Cr-10 Ni-Ti		Sm; > ⅜	8	1	S32109		70	25								√								√			
	-----		18 Cr-20 Ni-5.5 Si	Sm & WP				S32615	Alloy SX	80	32																	2029		
	-----		25 Cr-20 Ni-2 Mo-N		t ≤ .25	8	2	S31050	310 Mo LN	84	39			√					√								√	2038		
	-----		25 Cr-20 Ni-2 Mo-N		t > .25	8	2	S31050	310 Mo LN	78	37			√					√								√	2038		
	Gr TP347		18 Cr-10 Ni-Cb			8	1	S34700		75	30	√	√	√				√	√								√	2042		
	Gr TP347H		18 Cr-10 Ni-Cb			8	1	S34709		75	30	√	√	√				√	√								√			
	Gr TP348		18 Cr-10 Ni-Cb			8	1	S34800		75	30	√	√	√				√	√								√			
	Gr TP348H		18 Cr-10 Ni-Cb			8	1	S34809		75	30	√	√	√				√	√								√			

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SA-312	Gr TP XM-10		21 Cr-6 Ni-9 Mn					S21900	21-6-9	90	50																√			
(Con't)	Gr TP XM-11		21 Cr-6 Ni-9 Mn			8	3	S21904	Nitronic 40 or 21-6-9LC	90	50			√					√								√			
	Gr TP XM-15		18 Cr-18 Ni-2 Si			8	1	S38100	18-18-2	75	30			√					√								√			
	Gr TP XM-19		22 Cr-13 Ni-5 Mn			8	3	S20910	Nitronic 50 or 22-13-5	100	55		√	√				√	√								√			
	Gr TP XM-29		18 Cr-3 Ni-12 Mn			8	3	S24000	18-3 Mn	100	55			√													√			
	-----		20Cr-18Ni-6Mo-Cu-N			8	4	S31254	254 SMO	94	44			√													√		N439	
	-----		18 Cr-15 Ni-3.7 Si					S30615	RA85H	90	40																			
	-----		21 Cr-11 Ni-N			8	2	S30815	253 MA	87	45			√													√	2033		
	-----		18 Cr-15 Ni-4 Si			8	1	S30600	1815 LC Si	78	35																√	1953		
	-----		19 Cr-15 Ni- 4 Mo			8	4	S31725	317 LM	75	30			√													√			
	-----		19 Cr-15½ Ni-4 Mo			8	4	S31726	317L4	80	35																√			
	-----		27 Cr-32 Ni-Cb					S33228	Nicrofer 3228NbCe Alloy AC 66	73	27																			
	-----		24 Cr-22 Ni-7.5 Mo					S32654	654-SMO	109	62																	2195		
	(Case only)		18 Cr-17 Ni-5.3 Si					S30601	18-17 LC	78-107	37																	2125		
	-----		24Cr-17Ni-6Mn-4.5Mo-N					S34565	4565S	115	60																	2146		
	(Case only)		18 Cr-11 Ni-Cb-N					S34751	347 N	75	30																	2196		
SA-320	Gr L7	Q & T	1 Cr- ⅕ Mo	Bo	≤ 2½			G41400	L7, 4140, 4142 & 4145	125	105											√	√	√						
	Gr L7A	Q & T	C-¼ Mo		≤ 2½			G40370	L7A, 4037	125	105												√						N249	
	Gr L7B	Q & T	1 Cr- ⅕ Mo		≤ 2½			G41370	L7B, 4137	125	105																		N249	
	Gr L7C	Q & T	½ Cr-½ Ni-¼ Mo		≤ 2½			G87400	L7C, 8740	125	105																			
	Gr L70	Q & T	1 Cr- ⅕ Mo		≤ 2½				L70, 4140, 4142 & 4145	125	105																			
	Gr L71	Q & T	C-¼ Mo		≤ 2½			G40370	L71, 4037	125	105																			
	Gr L72	Q & T	1 Cr- ⅕ Mo		≤ 2½			G41370	L72, 4137	125	105																			
	Gr L73	Q & T	½ Cr-½ Ni-¼ Mo		≤ 2½			G87400	L73, 8740	125	105																			
	Gr L43	Q & T	1¾ Ni-¾ Cr-¼ Mo		≤ 4			G43400	L43, 4340	125	105											√	√	√	√	√				
	Gr L7M	Q & T (1150°F)	1 Cr- ⅕ Mo	Bo	≤ 2½			G41400	L7M, 4140, 4142 & 4145	100	80												√	√						
	Gr L1	Q & T	Low C - Boron		≤ 1				L1	125	105																			
	Gr B8, Cl 1		18 Cr-8 Ni					S30400	B8, Ty 304	75	30											√	√						N71	
	Gr B8, Cl 2		18 Cr-8 Ni		≤ ¾			S30400	B8, Ty 304	125	100												√							
	Gr B8, Cl 2		18 Cr-8 Ni		> ¾ to 1 incl.			S30400	B8, Ty 304	115	80												√							

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SA-320 (Con't)	Gr B8, Cl 2		18 Cr-8 Ni		> 1 to 1¼ incl.			S30400	B8, Ty 304	105	65												√							
	Gr B8, Cl 2		18 Cr-8 Ni		> 1¼ to 1½ incl.			S30400	B8, Ty 304	100	50												√							
	Gr B8A, Cl 1A		18 Cr-8 Ni					S30400	B8A, Ty 304	75	30												√						N71	
	Gr B8C, Cl 1		18 Cr-10 Ni-Cb					S34700	B8C, Ty 347	75	30											√	√						N71	
	Gr B8C, Cl 2		18 Cr-10 Ni-Cb		≤ ¾			S34700	B8C, Ty 347	125	100												√							
	Gr B8C, Cl 2		18 Cr-10 Ni-Cb		> ¾ to 1 incl.			S34700	Ty 347	115	80												√							
	Gr B8C, Cl 2		18 Cr-10 Ni-Cb		> 1 to 1¼ incl.			S34700	Ty 347	105	65												√							
	Gr B8C, Cl 2		18 Cr-10 Ni-Cb		> 1¼ to 1½ incl.			S34700	B8C, Ty 347	100	50												√							
	Gr B8CA, Cl 1A		18 Cr-10 Ni-Cb					S34700	B8CA, Ty 347	75	30												√						N71	
	Gr B8M, Cl 1		16 Cr-12 Ni-2 Mo					S31600	B8M, Ty 316	75	30											√	√						N71	
	Gr B8M, Cl 2		16 Cr-12 Ni-2 Mo		≤ ¾			S31600	B8M, Ty 316	110	95												√							
	Gr B8M, Cl 2		16 Cr-12 Ni-2 Mo		> ¾ to 1 incl.			S31600	B8M, Ty 316	100	80												√							
	Gr B8M, Cl 2		16 Cr-12 Ni-2 Mo		> 1 to 1¼ incl.			S31600	B8M, Ty 316	95	65												√							
	Gr B8M, Cl 2		16 Cr-12 Ni-2 Mo		> 1¼ to 1½ incl.			S31600	B8M, Ty 316	90	50												√							
	Gr B8MA, Cl 1A		16 Cr-12 Ni-2 Mo					S31600	B8MA, Ty 316	75	30												√						N71	
	Gr B8P, Cl 1		18 Cr-11 Ni					S30500	B8P, Ty 305	75	30																			
	Gr B8P, Cl 2		18 Cr-11 Ni		≤ ¾			S30500	B8P, Ty 305	125	100																			
	Gr B8P, Cl 2		18 Cr-11 Ni		> ¾ to 1 incl.			S30500	B8P, Ty 305	115	80																			
	Gr B8P, Cl 2		18 Cr-11 Ni		> 1 to 1¼ incl.			S30500	B8P, Ty 305	105	65																			
	Gr B8P, Cl 2		18 Cr-11 Ni		> 1¼ to 1½ incl.			S30500	B8P, Ty 305	100	50																			
	Gr B8PA, Cl 1A		18 Cr-11 Ni	Bo				S30500	B8PA, Ty 305	75	30																			
	Gr B8F, Cl 1		18 Cr-8 Ni-S					S30300	B8F, Ty 303S	75	30											√	√						N71, 249	
	Gr B8F, Cl 2		18 Cr-8 Ni-S		≤ ¾			S30300	B8F, Ty 303S	125	100																			
	Gr B8F, Cl 2		18 Cr-8 Ni-S		> ¾ to 1 incl.			S30300	B8F, Ty 303S	115	80																			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-320 (Con't)	Gr B8F, Cl 2		18 Cr-8 Ni-S		> 1 to 1¼ incl.			S30300	B8F, Ty 303S	105	65																			
	Gr B8F, Cl 2		18 Cr-8 Ni-S		> 1¼ to 1½ incl.			S30300	B8F, Ty 303S	100	50																			
	Gr B8FA, Cl 1A		18 Cr-8 Ni-S					S30300	B8FA, Ty 303S	75	30												√						N71, 249	
	Gr B8T, Cl 1		18 Cr-10 Ni-Ti					S32100	B8T, Ty 321	75	30											√	√						N71	
	Gr B8T, Cl 2		18 Cr-10 Ni-Ti		≤ ¾			S32100	B8T, Ty 321	125	100												√							
	Gr B8T, Cl 2		18 Cr-10 Ni-Ti		> ¾ to 1 incl.			S32100	B8T, Ty 321	115	80												√							
	Gr B8T, Cl 2		18 Cr-10 Ni-Ti		> 1 to 1¼ incl.			S32100	B8T, Ty 321	105	65												√							
	Gr B8T, Cl 2		18 Cr-10 Ni-Ti		> 1¼ to 1½ incl.			S32100	B8T, Ty 321	100	50												√							
	Gr B8TA, Cl 1A		18 Cr-10 Ni-Ti					S32100	B8TA, Ty 321	75	30												√						N71	
	Gr B8LN, Cl 1		18 Cr-8 Ni-N					S30453	B8LN, Ty 304LN	75	30																			
	Gr B8LNA, Cl 1A		18 Cr-8 Ni-N					S30453	B8LNA, Ty 304LN	75	30																			
	Gr B8MLN, Cl1		16 Cr-12 Ni-2 Mo-N					S31653	B8MLN, Ty 316LN	75	30																			
	Gr B8MLNA, Cl 1A		16 Cr-12 Ni-2 Mo-N					S31653	B8MLNA, Ty 316LN	75	30																			
SA-325	Ty 1		C Stl	Bo				K02706		see Note 1												√	√						N249	
	Ty 3-A		Cr-Ni Stl					K13643	Weathering steel	see Note 1												√								
	Ty 3-B		Cr-Ni Stl					K14358	Weathering steel	see Note 1												√								
	Ty 3-C		Cr-Ni Stl					K12033	Weathering steel	see Note 1												√								
	Ty 3-D		Cr-Ni Stl					K12059	Weathering steel	see Note 1												√								
	Ty 3-E		Cr-Ni Stl					K12254	Weathering steel	see Note 1												√								
	Ty 3-F		Cr-Ni Stl					K12238	Weathering steel	see Note 1												√								
SA-333	Gr 1		C-Mn Stl	Sm & WP		1	1	K03008		55	30		√	√				√	√								√			
	Gr 3		3½ Ni			9B	1	K31918		65	35			√					√								√			
	Gr 4		¾ Cr-¾ Ni-Cu-Al	Sm & WP		4	2	K11267		60	35			√					√								√			
	Gr 6		C-Mn-Si Stl			1	1	K03006		60	35		√	√				√	√								√	2056		
	Gr 7		2½ Ni			9A	1	K21903		65	35			√													√			
	Gr 8		9 Ni			11A	1	K81340		100	75		√	√					√								√	2214		
	Gr 9		2 Ni-1 Cu			9A	1	K22035		63	46		√	√					√								√			

Note 1 - See SA-325 where strength is a function of bolt size.

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-333	Gr 10		C-Mn-Si + x			1	3			80	65																√			
SA-334	Gr 1		C-Mn Stl	WT		1	1	K03008		55	30		√	√				√	√								√			
	Gr 3		3½ Ni			9B	1	K31918		65	35			√					√								√			
	Gr 6		C-Mn-Si Stl			1	1	K03006		60	35		√	√				√									√			
	Gr 7		2½ Ni			9A	1	K21903		65	35			√													√			
	Gr 8		9 Ni			11A	1	K81340		100	75		√	√					√								√			
	Gr 9		2 Ni-1 Cu			9A	1	K22035		63	46			√					√								√			
	Gr 11		36 Ni							65	35																			
SA-335	Gr P1		C-½ Mo	SP		3	1	K11522		55	30	√	√	√				√	√								√		N253	
	Gr P2		½ Cr-½ Mo			3	1	K11547		55	30	√	√	√				√	√								√			
	Gr P5		5 Cr-½ Mo			5B	1	K41545		60	30	√	√	√				√	√								√			
	Gr P5b		5 Cr-½ Mo-Si			5B	1	K51545		60	30	√		√					√								√			
	Gr P5c		5 Cr-½ Mo-Ti			5B	1	K41245		60	30	√		√					√								√			
	Gr P9		9 Cr-1 Mo			5B	1	S50400		60	30	√	√	√				√	√								√		N253	
	Gr P91		9 Cr-1 Mo-V			5B	2			85	60	√	√	√				√									√	1973	N253, N466	
	Gr P11		1¼ Cr-½ Mo-Si			4	1	K11597		60	30	√	√	√				√	√								√	1876		
	Gr P12		1 Cr-½ Mo			4	1	K11562		60	32	√	√	√				√	√								√		N253	
	Gr P15		1½ Si-½ Mo			3	1	K11578		60	30			√													√			
	Gr P21		3 Cr-1 Mo			5A	1	K31545		60	30	√	√	√				√	√								√			
	Gr P22		2¼ Cr-1 Mo			5A	1	K21590		60	30	√	√	√				√	√								√	1876	N201, 253	
	(Case only		9 Cr-2 W							90	64																	2179		
	(Case only)		12 Cr-2 W							95	58																	2180		
SA-336	Gr F1		C-½ Mo	Fo		3	2	K12520		70-95	40	√	√	√				√	√								√		N253	
	Gr F11, Cl 2		1¼ Cr-½ Mo-Si			4	1	K11572	formerly Cl F11	70-95	40	√		√					√								√			
	Gr F11, Cl 3		1¼ Cr-½ Mo-Si			4	1	K11572	formerly Cl F11A	75-100	45			√					√								√			
	Gr F11, Cl 1		1¼ Cr-½ Mo-Si			4	1	K11597	formerly Cl F11B	60-85	30	√															√			
	Gr F12		1 Cr-½ Mo	Fo		4	1	K11564		70-95	40	√	√	√				√	√								√		N253	
	Gr F5		5 Cr-½ Mo			5B	1	K41545		60-85	36	√		√					√								√			
	Gr F5A		5 Cr-½ Mo			5B	1	K42544		80-105	50	√		√					√								√			
	Gr F9		9 Cr-1 Mo			5B	1	S50400		85-110	55			√					√								√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-336 (Con't)	Gr F91		9 Cr-1 Mo-V			5B	2			85-110	60	√		√													√			
	Gr F6		13 Cr			6	3	S41000		85-110	55								√								√			
	Gr F21, Cl 3	N & T	3 Cr-1 Mo			5A	1	K31545	formerly Cl F21	75-100	45	√	√	√				√	√								√	1473		
	Gr F3V		3 Cr-1 Mo-¼ V			5C	1	K31830		85-110	60			√					√								√	1961, 2151		
	Gr F3VCb		2¼ Cr - 1 Mo - V - Cb					K31835		85-110	60																			
	Gr F21, Cl 1		3 Cr-1 Mo			5A	1	K31545	formerly Cl F21A	60-85	30	√	√	√				√	√								√			
	Gr F22, Cl 3	N & T	2¼ Cr-1 Mo			5A	1	K21590	formerly Cl F22	75-100	45	√	√	√				√	√								√	1473, 1876	N253	
	Gr F22, Cl 1		2¼ Cr-1 Mo			5A	1	K21590	formerly Cl F22A	60-85	30	√	√	√				√	√								√	1876	N201, 253	
	Gr F304		18 Cr-8 Ni			8	1	S30400	Old F8	70	30	√	√	√				√	√								√	1896	N201, 253	
	Gr F304H		18 Cr-8 Ni			8	1	S30409		70	30		√	√				√	√								√		N201, 253	
	Gr F304L		18 Cr-8 Ni			8	1	S30403		65	25			√					√								√	1896		
	Gr F304N		18 Cr-8 Ni-N			8	1	S30451		80	35		√	√				√	√								√			
	Gr F304LN		18 Cr-8 Ni-N			8	1	S30453		70	30		√					√									√	2127		
	Gr F316		16 Cr-12 Ni-2 Mo			8	1	S31600	Old F8M	70	30	√	√	√				√	√								√	1896	N201, 253	
	Gr F316H		16 Cr-12 Ni-2 Mo			8	1	S31609		70	30		√	√				√	√								√		N201, 253	
	Gr F316L		16 Cr-12 Ni-2 Mo			8	1	S31603		65	25			√					√								√	1896		
	Gr F316N		16 Cr-12 Ni-2 Mo-N			8	1	S31651		80	35		√	√				√	√								√			
	Gr F316LN		16 Cr-12 Ni-2 Mo-N			8	1	S31653		70	30		√					√									√			
	Gr F321		18 Cr-10 Ni-Ti			8	1	S32100		70	30	√	√	√				√	√								√		N253	
	Gr F321H		18 Cr-10 Ni-Ti			8	1	S32109		70	30		√	√				√	√								√			
	Gr F347		18 Cr-10 Ni-Cb	Fo		8	1	S34700		70	30	√	√	√				√	√								√			
	Gr F347H		18 Cr-10 Ni-Cb			8	1	S34709		70	30		√	√				√	√								√			
	Gr F348		18 Cr-10 Ni-Cb			8	1	S34800		70	30			√													√			
	Gr F348H		18 Cr-10 Ni-Cb			8	1	S34809		65	25			√													√			
	Gr F310		25 Cr-20 Ni			8	2	S31000		75	30		√	√				√	√								√			
	Gr F309H		23 Cr-12 Ni					S30909	309H	70	30																			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-336	Gr F310H		25 Cr-20 Ni					S31009	310H	70	30																			
(Con't)	Gr FXM-11		21 Cr-6 Ni-9 Mn			8	3	S21904	Nitronic 40 21-6-9LC	90	50			√					√								√			
	Gr FXM-19		22 Cr-13 Ni-5 Mn			8	3	S20910	Nitronic 50	100	55								√								√			
	Gr F46		18 Cr-15 Ni-4 Si			8	4	S30600	Old S01815	78-100	32																√			
	Gr F22V		2¼ Cr-1 Mo-¼ V						Cl F22B	85-110	60																	2098		
SA-350	Gr LF1		C-Mn-Si Stl	Fo		1	1	K03009		60-85	30		√	√				√	√								√			
	Gr LF2		C-Mn-Si Stl			1	2	K03011		70-95	36		√	√				√	√								√			
	Gr LF3		3½ Ni			9B	1	K32025		70-95	37.5		√	√				√	√								√		N559	
	Gr LF5, Cl 1		1½ Ni			9A	1	K13050		60-85	30			√													√			
	Gr LF5, Cl 2		1½ Ni			9A	1	K13050		70-95	37.5			√													√			
	Gr LF6, Cl 1		C-Mn-Si-V-N					K12202		66-91	52																			
	Gr LF6, Cl 2		C-Mn-Si-V-N					K12202		75-100	60																			
	Gr LF787, Cl 2		¾ Ni-1 Cu-¾ Cr							65-85	55																			
	Gr LF787, Cl 3		¾ Ni-1 Cu-¾ Cr							75-95	65																			
	Gr LF9		2 Ni-1 Cu			9A	1	K22036		63-88	46			√					√								√			
SA-351	Gr CF3		18 Cr-8 Ni	Ca		8	1	J92500	CF3	70	30		√	√				√	√								√			
	Gr CF3A		18 Cr-8 Ni			8	1	J92500	CF3A	77	35		√	√				√									√			
	Gr CF8		18 Cr-8 Ni			8	1	J92600	CF8	70	30	√	√	√				√	√								√		N253	
	Gr CF8A		18 Cr-8 Ni			8	1	J92600	CF8A	77	35		√	√				√									√			
	Gr CF3M		16 Cr-12 Ni-2 Mo			8	1	J92800	CF3M	70	30		√	√				√									√		N253	
	Gr CF3MA		16 Cr-12 Ni-2 Mo					J92800	CF3MA	80	37																			
	Gr CF8M		16 Cr-12 Ni-2 Mo			8	1	J92900	CF8M	70	30	√	√	√				√	√								√	1954	N253	
	Gr CF8C		18 Cr-10 Ni-Cb			8	1	J92710	CF8C	70	30		√	√				√	√								√			
	Gr CF10		19 Cr-9 Ni-½ Mo			8	1	J92590	CF10	70	30			√					√								√			
	Gr CF10M		19 Cr-9 Ni-2 Mo			8	1		CF10M	70	30			√													√			
	Gr CH8		25 Cr-12 Ni	Ca		8	2	J93400	CH8	65	28		√	√				√	√								√			
	Gr CH10		25 Cr-12 Ni					J93401	CH10	70	30																			
	Gr CF3MN		16 Cr-12 Ni-2 Mo-N					J92700	CF3MN	75	37																			
	Gr CE8MN		24 Cr-10 Ni-3 Mo-N			10H	1	J93345	CE8MN	95	65			√													√			
	Gr CH20		25 Cr-12 Ni			8	2	J93402	CH20	70	30		√	√				√	√								√			
	Gr CK20		25 Cr-20 Ni			8	2	J94202	CK20	65	28		√	√				√	√								√			

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SA-351	Gr HK30		25 Cr-20 Ni-½ Mo					J94203	HK30	65	35																			
(Con't)	Gr HK40		25 Cr-20 Ni-½ Mo					J94204	HK40	62	35																			
	Gr HT30		15 Cr-35 Ni-½ Mo					N08603	HT30	65	28																			
	Gr CF10MC		16 Cr-14 Ni-2 Mo					J92971	CF10MC	70	30																			
	Gr CN7M		29Ni-20Cr-3Cu-2Mo			45		N08007	CN7M	62	25		√			√											√	1750		
	Gr CD4MCu		25 Cr-5 Ni-3 Mo-2 Cu			10H	1	J93370	CD4MCu	100	70		√														√	1750		
	Gr CG6MMN		22 Cr-13 Ni-5 Mn			8	3	J93790	CG6MMN	85	42.5			√													√			
	Gr CG8M		19 Cr-10 Ni-3 Mo			8	1	J93000	CG8M	75	35			√													√			
	Gr CF10SMnN		18 Cr-8 Ni-4 Si-N						CF10SMnN	85	42.5																			
	Gr CT15C		20 Cr-32 Ni-1 Cb			45			CT15C	63	25						√										√	1981		
	Gr CK3MCuN		20Cr-18Ni-6Mo-Cu-N			8	4	J93254	CK3MCuN	80	38			√													√		N440	
	Gr CN3MN		46 Fe - 24 Ni -21 Cr-6 Mo-Cu -N					(N08367)	AL6XN	80	38																	2106	N497, 539	
	Gr CE20N		24 Cr-9 Ni-Mo-N							80	40																			
	Gr CG3M		19 Cr-11 Ni--3 Mo							75	35																			
	Gr CD3MWCuN		25 Cr - 7.5 Ni - 3.5 Mo-N - Cu - W					J93880		100	65																			
SA-352	Gr LCA		C-Si Stl	Ca		1	1	J02504		60-85	30		√					√								√			
	Gr LCB		C-Si Stl			1	1	J03003		65-90	35		√	√				√	√							√			
	Gr LCC		C-Mn-Si Stl			1	2	J02505		70-95	40		√					√								√	1750		
	Gr LC1		C-½ Mo			3	1	J12522		65-90	35		√	√				√	√							√			
	Gr LC2		2½ Ni			9A	1	J22500		70-95	40		√	√				√	√							√			
	Gr LC2-1		3 Ni- 1½ Cr-½ Mo			11A	5	J42215		105-130	80															√			
	Gr LC3		3½ Ni			9B	1	J31550		70-95	40		√	√				√	√							√			
	Gr LC4		4½ Ni			9C	1	J41500		70-95	40															√			
	Gr CA6NM		13 Cr-4 Ni			6	4	J91540		110-135	80															√			
	Gr LC9		9 Ni							85	75																			
SA-353	9 Ni		9 Ni	Pl		11A	1	K81340		100-120	75		√	√					√							√	2214		
SA-354	Gr BC		C Stl	Bo	¼ -2½ incl.			K04100		125	109											√	√					N249	
	Gr BC		C Stl		> 2½			K04100		115	99											√	√					N249	
	Gr BD		C Stl		¼ -2½ incl.			K04100		150	130											√	√					N249	
	Gr BD		C Stl		> 2½			K04100		140	115											√	√					N249	

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SA-358	Gr 304		18 Cr-8 Ni	WP		8	1	S30400		75	30		√					√									√		N201	
	Gr 304L		18 Cr-8 Ni			8	1	S30403		70	25		√					√									√			
	Gr 304N		18 Cr-8 Ni-N			8	1	S30451		80	35		√					√									√		N253	
	Gr 304LN		18 Cr-8 Ni-N			8	1	S30453		75	30		√					√									√			
	Gr 304H		18 Cr-8 Ni			8	1	S30409		75	30		√					√									√			
	Gr 309S		23 Cr-12 Ni			8	2	S30908		75	30																√			
	Gr 309Cb		23 Cr-12 Ni-Cb			8	2	S30940		75	30																√			
	Gr 310S		25 Cr-20 Ni			8	2	S31008		75	30																√			
	Gr 310Cb		25 Cr-20 Ni-Cb			8	2	S31040		75	30																√			
	Gr 316		16 Cr-12 Ni-2 Mo			8	1	S31600		75	30		√					√									√		N201	
	Gr 316L		16 Cr-12 Ni-2 Mo			8	1	S31603		70	25		√					√									√			
	Gr 316H		16 Cr-12 Ni-2 Mo			8	1	S31609		75	30		√					√									√			
	Gr 316N		16 Cr-12 Ni-2 Mo-N			8	1	S31651		80	35		√					√									√			
	Gr 316LN		16 Cr-12 Ni-2 Mo-N			8	1	S31653		75	30		√					√									√			
	Gr 321		18 Cr-10 Ni-Ti			8	1	S32100		75	30		√					√									√			
	Gr 347		18 Cr-10 Ni-Cb			8	1	S34700		75	30		√					√									√			
	Gr 348		18 Cr-10 Ni-Cb			8	1	S34800		75	30		√					√									√			
	Gr XM-19		22 Cr-13 Ni-5 Mn			8	3	S20910		100	55		√					√									√			
	Gr XM-29		18 Cr-3 Ni-12 Mn			8	3	S28300	18-3 Mn	100	55																√			
	-----		20Cr-18Ni-6 Mo-Cu-N			8	4	S31254	254 SMO	94	44			√													√		N439	
	-----		21 Cr-11 Ni-N			8	2	S30815	253 MA	87	45																√	2033		
	-----		19 Cr-15 Ni-4 Mo			8	4	S31725	317 LM	75	30			√													√			
	-----		19 Cr-15½ Ni-4 Mo			8	4	S31726	317 L4	80	35																√			
	-----		18 Cr-15 Ni-4 Si					S30600	Old S01815, 18-15 LCSi	78	35																			
	-----		24 Cr-17 Ni-6 Mn-4.5 Mo-N					S34565	4565S	110	60																			
	-----		18 Cr-9 Ni-N-Ce					S30415	153 MA	87	42																			
	-----		24 Cr-22 Ni-7.5 Mo					S32654	654 SMO	109	62																			
SA-369	Gr FPA		C-Si Stl	FBP		1	1	K02501		48	30	√															√			
	Gr FPB		C-Mn-Si Stl			1	1	K03006		60	35	√															√			
	Gr FP1		C-½ Mo			3	1	K11522		55	30	√	√	√				√	√								√		N253	
	Gr FP2		½ Cr-½ Mo			3	1	K11547		55	30	√	√	√				√	√								√			
	Gr FP5		5 Cr-½ Mo			5B	1	K41545		60	30	√	√	√				√	√								√			
	Gr FP9		9 Cr- 1 Mo			5B	1	K90941		60	30	√	√	√				√	√								√		N253	

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-369	Gr FP91		9 Cr-1 Mo-V			5B	2			85	60	√															√			
(Con't)	Gr FP11		1¼ Cr-½ Mo-Si			4	1	K11597		60	30	√	√	√				√	√								√			
	Gr FP12		1 Cr-½ Mo			4	1	K11562		60	32	√	√	√				√	√								√		N253	
	Gr FP21		3 Cr-1 Mo			5A	1	K31545		60	30	√	√	√				√	√								√			
	Gr FP22		2¼ Cr-1 Mo			5A	1	K21590		60	30	√	√	√				√	√								√		N201, 253	
SA-372	Gr A		C-Si Stl	Fo		1	1	K03002	formerly Ty I	60-85	35			√					√								√			
	Gr B		C-Mn-Si Stl			1	2	K04001	formerly Ty II	75-100	45			√					√								√			
	Gr C		C-Mn-Si Stl					K04801	formerly Ty III	90-115	55			√					√											
	Gr D		Mn-¼ Mo					K14508	formerly Ty IV	105-130	65		√	√					√											
	Gr E, Cl 55		1 Cr-½ Mo					K13047	formerly Ty V, Gr 1, Cl A or Ty V, Gr 1, Cl 55	85-110	55																			
	Gr E, Cl 65		1 Cr-½ Mo					K13047	formerly Ty V,Gr 1,Cl 65	105-130	65																	2111, 2113		
	Gr E, Cl 70		1 Cr-½ Mo					K13047	formerly Ty V, Gr 1, Cl B or Ty V, Gr 1, Cl 70	120-145	70			√					√											
	Gr F, Cl 55		1 Cr-½ Mo					G41350	formerly Ty V, Gr 2, Cl A or Ty V, Gr 2, Cl 55	85-110	55																			
	Gr F, Cl 65		1 Cr-½ Mo					G41350	formerly Ty V,Gr 2,Cl 65	105-130	65																			
	Gr F, Cl 70		1 Cr-½ Mo					G41350	formerly Ty V, Gr 2, Cl B or Ty V, Gr 2, Cl 70	120-145	70			√					√											
	Gr G, Cl 55		1 Cr-½ Mo					K13049	formerly Ty V, Gr 3, Cl A or Ty V, Gr 3, Cl 55	85-110	55																			
	Gr G, Cl 65		1 Cr-½ Mo					K13049	formerly Ty V,Gr 3,Cl 65	105-130	65																			
	Gr G, Cl 70		1 Cr-½ Mo					K13049	formerly Ty V, Gr 3, Cl B or Ty V, Gr 3, Cl 70	120-145	70			√					√											
	Gr H, Cl 55		1 Cr-½ Mo	Fo				K13547	formerly Ty V, Gr 4, Cl A or Ty, Gr 4, Cl 55	85-110	55																			
	Gr H, Cl 65		1 Cr-½ Mo					K13547	formerly Ty V,Gr 4,Cl 65	105-130	65																			
	Gr H, Cl 70		1 Cr-½ Mo					K13547	formerly Ty V, Gr 4, Cl B or Ty V, Gr 4, Cl 70	120-145	70			√					√											
	Gr J, Cl 55		1 Cr-½ Mo					K13548	formerly Ty V, Gr 5, Cl A or Ty V, Gr 5, Cl 55	85-110	55																			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-372 (Con't)	Gr J, Cl 65		1 Cr- ½ Mo					K13548	formerly Ty V,Gr 5,Cl 65	105-130	65																2111, 2113		
	Gr J, Cl 70		1 Cr- ½ Mo					K13548	formerly Ty V, Gr 5, Cl B or Ty V, Gr 5, Cl 70	120-145	70			√					√										
	Gr K		2½ Ni-1½ Cr-Mo					K31820	formerly Ty VI	100-125	80																		
	Gr L		1¾ Ni-¾ Cr-Mo					K24055	formerly Ty VII	155-180	135																2112		
	Gr J, Cl 110		1 Cr- ½ Mo					G41370	formerly Ty VIII	135-160	110			√					√										
	Gr M, Cl A		3 Ni-1¾ Cr-½ Mo						formerly Ty IX, Cl A	105-130	85																2111, 2113		
	Gr M, Cl B		3 Ni-1¾ Cr-½ Mo						formerly Ty IX, Cl B	120-145	100																2111, 2113		
SA-376	Gr TP304		18 Cr-8 Ni	SP		8	1	S30400		75	30	√	√	√				√	√								√		N201, 253, 290
	Gr TP304		18 Cr-8 Ni		≥ NPS 8 & ≥ Sch 140	8	1	S30400		70	30		√	√				√	√								√		N201, 253, 290
	Gr TP304H		18 Cr-8 Ni			8	1	S30409		75	30	√	√	√				√	√								√		N201, 253, 290
	Gr TP304N		18 Cr-8 Ni-N			8	1	S30451		80	35	√	√	√				√	√								√		N253
	Gr TP304LN		18 Cr-8 Ni-N			8	1	S30453		75	30		√					√									√	2127	
	Gr TP316		16 Cr-12 Ni-2 Mo			8	1	S31600		75	30	√	√	√				√	√								√		N201, 253, 290
	Gr TP316H		16 Cr-12 Ni-2 Mo	SP		8	1	S31609		75	30	√	√	√				√	√								√		N201, 253, 290
	Gr TP316N		16 Cr-12 Ni-2 Mo-N			8	1	S31651		80	35	√	√	√				√	√								√		N253
	Gr TP316LN		16 Cr-12 Ni-2 Mo-N			8	1	S31653		75	30		√					√									√		
	Gr TP321		18 Cr-10 Ni-Ti		≤ ⅜	8	1	S32100		75	30	√	√	√				√	√								√		N253, 290
	Gr TP321		18 Cr-10 Ni-Ti		> ⅜	8	1	S32100		70	25		√	√				√	√								√		N290
	Gr TP321H		18 Cr-10 Ni-Ti		≤ ⅜	8	1	S32109		75	30	√	√	√				√	√								√		N253, 290
	Gr TP321H		18 Cr-10 Ni-Ti		> ⅜	8	1	S32109		70	25		√	√				√	√								√		N290

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-376	Gr TP347		18 Cr-10 Ni-Cb			8	1	S34700		75	30	√	√	√				√	√								√			
(Con't)	Gr TP347H		18 Cr-10 Ni-Cb			8	1	S34709		75	30	√	√	√				√	√								√			
	Gr TP348		18 Cr-10 Ni-Cb			8	1	S34800		75	30	√	√	√				√	√								√			
	Gr 16-8-2H		16 Cr-8 Ni-2 Mo			8	1	S16800		75	30																√			
	-----		19 Cr-15 Ni-4 Mo			8	4	S31725	317LM	75	30			√													√			
	-----		19 Cr-15½ Ni-4 Mo			8	4	S31726	317L4	80	35																√			
	(Case only)		24Cr-17Ni-6Mn-4.5Mo-N					S34565	4565S	115	60																	2146		
SA-387	Gr 2, Cl 1		½ Cr-½ Mo	Pl		3	1	K12143		55-80	33	√	√	√				√	√								√			
	Gr 2, Cl 2		½ Cr-½ Mo			3	2	K12143		70-90	45		√	√					√								√			
	Gr 12, Cl 1		1 Cr-½ Mo			4	1	K11757		55-80	33	√	√	√				√	√								√		N253	
	Gr 12, Cl 2		1 Cr-½ Mo			4	1	K11757		65-85	40	√	√	√				√	√								√		N253	
	Gr 11, Cl 1		1¼ Cr-½ Mo-Si			4	1	K11789		60-85	35	√	√	√				√	√								√		N201	
	Gr 11, Cl 2		1¼ Cr-½ Mo-Si			4	1	K11789		75-100	45	√	√	√				√	√								√			
	Gr 22, Cl 1		2¼ Cr-1 Mo			5A	1	K21590		60-85	30	√	√	√				√	√								√		N201, 253	
	Gr 22, Cl 2		2¼ Cr-1 Mo			5A	1	K21590		75-100	45	√	√	√				√	√								√	1473	N253	
	Gr 22L, Cl 1		2¼ Cr-1 Mo					K21590		60-85	30																			
	Gr 21, Cl 1		3 Cr-1 Mo			5A	1	K31545		60-85	30	√	√	√				√	√								√			
	Gr 21, Cl 2		3 Cr-1 Mo			5A	1	K31545		75-100	45	√	√	√				√	√								√	1473		
	Gr 21L, Cl 1		3 Cr-1 Mo							60-85	30																			
	Gr 5, Cl 1		5 Cr-½ Mo			5B	1	K41545		60-85	30	√	√	√				√	√								√			
	Gr 5, Cl 2		5 Cr-½ Mo	Pl		5B	1	K41545		75-100	45		√	√				√	√								√			
	Gr 9, Cl 1		9 Cr-1 Mo					S50400		60-85	30																			
	Gr 9, Cl 2		9 Cr-1 Mo					S50400		75-100	45																			
	Gr 91, Cl 2		9 Cr-1 Mo-V			5B	2	S50460		85-110	60	√	√	√				√									√	1973	N466, 253	
	(Case only)		3 Cr-1 Mo-¼ V						Gr 3V	85-110	60																	1961		
SA-395			3 C-3 Si	Ca				F32800	Nodular iron	60	40																	1939	N205	
SA-403	Gr 304		18 Cr-8 Ni	Fi		8	1	S30400		75	30		√	√				√	√								√		N201, 253	

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO.		UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi		SECTION II, PART D COVERAGE																IX	CODE CASE COVERAGE		NOTES
												TABLE 1A			TABLE 1B			TABLE 2A		TABLE 2B		TABLE 3			TABLE 4							
						P	Gr			UTS	YS	I	III 2/3	VIII 1	I	III 2/3	VIII 1	III 1	VIII 2	III 1	VIII 2	III 2/3	VIII 1	VIII 2	III 1	VIII 2	QW 422	NON-NUCL	NUCL	
SA-403 (Con't)	Gr 304H		18 Cr-8 Ni			8	1	S30409		75	30		√	√				√	√								√		N201, 253	
	Gr 304L		18 Cr-8 Ni			8	1	S30403		70	25		√	√				√	√								√			
	Gr 304LN		18 Cr-8 Ni-N			8	1	S30453		75	30		√					√									√			
	Gr 304N		18 Cr-8 Ni-N			8	1	S30451		80	35		√	√				√	√								√			
	Gr 309		23 Cr-12 Ni			8	2	S30900		75	30		√	√				√	√								√			
	Gr 310		25 Cr-20 Ni			8	2	S31000		75	30		√	√				√	√								√			
	Gr 316		16 Cr-12 Ni-2 Mo			8	1	S31600		75	30		√	√				√	√								√		N201, 253	
	Gr 316H		16 Cr-12 Ni-2 Mo			8	1	S31609		75	30		√	√				√									√		N201, 253	
	Gr 316LN		16 Cr-12 Ni-2 Mo-N			8	1	S31653		75	30		√					√									√			
	Gr 316L		16 Cr-12 Ni-2 Mo			8	1	S31603		70	25		√	√				√	√								√		N253	
	Gr 316N		16 Cr-12 Ni-2 Mo-N			8	1	S31651		80	35		√	√				√	√								√			
	Gr 317		18 Cr-13 Ni-3 Mo			8	1	S31700		75	30			√					√								√			
	Gr 317L		18 Cr-13 Ni-3 Mo			8	1	S31703		75	30			√					√								√			
	Gr 321		18 Cr-10 Ni-Ti			8	1	S32100		75	30		√	√				√	√								√		N253	
	Gr 321H		18 Cr-10 Ni-Ti			8	1	S32109		75	30		√	√				√	√								√		N253	
	Gr 347		18 Cr-10 Ni-Cb			8	1	S34700		75	30		√	√				√	√								√			
	Gr 347H		18 Cr-10 Ni-Cb			8	1	S34709		75	30		√	√				√	√								√			
	Gr 348		18 Cr-10 Ni-Cb			8	1	S34800		75	30		√	√				√	√								√			
	Gr 348H		18 Cr-10 Ni-Cb	Fi		8	1	S34809		75	30		√	√				√	√								√			
	Gr XM-19		22 Cr-13 Ni-5 Mn			8	3	S20910		100	55		√	√				√	√								√			
	-----		20Cr-18Ni-6Mo-Cu-N					S31254	254 SMO	94	44																		N441	
	-----		24Cr-17Ni-6Mn-4.5Mo-N					S34565	4565S	115	60																	2146		
	(Case only)		24 Cr-22 Ni-7.5 Mo					S32654	654 SMO	109	62																	2195		
SA-409	Gr TP304		18 Cr-8 Ni	WP		8	1	S30400		75	30		√														√			
	Gr TP304L		18 Cr-8 Ni			8	1	S30403		70	25		√														√			
	Gr TP309S		23 Cr-12 Ni			8	2	S30908		75	30																√			
	Gr TP309Cb		23 Cr-12 Ni-Cb			8	2	S30940		75	30																√			
	Gr TP310S		25 Cr-20 Ni			8	2	S31008		75	30																√			
	Gr TP310Cb		25 Cr-20 Ni-Cb			8	2	S31040		75	30																√			
	Gr TP316		16 Cr-12 Ni-2 Mo			8	1	S31600		75	30		√														√			
	Gr TP316L		16 Cr-12 Ni-2 Mo			8	1	S31603		70	25		√														√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-409	Gr TP317		18 Cr-13 Ni-3 Mo			8	1	S31700		75	30																√			
(Con't)	Gr TP321		18 Cr-10 Ni-Ti			8	1	S32100		75	30		√														√			
	Gr TP347		18 Cr-10 Ni-Cb			8	1	S34700		75	30		√														√			
	Gr TP348		18 Cr-10 Ni-Ti			8	1	S34800		75	30		√														√			
	-----		20Cr-18Ni-6Mo-Cu-N			8	4	S31254	254 SMO	94	44																√			
	-----		21 Cr-11 Ni-N			8	2	S30815	253 MA	87	45																√	2033		
	-----		19 Cr-15 Ni-4 Mo			8	4	S31725	317LM	75	30			√													√			
	-----		19 Cr-15½ Ni-4 Mo			8	4	S31726	317L4	80	35																√			
	-----		24 Cr-17 Ni-6 Mn-4.5 Mo-N					S34565	4565S	115	60																	2146		
SA-414	Gr A		C Stl	Sh		1	1	K01501		45-60	25			√													√	1518		
	Gr B		C Stl			1	1	K02201		50-65	30			√													√	1518		
	Gr C		C Stl			1	1	K02503		55-70	33		√	√													√	1518		
	Gr D		C-Mn Stl			1	1	K02505		60-75	35			√													√	1518		
	Gr E		C-Mn Stl			1	1	K02704		65-85	38			√													√	1518		
	Gr F		C-Mn Stl			1	2	K03102		70-90	42			√													√	1518		
	Gr G		C-Mn Stl			1	2	K03103		75-95	45			√													√	1518		
SA-420	Gr WPL6		C-Mn-Si Stl	WFi		1	1			60-85	35		√	√				√	√								√			
	Gr WPL9		2 Ni-1 Cu			9A	1	K22035		63-88	46		√	√					√								√			
	Gr WPL3		3½ Ni			9B	1			65-90	35			√					√								√			
	Gr WPL8		9 Ni			11A	1	K81340		100-125	75			√					√								√			
SA-423	Gr 1		¾ Cr-½ Ni-Cu	Sm & WT		4	2	K11535		60	37	√		√					√								√			
	Gr 2		¾ Ni-½ Cu-Mo			4	2	K11540		60	37	√		√					√								√			
SA-426	Gr CP1		C-½ Mo	CCP		3	1	J12521	CP1	65	35		√					√									√			
	Gr CP2		½ Cr-½ Mo			3	1	J11547	CP2	60	30		√					√									√			
	Gr CP5		5 Cr-½ Mo			5B	1	J42045	CP5	90	60		√					√									√			
	Gr CP5b		5 Cr-½ Mo-Si			5B	1	J51545	CP5b	60	30																√			
	Gr CP9		9 Cr-1 Mo			5B	1	J82090	CP9	90	60		√					√									√			
	Gr CP11		1¼ Cr-½ Mo			4	1	J12072	CP11	70	40		√					√									√			
	Gr CP12		1 Cr-½ Mo			4	1	J11562	CP12	60	30		√					√									√			
	Gr CP15		C-½ Mo-Si			3	1	J11522	CP15	60	30																√			
	Gr CP21		3 Cr-1 Mo			5A	1	J31545	CP21	60	30		√					√									√			
	Gr CP22		2¼ Cr- 1 Mo			5A	1	J21890	CP22	70	40		√					√									√		N201	

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-426	Gr CPCA15		13 Cr			6	3	J91150	CPCA15	90	65		√					√									√			
(Con't)	(Case only)		9 Cr-1 Mo-V							85	60																	2192		
SA-430	Gr FP304		18 Cr-8 Ni	FBP		8	1	S30400		70	30	√	√	√				√									√		N201, 253	
	Gr FP304H		18 Cr-8 Ni			8	1	S30409		70	30	√	√	√				√	√								√		N201, 253	
	Gr FP304N		18 Cr-8 Ni-N			8	1	S30451		75	35	√	√	√				√	√								√		N253	
	Gr FP316		16 Cr-12 Ni-2 Mo			8	1	S31600		70	30	√	√	√				√									√		N201, 253	
	Gr FP316H		16 Cr-12 Ni-2 Mo			8	1	S31609		70	30	√	√	√				√	√								√		N201, 253	
	Gr FP316N		16 Cr-12 Ni-2 Mo-N			8	1	S31651		75	35	√	√	√				√	√								√		N253	
	Gr FP321		18 Cr-10 Ni-Ti			8	1	S32100		70	30	√	√	√				√	√								√		N253	
	Gr FP321H		18 Cr-10 Ni-Ti			8	1	S32109		70	30	√	√	√				√	√								√		N253	
	Gr FP347		18 Cr-10 Ni-Cb			8	1	S34700		70	30	√	√	√				√									√			
	Gr FP347H		18 Cr-10 Ni-Cb			8	1	S34709		70	30	√	√	√				√	√								√			
	Gr FP16-8-2H		16 Cr-8 Ni-2 Mo			8	1	S16800		70	30																√			
SA-437	Gr B4B		12 Cr-1 Mo-V-W	Bo				K91352		145	105											√			√					
	Gr B4C		12 Cr-1 Mo-V-W					K91352		115	85											√			√					
	Gr B4D		1 Cr-½ Mo-V		≤ 2½			K14072		125	105																			
	Gr B4D		1 Cr-½ Mo-V	Bo	> 2½ to 4 incl.			K14072		110	95																			
	Gr B4D		1 Cr-½ Mo-V		> 4 to 7 incl.			K14072		100	85																			
SA-449	-----		C Stl	Bo & Sd	¼ to 1 incl.			K04200		120	92											√	√						N249	
	-----		C Stl		>1 to 1½ incl.			K04200		105	81											√	√						N249	
	-----		C Stl		>1½ to 3 incl.			K04200		90	58											√	√						N249	
SA-451	Gr CPF3		18 Cr-8 Ni	CCP		8	1	J92500	CPF3	70	30		√					√									√			
	Gr CPF3A		18 Cr-8 Ni			8	1	J92500	CPF3A	77	35		√					√									√			
	Gr CPF3M		16 Cr-12 Ni-2 Mo			8	1	J92800	CPF3M	70	30		√					√									√			
	Gr CPF8		18 Cr-8 Ni			8	1	J92600	CPF8	70	30		√					√									√			
	Gr CPF8A		18 Cr-8 Ni			8	1	J92600	CPF8A	77	35		√					√									√			
	Gr CPF8M		16 Cr-12 Ni-2 Mo			8	1	J92900	CPF8M	70	30		√					√									√			
	Gr CPF8C		18 Cr-10 Ni-Cb			8	1	J92710	CPF8C	70	30		√					√									√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-451	Gr CPH8		25 Cr-12 Ni			8	2	J93400	CPH8	65	28		√					√									√			
(Con't)	Gr CPK20		25 Cr-20 Ni			8	2	J94202	CPK20	65	28		√					√									√			
	Gr CPH20		25 Cr-12 Ni			8	2	J93402	CPH20	70	30		√					√									√			
	Gr CPF10MC		16 Cr-14 Ni-2 Mo						CPF10MC	70	30																			
	Gr CPF8C		18 Cr-10 Ni-Cb					J92710	CPF8C (limited Ta)	70	30																			
	Gr CPH10		25 Cr-12 Ni					J93401	CPH10	70	30																			
	Gr CPE20N		24 Cr-9 Ni-N							80	40																			
SA-452	Gr TP304H		18 Cr-8 Ni	CWP		8	1	S30409		75	30		√	√				√									√		N253	
	Gr TP347H		18 Cr-10 Ni-Cb			8	1	S34709		75	30		√	√				√									√			
	Gr TP316H		16 Cr-12 Ni-2 Mo			8	1	S31609		75	30		√	√				√									√		N253	
SA-453	Gr 660, Cl A	ST 1650°F H 1325°F	25 Ni-15 Cr-2 Ti	Bo				S66286	A-286 SS	130	85											√	√		√				N60, 249, 253	
	Gr 660, Cl B	ST 1800°F H 1325°F	25 Ni-15 Cr-2 Ti					S66286	A-286 SS	130	85											√	√		√				N60, 249, 253	
	Gr 660, Cl C	ST 1800°F H 1425°F	25 Ni-15 Cr-2 Ti					S66286	A-286 SS	130	85																			
	Gr 651, Cl A		19 Cr-9 Ni-Mo-W		≤ 3 dia.			S63198	19-9 DL	100	70											√	√		√				N253	
	Gr 651, Cl A		19 Cr-9 Ni-Mo-W		> 3 dia.			S63198	19-9 DL	100	60											√	√		√				N253	
SA-453	Gr 651, Cl B		19 Cr-9 Ni-Mo-W	Bo	≤ 3 dia.			S63198	19-9 DL	95	60											√	√		√				N253	
(Con't)	Gr 651, Cl B		19 Cr-9 Ni-Mo-W		> 3 dia.			S63198	19-9 DL	95	50											√	√		√				N253	
	Gr 662, Cl A		26 Ni-14 Cr-Mo-Ti					S66220	Discaloy	130	85																			
	Gr 662, Cl B		26 Ni-14 Cr-Mo-Ti					S66220	Discaloy	125	80																			
	Gr 665, Cl A		26 Ni-14 Cr-Mo-Ti					S66545	W545	170	120																			
	Gr 665, Cl B		26 Ni-14 Cr-Mo-Ti					S66545	W545	155	120																			
SA-455	-----		C-Mn Stl	Pl	≤ .375	1	2	K03300		75-95	38		√	√													√	1518		
	-----		C-Mn Stl		> .375 to .580	1	2	K03300		73-93	37		√	√													√	1518		
	-----		C-Mn Stl		> .580 to .750	1	2	K03300		70-90	35		√	√													√	1518		
SA-476	-----		3 C -3 Si	Ca				F34100	Ductile or nodular iron	80	60																			
SA-479	Ty XM-11	Annealed	21 Cr-6 Ni-9 Mn	Ba & Sa		8	3	S21904	Nitronic 40	90	50																√			
	Ty XM-17	Annealed	19 Cr-8 Mn-6 Ni-Mo-N			8	3	S21600		90	50																√			
	Ty XM-18	Annealed	19 Cr-8 Mn-6 Ni-Mo-N			8	3	S21603		90	50																√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-479	-----	Annealed	18 Cr -8 Ni-4 Si-N			8	3	S21800	Nitronic 60	95	50		√					√									√			
(Con't)	-----		16½Cr-5Ni-5Mn - 3½Si					S20161	Gall Tough	125	50																			
	-----	Annealed	20Cr-18Ni-6Mo-Cu-N			8	4	S31254	254 SMO	95	44																√			
	-----	Annealed	24 Cr-17 Ni-6 Mn-4.5 Mo-N					S34565	4565S	115	60																	2146		
	Ty XM-19	Annealed	22 Cr-13 Ni-5 Mn			8	3	S20910	Nitronic 50	100	55		√	√				√	√				√				√			
	Ty XM-19	HR	22 Cr-13 Ni-5 Mn		≤ 2			S20910	Nitronic 50	135	105												√							
	Ty XM-19	HR	22 Cr-13 Ni-5 Mn		> 2 to 3 incl.			S20910	Nitronic 50	115	75												√							
	Ty XM-19	HR	22 Cr-13 Ni-5 Mn		> 3 to 8 incl.			S20910	Nitronic 50	100	60												√							
	Ty XM-19	Strain Hardened	22 Cr-13 Ni-5 Mn		≤ 1½			S20910	Nitronic 50	145	125																			
	Ty XM-19	Strain Hardened	22 Cr-13 Ni-5 Mn		> 1½ to 2¼ incl.			S20910	Nitronic 50	120	105																			
	Ty XM-29	Annealed	18 Cr-3 Ni-12 Mn			8	3	S24000	18-3 Mn	100	55			√													√			
	-----		21 Cr-11 Ni-N			8	2	S30815	253 MA	87	45			√													√	2033		
	Ty 302	Annealed	18 Cr-8 Ni			8	1	S30200		75	30		√	√				√									√			
	Ty 304		18 Cr-8 Ni			8	1	S30400		75	30	√	√	√				√									√	1896	N201, 253	
	Ty 304H		18 Cr-8 Ni			8	1	S30409		75	30	√	√	√				√									√		N201, 253	
SA-479	Ty 304L		18 Cr-8 Ni	Ba & Sa		8	1	S30403		70	25		√	√				√									√	1896		
(Con't)	Ty 304N		18 Cr-8 Ni-N			8	1	S30451		80	35	√	√					√									√			
	Ty 304LN		18 Cr-8 Ni-N			8	1	S30453		75	30		√					√									√	2127		
	Ty ER308		20 Cr-10 Ni					S30880		75	30		√					√												
	Ty 309S		23 Cr-12 Ni			8	2	S30908		75	30	√		√				√									√			
	Ty 309Cb		23 Cr-12 Ni-Cb			8	2	S30940		75	30			√													√			
	Ty 310S		25 Cr-20 Ni			8	2	S31008		75	30	√	√	√													√			
	Ty 310Cb		25 Cr-20 Ni-Cb			8	2	S31040		75	30			√													√			
	Ty 316		16 Cr-12 Ni-2 Mo			8	1	S31600		75	30	√	√	√				√									√	1896	N201, 253	
	Ty 316H		16 Cr-12 Ni-2 Mo			8	1	S31609		75	30	√	√					√									√		N201, 253	
	Ty 316L		16 Cr-12 Ni-2 Mo			8	1	S31603		70	25		√	√				√									√	1896	N253	

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SA-479 (Con't)	Ty 316-Level 1	Strain Hardened	16 Cr-12 Ni-2 Mo					S31600		85	65																		N60	
	Ty 316-Level 2	Strain Hardened	16 Cr-12 Ni-2 Mo		≤ 2			S31600		95	75																			
	Ty 316-Level 2	Strain Hardened	16 Cr-12 Ni-2 Mo		> 2 to 2½ incl.			S31600		90	65																			
	Ty 316-Level 2	Strain Hardened	16 Cr-12 Ni-2 Mo		> 2½ to 3 incl.			S31600		80	55																			
	Ty 316N		16 Cr-12 Ni-2 Mo-N			8	1	S31651		80	35	√	√					√									√			
	Ty 316LN		16 Cr-12 Ni-2 Mo-N			8	1	S31653		75	30		√					√									√			
	Ty 316Cb		16 Cr-12 Ni-2 Mo-Cb			8	1	S31640		75	30																√			
	Ty 316Ti		16 Cr-12 Ni-2 Mo-Ti			8	1	S31635		75	30																√			
	Ty S31725		19 Cr-15 Ni-4 Mo			8	4	S31725	317LM	75	30			√													√			
	Ty S31726		19 Cr-15½ Ni-4 Mo			8	4	S31726	317L4	80	35																√			
	Ty 321		18 Cr-10 Ni-Ti			8	1	S32100		75	30	√	√	√				√									√		N253	
	Ty 321H		18 Cr-10 Ni-Ti			8	1	S32109		75	30	√	√					√									√		N253	
	Ty 347		18 Cr-10 Ni-Cb			8	1	S34700		75	30	√	√	√				√									√			
	Ty 347H		18 Cr-10 Ni-Cb			8	1	S34709		75	30	√	√					√									√			
	Ty 348		18 Cr-10 Ni-Cb			8	1	S34800		75	30	√	√	√				√									√			
	Ty 348H		18 Cr-10 Ni-Cb			8	1	S34809		75	30	√	√					√									√			
	Ty 403	Annealed	12 Cr			6	1	S40300		70	40		√					√									√			
	Ty 403	Cond'n 1	12 Cr	Ba & Sa		6	1	S40300		70	40							√									√			
	Ty 403	Cond'n 2	12 Cr					S40300		110	85																			
	Ty 403	Cond'n 3	12 Cr					S40300		130	100																			
	Ty 410	Annealed	13 Cr			6	1	S41000		70	40	√	√	√				√									√			
	Ty 410	Cond'n 1	13 Cr			6	1	S41000		70	40							√									√			
	Ty 410	Cond'n 2	13 Cr					S41000		110	85																			
	Ty 410	Cond'n 3	13 Cr					S41000		130	100																			
	Ty 414	Tempered	12½ Cr-2 Ni-Si			6	4	S41400		115	90							√									√			
	Ty S41500	N & T	13 Cr-4½ Ni-Mo			6	4	S41500	(Wrought CA6NM)	115	90																√			
	Ty XM-30	Annealed	12½ Cr-Cb					S41040		70	40																			
	Ty XM-30	Q & T	12½ Cr-Cb					S41040		125	100																		N62	
	Ty 405	Annealed	12 Cr-1 Al			7	1	S40500		60	25		√	√				√									√			
	Ty 430	Annealed	17 Cr			7	2	S43000		70	40	√	√	√													√			
	Ty 439	Annealed	17 Cr-Ti			7	2	S43035	Formerly XM-8	70	40			√													√			

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SA-479	Ty XM-27	Annealed	27 Cr-1 Mo			10I	1	S44627		65	40		√	√				√								√			
(Con't)	-----	Annealed	18 Cr-2 Mo			7	2	S44400	18-2	60	45															√			
	-----	Annealed	29 Cr-4 Mo			10J	1	S44700	29-4	70	55			√												√			
	-----	Annealed	29 Cr-4 Mo-2 Ni			10K	1	S44800	29-4-2	70	55			√												√			
	Ty F255	Annealed	25 Cr-5 Ni-3 Cu -2 Mo			10H	1	S32550	Ferralium 255	110	80			√												√			
	Ty 309H		23 Cr-12 Ni					S30909		75	30	√		√					√										
	Ty 310H		25 Cr-20 Ni					S31009		75	30	√		√															
	Ty S32950		26 Cr-4 Ni-Mn-N					S32950	7 Mo Plus	100	70																		
	Ty 431	Annealed	16 Cr-2 Ni					S43100		115	90																		
	-----		18 Cr-20 Ni-5.5 Si					S32615	Alloy SX	80	32																	2029	
	-----		18 Cr-15 Ni-4 Si			8	1	S30600	18-15 LC Si	78	35															√	1953		
	-----		22 Cr-5 Ni-3 Mo-N					S31803	2205	90	65																		
	-----		25 Cr-7 Ni-4 Mo-N		≤ 2			S32750	SAF 2507	116	80																		
	-----		25 Cr-7 Ni-4 Mo-N		> 2			S32750	SAF 2507	110	75																		
	Ty 317		18 Cr-13 Ni-3 Mo					S31700		75	30																		
	-----		27 Cr-32 Ni-Cb					S33228	Nicrofer 3228 NbCe or Alloy AC66	73	27																		
	-----		25 Cr - 7 Ni - 3½ Mo - Cu - W - N					S39277	AF918	118	85																		
	(Case only)		18 Cr-17 Ni-5.3 Si					S30601	18-17 LC	78-107	37																	2125	
SA-487	Gr 1A	N & T	Mn-V	Ca		10A	1	J13002	Old 1N	85-110	55		√	√				√	√							√			
	Gr 1B	Q & T	Mn-V	Ca		10A	1	J13002	Old 1Q	90-115	65			√												√			
	Gr 1C		Mn-V					J13002		90	65																		
	Gr 2A	N & T	Mn-¼ Mo-V			10F	1	J13005	Old 2N	85-110	53		√	√				√								√			
	Gr 2B	Q & T	Mn-¼ Mo-V			10F	1	J13005	Old 2Q	90-115	65			√												√			
	Gr 2C		Mn-¼ Mo-V					J13005		90	65																		
	Gr 4A	N & T	½ Ni-½ Cr-¼ Mo-V			10F	1	J13047	Old 4N	90-115	60		√	√				√	√							√			
	Gr 4B	Q & T	½ Ni-½ Cr-¼ Mo-V			11A	3	J13047	Old 4Q	105-130	85			√												√			
	Gr 4C		½ Ni-½ Cr-¼ Mo-V					J13047		90	60																		

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SA-487	Gr 4D		½ Ni-½ Cr-¼ Mo-V					J13047		100	75																			
(Con't)	Gr 4E	Q & T	½ Ni-½ Cr-¼ Mo-V			11A	3	J13047	Old 4QA	115	95			√													√			
	Gr 6A	N & T	Mn-Ni-Cr-Mo					J13855	Old 6N	115	80																			
	Gr 6B	Q & T	Mn-Ni-Cr-Mo					J13855	Old 6Q	120	95																			
	Gr 7A	Q & T	Ni-Cr-Mo-V					J12084	Old 7Q	115	100																			
	Gr 8A	N & T	2¼ Cr-1 Mo			5C	1	J22091	Old 8N	85-110	55			√				√	√								√			
	Gr 8B	Q & T	2¼ Cr-1 Mo			5C	4	J22091	Old 8Q	105	85																√			
	Gr 8C		2¼ Cr-1 Mo			5C	4	J22091		100	75																√			
	Gr 9A	N & T	1 Cr- ½ Mo					J13345	Old 9N	90	60																			
	Gr 9B	Q & T	1 Cr- ½ Mo					J13345	Old 9Q	105	85																			
	Gr 9C		1 Cr- ½ Mo					J13345		90	60																			
	Gr 9D		1 Cr- ½ Mo					J13345		100	75																			
	Gr 9E		1 Cr- ½ Mo					J13345		115	95																			
	Gr 10A	N & T	1½ Ni-¾ Cr-¼ Mo					J23015	Old 10N	100	70																			
	Gr 10B	Q & T	1½ Ni-¾ Cr-¼ Mo					J23015	Old 10Q	125	100																		N71	
	Gr 11A	N & T	Ni-Cr-Mo					J12082	Old 11N	70-95	40																			
	Gr 11B	Q & T	Ni-Cr-Mo					J12082	Old 11Q	105-130	85																			
	Gr 12A	N & T	Ni-Cr-Mo					J22000	Old 12N	70-95	40																			
	Gr 12B	Q & T	Ni-Cr-Mo					J22000	Old 12Q	105-130	85																			
	Gr 13A	N & T	Ni-Mo					J13080	Old 13N	90-115	60																			
	Gr 13B	Q & T	Ni-Mo	Ca				J13080	Old 13Q	105-130	85																			
	Gr 14A	Q & T	Ni-Mo					J15580	Old 14Q	120-145	95																			
	Gr 16A	N & T	Low C Mn-Ni			1	2		Old 16N	70-95	40		√					√									√			
	Gr CA6NM-A	N & T	13 Cr-4 Ni			6	4	J91540		110-135	80		√	√				√									√	2073		
	Gr CA6NM-B		13 Cr-4 Ni			6	4	J91540		100	75																√			
	Gr CA15A	N & T	13 Cr					J91150		140-170	110-130																			
	Gr CA15B	N & T	13 Cr			6	3	J91150		90-115	65																√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-487	Gr CA15C		13 Cr			6	3	J91171		90	60																√			
(Con't)	Gr CA15D		13 Cr			6	3	J91171		100	75																√			
	Gr CA15M-A	N & T	13 Cr - Mo			6	3	J91151		90-115	65																√			
SA-508	Gr 1		C-Si Stl	Fo		1	2	K13502	formerly Cl 1	70-95	36		√	√				√	√								√			
	Gr 1A		C-Mn-Si Stl			1	2	K13502	formerly Cl 1a	70-95	36		√	√				√	√								√			
	Gr 2, Cl 1		¾ Ni-½ Mo- ⅓ Cr-V			3	3	K12766	formerly Cl 2	80-105	50		√	√				√	√								√	1473	N253, 557	
	Gr 2, Cl 2		¾ Ni-½ Mo- ⅓ Cr-V			3	3	K12766	formerly Cl 2a	90-115	65		√					√									√			
	Gr 3, Cl 1		¾ Ni-½ Mo-Cr-V			3	3	K12042	formerly Cl 3	80-105	50		√	√				√	√								√	1473	N499, 557	
	Gr 3, Cl 2		¾ Ni-½ Mo-Cr-V			3	3	K12042	formerly Cl 3a	90-115	65		√					√									√			
	Gr 4N, Cl 1		3½ Ni-1¾ Cr-½ Mo-V			11A	5	K22375	formerly Cl 4	105-130	85		√	√				√	√								√		N7	
	Gr 4N, Cl 2		3½ Ni-1¾ Cr-½ Mo-V			11A	5	K22375	formerly Cl 4a	115-140	100			√					√								√		N71	
	Gr 4N, Cl 3		3½ Ni-1¾ Cr-½ Mo-V			3	3	K22375	formerly Cl 4b	90-115	70			√				√	√								√			
	Gr 5, Cl 1		3½ Ni-1¾ Cr-½ Mo-V			11A	5	K42365	formerly Cl 5	105-130	85																√			
	Gr 5, Cl 2		3½ Ni-1¾ Cr-½ Mo-V			11A	5	K42365	formerly Cl 5a	115-140	100													√			√			
	Gr 22, Cl 3		2¼ Cr-1 Mo					K21590	formerly Cl 22B	85-110	55																	1960		
	Gr 3V		3 Cr-1 Mo-¼ V			5C	1	K31830	formerly Cl F3V	85-110	60			√					√								√	1961, 2151		
	Gr 3VCb		2¼ Cr - 1 Mo - V - Cb					K31835		85-110	60																			
SA-515	Gr 60		C-Si Stl	Pl	8 max	1	1	K02401		60-80	32	√	√	√				√	√								√		N253	
	Gr 65		C-Si Stl		8 max	1	1	K02800		65-85	35	√	√	√				√	√								√		N253	
	Gr 70		C-Si Stl		8 max	1	2	K03101		70-90	38	√	√	√				√	√								√		N253	
SA-516	Gr 55		C-Si Stl	Pl	12 max	1	1	K01800		55-75	30	√	√	√				√	√								√	2161		
	Gr 60		C-Mn-Si Stl		8 max	1	1	K02100		60-80	32	√	√	√				√	√								√	2161	N71, 253	
	Gr 65		C-Mn-Si Stl		8 max	1	1	K02403		65-85	35	√	√	√				√	√								√	2161	N71, 253	

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-516 (Con't)	Gr 70		C-Mn-Si Stl		8 max	1	2	K02700		70-90	38	√	√	√				√	√								√	2161	N71, 253	
SA-517	Gr A		½ Cr-¼ Mo-Si	Pl	≤ 2½	11B	1	K11856		115-135	100		√	√				√	√								√		N71	
	Gr A		½ Cr-¼ Mo-Si		2½ to 6	11B	1	K11856		105-135	90																√			
	Gr B		½ Cr- ⅘ Mo-V		≤ 2½	11B	4	K11630		115-135	100		√	√				√	√								√		N71	
	Gr B		½ Cr- ⅘ Mo-V		2½ to 6	11B	4	K11630		105-135	90																√			
	Gr C		1¼ Mn - ¼ Mo - B		≤ 2½			K11511		115-135	100																			
	Gr C		1¼ Mn - ¼ Mo - B		2½ to 6			K11511		105-135	90																			
	Gr E		1¾ Cr-½ Mo-Ti		≤ 2½	11B	2	K21604		115-135	100		√	√				√	√								√		N71	
	Gr E		1¾ Cr-½ Mo-Ti		2½ to 6	11B	2	K21604		105-135	90		√	√				√	√								√		N71	
	Gr F		¾ Ni-½ Cr-½ Mo-V		≤ 2½	11B	3	K11576		115-135	100		√	√				√	√								√		N71	
	Gr F		¾ Ni-½ Cr-½ Mo-V		2½ to 6	11B	3	K11576		105-135	90																√			
	Gr H		1¼ Mn - ¼ Mo - ½ Ni - ½ Cr - V - B		≤ 2½			K11646		115-135	100																			
	Gr H		1¼ Mn - ¼ Mo - ½ Ni - ½ Cr - V - B		2½ to 6			K11646		105-135	90																			
	Gr J		C-½ Mo		≤ 2½	11B	6	K11625		115-135	100		√	√				√	√								√		N71	
	Gr J		C-½ Mo	Pl	2½ to 6	11B	6	K11625		105-135	90																√			
	Gr K		1¼ Mn - ½ Mo - B		≤ 2½			---		115-135	100																			
	Gr K		1¼ Mn - ½ Mo - B		2½ to 6			---		105-135	90																			
	Gr M		½ Mn - ½ Mo - 1¼ Ni - B		≤ 2½			K11683		115-135	100																			
	Gr M		½ Mn - ½ Mo - 1¼ Ni - B		2½ to 6			K11683		105-135	90																			
	Gr P		1¼ Ni -1 Cr -½ Mo		≤ 2½	11B	8	K21650		115-135	100		√	√				√	√								√		N71	

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-517 (Con't)	Gr P		1¼ Ni -1 Cr -½ Mo		2½ to 6	11B	8	K21650		105-135	90		√	√				√	√								√		N71	
	Gr Q		1¼ Mn - ½ Mo - 1¼ Ni - 1¼ Cr - V		≤ 2½			---		115-135	100																			
	Gr Q		1¼ Mn - ½ Mo - 1¼ Ni - 1¼ Cr - V		2½ to 6			---		105-135	90																			
	Gr S		1¼ Mn - ¼ Mo - Ti - Cb		≤ 2½			---		115-135	100																			
	Gr S		1¼ Mn - ¼ Mo - Ti - Cb		2½ to 6			---		105-135	90																			
	Gr T		1¼ Mn - ½ Mo - V - B		≤ 2½			---		115-135	100																			
	Gr T		1¼ Mn - ½ Mo - V - B		2½ to 6			---		105-135	90																			
SA-522	Ty I		9 Ni	Fl, Fi, Va & Pa		11A	1	K81340		100	75		√	√					√								√	2214		
	Ty II		8 Ni			11A	1	K71340		100	75		√														√			
SA-524	Gr I		C-Mn-Si Stl	SP		1	1	K02104		60-85	35			√					√								√		N71	
	Gr II		C-Mn-Si Stl			1	1	K02104		55-80	30			√					√								√		N71	
SA-533	Gr A, Cl 1		Mn-½ Mo	Pl		3	3	K12521		80-100	50		√	√				√	√								√			
	Gr A, Cl 2		Mn-½ Mo			3	3	K12521		90-115	70		√	√				√	√								√			
	Gr A, Cl 3		Mn-½ Mo			11A	4	K12521		100-125	83		√					√									√			
	Gr B, Cl 1		Mn-½ Mo-½ Ni			3	3	K12539		80-100	50		√	√				√	√								√		N499, 557	
	Gr B, Cl 2		Mn-½ Mo-½ Ni	Pl		3	3	K12539		90-115	70		√	√				√	√								√			
	Gr B, Cl 3		Mn-½ Mo-½ Ni			11A	4	K12539		100-125	83		√	√				√	√								√			
	Gr C, Cl 1		Mn-½ Mo-¾ Ni			3	3	K12554		80-100	50		√	√				√	√								√		N253	
	Gr C, Cl 2		Mn-½ Mo-¾ Ni			3	3	K12554		90-115	70		√	√				√	√								√			
	Gr C, Cl 3		Mn-½ Mo-¾ Ni			11A	4	K12554		100-125	83		√					√									√			
	Gr D, Cl 1		Mn-½ Mo-¼ Ni			3	3	K12529		80-100	50		√					√									√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-533 (Con't)	Gr D, Cl 2		Mn-½ Mo-¼ Ni			3	3	K12529		90-115	70		√	√				√	√								√			
	Gr D, Cl 3		Mn-½ Mo-¼ Ni			11A	4	K12529		100-125	83		√	√				√	√								√			
SA-537	Cl 1	Norm'd	C-Mn-Si Stl	Pl	≤ 2½	1	2	K12437		70-90	50		√	√				√	√								√		N71	
	Cl 1	Norm'd	C-Mn-Si Stl		2½ to 4	1	2	K12437		65-85	45		√	√				√	√								√		N71	
	Cl 2	Q & T	C-Mn-Si Stl		≤ 2½	1	3	K12437		80-100	60		√	√				√	√								√	2020	N71, 213	
	Cl 2	Q & T	C-Mn-Si Stl		2½ to 4	1	3	K12437		75-95	55		√	√				√	√								√		N71	
	Cl 2	Q & T	C-Mn-Si Stl		4 to 6	1	3	K12437		70-90	46		√	√				√	√								√			
	Cl 3		C-Mn-Si-Stl		≤ 2½	1	3	K12437		80-100	55			√					√								√			
	Cl 3		C-Mn-Si-Stl		> 2½ to 4	1	3	K12437		75-95	50			√					√								√			
	Cl 3		C-Mn-Si-Stl		> 4 to 6	1	3	K12437		70-90	40			√					√								√			
SA-540	Gr B21, Cl 5		1 Cr-½ Mo-V	Bo	≤ 2			K14073	Cr-Mo-V	120	105											√			√				N201, 249, 253	
	Gr B21, Cl 5		1 Cr-½ Mo-V		> 2 to 8 incl.			K14073	Cr-Mo-V	115	100											√			√				N201, 249, 253	
	Gr B21, Cl 4		1 Cr-½ Mo-V		≤ 6			K14073	Cr-Mo-V	135	120											√			√				N201, 249, 253	
	Gr B21, Cl 3		1 Cr-½ Mo-V	Bo	≤ 6			K14073	Cr-Mo-V	145	130											√			√				N201, 249, 253	
	Gr B21, Cl 2		1 Cr-½ Mo-V		≤ 4			K14073	Cr-Mo-V	155	140											√			√				N201, 249, 253	
	Gr B21, Cl 1		1 Cr-½ Mo-V		≤ 4			K14073	Cr-Mo-V	165	150											√			√				N249	
	Gr B22, Cl 5		1 Cr-1 Mn-¼ Mo		≤ 2			H41420	4142H	120	105											√			√				N249	
	Gr B22, Cl 5		1 Cr-1 Mn-¼ Mo		> 2 to 4 incl.			H41420	4142H	115	100											√			√				N249	
	Gr B22, Cl 4		1 Cr-1 Mn-¼ Mo		≤ 4			H41420	4142H	135	120											√			√				N249	
	Gr B22, Cl 3		1 Cr-1 Mn-¼ Mo		≤ 4			H41420	4142H	145	130											√			√				N249	
	Gr B22, Cl 2		1 Cr-1 Mn-¼ Mo		≤ 3			H41420	4142H	155	140											√			√				N249	
	Gr B22, Cl 1		1 Cr-1 Mn-¼ Mo		≤ 1½			H41420	4142H	165	150											√			√				N249	
	Gr B23, Cl 5		2 Ni-¾ Cr-¼ Mo		≤ 6			H43400	E4340H	120	105											√	√		√				N249	

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-540	Gr B23, Cl 5		2 Ni-¾ Cr-¼ Mo		> 6 to 9			H43400	E4340H	115	100											√	√		√	√			N249	
(Con't)	Gr B23, Cl 4		2 Ni-¾ Cr-¼ Mo		≤ 9½			H43400	E4340H	135	120											√	√		√	√			N249	
	Gr B23, Cl 3		2 Ni-¾ Cr-¼ Mo		≤ 9½			H43400	E4340H	145	130											√	√		√	√			N249	
	Gr B23, Cl 2		2 Ni-¾ Cr-¼ Mo		≤ 9½			H43400	E4340H	155	140											√			√				N249	
	Gr B23, Cl 1		2 Ni-¾ Cr-¼ Mo		≤ 8			H43400	E4340H	165	150											√			√				N249	
	Gr B24, Cl 5		2 Ni-¾ Cr- ⅓ Mo		≤ 6			K24064	4340 Mod.	120	105											√	√		√				N249	
	Gr B24, Cl 5		2 Ni-¾ Cr- ⅓ Mo		> 6 to 9½			K24064	4340 Mod.	115	100											√	√		√	√			N249	
	Gr B24, Cl 4		2 Ni-¾ Cr- ⅓ Mo		≤ 9½			K24064	4340 Mod.	135	120											√	√		√	√			N249	
	Gr B24, Cl 3		2 Ni-¾ Cr- ⅓ Mo		≤ 9½			K24064	4340 Mod.	145	130											√	√		√	√			N249	
	Gr B24, Cl 2		2 Ni-¾ Cr- ⅓ Mo		≤ 9½			K24064	4340 Mod.	155	140											√			√				N249	
	Gr B24, Cl 1		2 Ni-¾ Cr- ⅓ Mo		≤ 8			K24064	4340 Mod.	165	150											√		√	√				N249	
	Gr B24V, Cl 3		2 Ni-¾ Cr- ⅓ Mo-V		≤ 11			K24070	4340V Mod.	145	130											√			√					
	Gr B24V, Cl 2		2 Ni-¾ Cr- ⅓ Mo-V		≤ 11			K24070	4340V Mod.	155	140																			
	Gr B24V, Cl 1		2 Ni-¾ Cr- ⅓ Mo-V		≤ 11			K24070	4340V Mod.	165	150																			
SA-541	Gr 1		C-Si Stl	Fo		1	2	K03506	formerly Cl 1	70-95	36		√	√				√	√								√			
	Gr 1A		C-Mn-Si Stl			1	2		formerly Cl 1A	70-95	36		√	√				√	√								√			
	Gr 2, Cl 1		¾ Ni-½ Mo- ⅓ Cr-V			3	3	K12765	formerly Cl 2	80-105	50		√	√				√	√								√		N253	
	Gr 2, Cl 2		¾ Ni-½ Mo- ⅓ Cr-V			3	3	K12765	formerly Cl 2A	90-115	65		√					√									√			
	Gr 3, Cl 1		½ Ni-½ Mo-V			3	3	K12045	formerly Cl 3	80-105	50		√	√				√	√								√			
	Gr 3, Cl 2		½ Ni-½ Mo-V	Fo		3	3	K12045	formerly Cl 3A	90-115	65		√					√									√			
	Gr 1C		C-Mn-Si-V					K11800	formerly Cl 4	80-105	50																			
	Gr 4N, Cl 1		3½ Ni-1¾ Cr-½ Mo-V					K42343	formerly Cl 7	105-130	85																			
	Gr 4N, Cl 2		3½ Ni-1¾ Cr-½ Mo-V					K42343	formerly Cl 7A	115-140	100																			
	Gr 4N, Cl 3		3½ Ni-1¾ Cr-½ Mo-V					K42343	formerly Cl 7B	90-115	70																			
	Gr 5, Cl 1		3½ Ni-1¾ Cr-½ Mo-V					K42348	formerly Cl 8	105-130	85																			
	Gr 5, Cl 2		3½ Ni-1¾ Cr-½ Mo-V					K42348	formerly Cl 8A	115-140	100																			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-541 (Con't)	Gr 11, Cl 4		1¼ Cr-½ Mo-Si			4	1	K11572	formerly Cl 11C	80-105	50																√			
	Gr 22, Cl 3		2¼ Cr-1 Mo			5C	1	K21390	formerly Cl 22B	85-110	55																√	1960		
	Gr 22, Cl 4		2¼ Cr-1 Mo			5C	4	K21390	formerly Cl 22C	105-130	85																√		N71, 443	
	Gr 22, Cl 5		2¼ Cr-1 Mo			5C	5	K21390	formerly Cl 22D	115-140	100																√			
	Gr 3V		3 Cr-1 Mo-¼ V			5C	1	K31830	formerly Cl F3V	85-110	60			√					√								√	1961, 2151		
	Gr 3VCb		2¼ Cr-1 Mo- V- Cb					K31835		85-110	60																			
	Gr 22V		2¼ Cr-1 Mo-¼ V						formerly Cl 22V	85-110	60																	2098		
SA-542	Ty A, Cl 1		2¼ Cr -1 Mo	Pl		5C	4	K21590		105-125	85																√		N71	
	Ty A, Cl 2		2¼ Cr -1 Mo			5C	5	K21590		115-135	100																√		N71	
	Ty A, Cl 3		2¼ Cr -1 Mo			5C	3	K21590		95-115	75																√		N71	
	Ty A, Cl 4		2¼ Cr -1 Mo			5C	1	K21590		85-110	55																√			
	Ty A, Cl 4a		2¼ Cr -1 Mo			5C	1	K21590		85-110	60																√		N71	
	Ty B, Cl 1		2¼ Cr -1 Mo			5C	4	K21590		105-125	85																√		N71	
	Ty B, Cl 2		2¼ Cr -1 Mo			5C	5	K21590		115-135	100																√		N71	
	Ty B, Cl 3		2¼ Cr -1 Mo	Pl		5C	3	K21590		95-115	75																√		N71	
	Ty B, Cl 4		2¼ Cr -1 Mo			5C	1	K21590		85-110	55																√	1960		
	Ty B, Cl 4a		2¼ Cr -1 Mo			5C	1	K21590		85-110	60																√		N71	
	Ty C, Cl 1		3 Cr -1 Mo-¼ V			5C	4	K31830		105-125	85																√			
	Ty C, Cl 2		3 Cr -1 Mo-¼ V			5C	5	K31830		115-135	100																√			
	Ty C, Cl 3		3 Cr -1 Mo-¼ V			5C	3	K31830		95-115	75																√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO.		UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi		SECTION II, PART D COVERAGE																IX	CODE CASE COVERAGE		NOTES
												TABLE 1A			TABLE 1B			TABLE 2A		TABLE 2B		TABLE 3			TABLE 4						
						P	Gr			UTS	YS	I	III 2/3	VIII 1	I	III 2/3	VIII 1	III 1	VIII 2	III 1	VIII 2	III 2/3	VIII 1	VIII 2	III 1	VIII 2	QW 422	NON-NUCL	NUCL	
SA-542 (Con't)	Ty C, Cl 4		3 Cr -1 Mo-¼ V			5C	1	K31830		85-110	55																√			
	Ty C, Cl 4a		3 Cr -1 Mo-¼ V			5C	1	K31830		85-110	60			√					√								√			
	(Case only)		3 Cr-1 Mo-¼ V			5C	1			85-110	60																	1961		
	Ty D, Cl 1		2¼ Cr-1 Mo-¼ V							105-125	85																			
	Ty D, Cl 2		2¼ Cr-1 Mo-¼ V							115-135	100																			
	Ty D, Cl 3		2¼ Cr-1 Mo-¼ V							95-115	75																			
	Ty D, Cl 4		2¼ Cr-1 Mo-¼ V							85-110	55																			
	Ty D, Cl 4a		2¼ Cr-1 Mo-¼ V							85-110	60																	2098		
	Ty E, Cl 1		3 Cr-1 Mo-¼ V							105-125	85																			
	Ty E, Cl 2		3 Cr-1 Mo-¼ V							115-135	100																			
	Ty E, Cl 3		3 Cr-1 Mo-¼ V							95-115	75																			
	Ty E, Cl 4		3 Cr-1 Mo-¼ V							85-110	55																			
	Ty E, Cl 4a		3 Cr-1 Mo-¼ V							85-110	60																			
SA-543	Ty B, Cl 1		3 Ni-1¾ Cr-½ Mo	Pl		11A	5	K42339		105-125	85			√					√								√		N7	
	Ty B, Cl 2		3 Ni-1¾ Cr-½ Mo			11B	10	K42339		115-135	100			√					√								√			
	Ty B, Cl 3		3 Ni-1¾ Cr-½ Mo			11A	5	K42339		90-115	70			√					√								√			
	Ty C, Cl 1		2¾ Ni-1½ Cr-½ Mo			11A	5			105-125	85			√					√								√			
	Ty C, Cl 2		2¾ Ni-1½ Cr-½ Mo			11B	10			115-135	100			√					√								√			
	Ty C, Cl 3		2¾ Ni-1½ Cr-½ Mo			11A	5			90-115	70			√					√								√			
SA-553	Ty I		9 Ni	Pl		11A	1	K81340		100-120	85		√	√					√								√	2214		

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-553 (Con't)	Ty II		8 Ni			11A	1	K71340		100-120	85		√	√					√								√	2214		
SA-556	Gr A2		C Stl	ST		1	1	K01807		47	26			√													√			
	Gr B2		C-Si Stl			1	1	K02707		60	37			√													√			
	Gr C2		C-Mn-Si Stl			1	2	K03006		70	40			√													√			
SA-557	Gr A2		C Stl	WT		1	1	K01807		47	26			√													√			
	Gr B2		C Stl			1	1	K03007		60	37			√													√			
	Gr C2		C-Si Stl			1	2	K03505		70	40			√													√			
SA-562	-----		C-Mn-Ti-Stl	Pl Co		1	1	K11224		55-75	30			√													√			
SA-563	Gr O		C Stl	Nuts				K05802																						
	Gr A		C Stl					K05802																						
	Gr B		C Stl					K05802																						
	Gr C		C Stl					K05802																						
	Gr D		C Stl					K05801																						
	Gr DH		C Stl					K03800																						
	Gr C3, Cl N		Low alloy steel																											
	Gr C3, Cl A		Low alloy steel					K13643																						
	Gr C3, Cl B		Low alloy steel					K14358																						
	Gr C3, Cl C		Low alloy steel					K12033																						
	Gr C3, Cl D		Low alloy steel					K12059																						
	Gr C3, Cl E		Low alloy steel					K12254																						
	Gr C3, Cl F		Low alloy steel					K12238																						
	Gr DH3		Low alloy steel					K13650																						
SA-564	Ty 630	Sol'n Treated	17 Cr-4 Ni-4 Cu	Ba & Sa				S17400	17-4 PH																					38 HRC max.
	Ty 630	H900	17 Cr-4 Ni-4 Cu					S17400	17-4 PH	190	170																			
	Ty 630	H925	17 Cr-4 Ni-4 Cu					S17400	17-4 PH	170	155																			
	Ty 630	H1025	17 Cr-4 Ni-4 Cu					S17400	17-4 PH	155	145																			
	Ty 630	H1075	17 Cr-4 Ni-4 Cu					S17400	17-4 PH	145	125		√					√											N249	
	Ty 630	H1100	17 Cr-4 Ni-4 Cu					S17400	17-4 PH	140	115		√	√				√				√	√		√				N249	
	Ty 630	H1150	17 Cr-4 Ni-4 Cu					S17400	17-4 PH	135	105		√	√				√											N249	
	Ty 630	H1150M	17 Cr-4 Ni-4 Cu					S17400	17-4 PH	115	75																			
	Ty 631	Sol'n Treated	17 Cr-7 Ni-1 Al	Ba & Sa				S17700	17-7 PH																					98 HRB max.

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SA-564	Ty 631	RH950	17 Cr-7 Ni-1 Al					S17700	17-7 PH	185	150																			
(Con't)	Ty 631	TH1050	17 Cr-7 Ni-1 Al					S17700	17-7 PH	170	140																			
	Ty 632	Sol'n Treated	15 Cr-7 Ni-2½ Mo-1 Al					S15700	15-7 Mo PH																					100 HRB max.
	Ty 632	RH950	15 Cr-7 Ni-2½ Mo-1 Al		≤ 4			S15700	15-7 Mo PH	200	175																			
	Ty 632	TH1050	15 Cr-7 Ni-2½ Mo-1 Al		≤ 6			S15700	15-7 Mo PH	180	160																			
	Ty 634	Sol'n treated	15 Cr-4 Ni-3 Mo					S35500	AM-355																					363 HB max.
	Ty 634	H1000	15 Cr-4 Ni-3 Mo					S35500	AM-355	170	155																			
	Ty 635	Sol'n Treated	17 Cr-7 Ni-Al-Ti					S17600	Stainless W	120	75																			32 HRC max.
	Ty 635	H950	17 Cr-7 Ni-Al-Ti					S17600	Stainless W	190	170																			
	Ty 635	H1000	17 Cr-7 Ni-Al-Ti					S17600	Stainless W	180	160																			
	Ty 635	H1050	17 Cr-7 Ni-Al-Ti					S17600	Stainless W	170	150																			
	Ty XM-12	Sol'n Treated	15 Cr-5 Ni-3 Mo					S15500	15-5 PH																					38 HRC max.
	Ty XM-12	H900	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	190	170																			
	Ty XM-12	H925	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	170	155																			
	Ty XM-12	H1025	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	155	145																		N249	
	Ty XM-12	H1075	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	145	125																		N249	
	Ty XM-12	H1100	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	140	115																			
	Ty XM-12	H1150	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	135	105																			
	Ty XM-12	H1150M	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	115	75																			
	Ty XM-13	Sol'n Treated	13 Cr-8 Ni-2 Mo					S13800	13-8 Mo PH																					38 HRC max.
	Ty XM-13	H950	13 Cr-8 Ni-2 Mo					S13800	13-8 Mo PH	220	205																			
	Ty XM-13	H1000	13 Cr-8 Ni-2 Mo					S13800	13-8 Mo PH	205	190																			
	Ty XM-13	H1025	13 Cr-8 Ni-2 Mo					S13800	13-8 Mo PH	185	175																			
	Ty XM-13	H1050	13 Cr-8 Ni-2 Mo					S13800	13-8 Mo PH	175	165																		N249	
	Ty XM-13	H1100	13 Cr-8 Ni-2 Mo					S13800	13-8 Mo PH	150	135																			
	Ty XM-13	H1150	13 Cr-8 Ni-2 Mo					S13800	13-8 Mo PH	135	90																			
	Ty XM-13	H1150M	13 Cr-8 Ni-2 Mo					S13800	13-8 Mo PH	125	85																			
	Ty XM-16	Sol'n Treated	12 Cr-8 Ni-Cu-Ti					S45500	Custom 455																					36 HRC max.

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SA-564	Ty XM-16	H900	12 Cr-8 Ni-Cu-Ti	Ba & Sa				S45500	Custom 455	235	220																			
(Con't)	Ty XM-16	H950	12 Cr-8 Ni-Cu-Ti					S45500	Custom 455	220	205																			
	Ty XM-16	H1000	12 Cr-8 Ni-Cu-Ti					S45500	Custom 455	205	185																			
	Ty XM-25	Sol'n Treated	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	130	95																			32 HRC max.
	Ty XM-25	H900	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	180	170																			
	Ty XM-25	H950	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	170	160																			
	Ty XM-25	H1000	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	160	150																			
	Ty XM-25	H1025	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	150	140																			
	Ty XM-25	H1050	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	145	135																			
	Ty XM-25	H1100	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	130	105																			
	Ty XM-25	H1150	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	125	75																			
	-----	Sol'n Treated	12 Cr-8 Ni-Cu-Ti					S45503																						36 HRC
	-----	H900	12 Cr-8 Ni-Cu-Ti					S45503		235	220																			
	-----	H950	12 Cr-8 Ni-Cu-Ti					S45503		220	205																			
	-----	H1000	12 Cr-8 Ni-Cu-Ti					S45503		205	185																			
SA-574	Gr 4037		C-¼ Mo	SHS	≤ ½			G40370		180	140											√	√					N249	
	Gr 4037		C-¼ Mo		> ½			G40370		170	135											√	√					N249	
	Gr 4042		C-¼ Mo		≤ ½			G40420		180	140											√	√					N249	
	Gr 4042		C-¼ Mo		> ½			G40420		170	135											√	√					N249	
	Gr 4137		1 Cr- ⅕ Mo		≤ ½			G41370		180	140											√						N249	
	Gr 4137		1 Cr- ⅕ Mo		> ½			G41370		170	135											√						N249	
	Gr 4140		1 Cr- ⅕ Mo		≤ ½			G41400		180	140											√						N249	
	Gr 4140		1 Cr- ⅕ Mo		> ½			G41400		170	135											√						N249	
	Gr 4142		1 Cr- ⅕ Mo		≤ ½			G41420		180	140											√							
	Gr 4142		1 Cr- ⅕ Mo		> ½			G41420		170	135											√							
	Gr 4145		1 Cr- ⅕ Mo		≤ ½			G41450		180	140											√						N249	
	Gr 4145		1 Cr- ⅕ Mo		> ½			G41450		170	135											√						N249	
	Gr 4340		1¾ Ni-¾ Cr-¼ Mo		≤ ½			G43400		180	140											√						N249	
	Gr 4340		1¾ Ni-¾ Cr-¼ Mo		> ½			G43400		170	135											√						N249	
	Gr 8740		½ Ni-½ Cr-¼ Mo		≤ ½			G87400		180	140											√							
	Gr 8740		½ Ni-½ Cr-¼ Mo		> ½			G87400		170	135											√							
	Gr 5137M		¾ Cr		≤ ½					180	140											√							

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SA-574	Gr 5137M		¾ Cr	SHS	> ½					170	135											√								
(Con't)	Gr 51B37M		¾ Cr		≤ ½					180	140											√								
	Gr 51B37M		¾ Cr		> ½					170	135											√								
SA-587	-----		C Stl	WP		1	1	K11500		48	30		√	√													√			
SA-592	Gr A		½ Cr-¼ Mo-Si	FFP	≤ 2½	11 B	1	K11856		115-135	100		√	√					√								√		N71	
	Gr A		½ Cr-¼ Mo-Si		> 2 to 4 incl.	11B	1	K11856		105-135	90		√	√				√									√		N71	
	Gr E		1¾ Cr-½ Mo-Cu		≤ 2½	11B	2	K11695		115-135	100			√					√								√		N71	
	Gr E		1¾ Cr-½ Mo-Cu		> 2 to 4 incl.	11B	2	K11695		105-135	90		√	√				√	√								√		N71	
	Gr F		¾ Ni-½ Cr-½ Mo-V		≤ 2½	11B	3	K11576		115-135	100			√					√								√		N71	
	Gr F		¾ Ni-½ Cr-½ Mo-V		> 2 to 4 incl.	11B	3	K11576		105-135	90		√	√				√	√								√		N71	
SA-612	-----		C-Mn-Si Stl	Pl	≤ ½	10C	1	K02900		83-105	50		√	√													√			
	-----		C-Mn-Si Stl		> ½ to 1	10C	1	K02900		81-101	50		√	√													√			
SA-620	-----		C Stl	CR Sh Dr		1	1	K00040		(40)	(20)			√													√			
SA-638	Gr 660, Ty 1	ST 1650°F & age	25 Ni-15 Cr-2 Ti	Ba & Fo				S66286	A-286 SS	130	85		√					√										2105	N60	
	Gr 660, Ty 2	ST 1800°F & age	25 Ni-15 Cr-2 Ti					S66286	A-286 SS	130	85		√					√										2105	N60	
	Gr 662	ST & age	26 Ni-14 Cr-Mo-Ti		Ba			S66220	Discaloy	130	85																			Ba
	Gr 662	ST & age	26 Ni-14 Cr-Mo-Ti		Fo			S66220	Discaloy	125	80																			Fo
SA-645	-----		5 Ni-¼ Mo	Pl		11A	2	K41583		95	65			√					√								√	2214		
SA-649	Cl 1A, Gr 1		1 Cr-½ Mo	Fo Cor Ro				K14247		150	130																	2122		
	Cl 1A, Gr 2		1 Cr-½ Mo					K14247		100	65																	2122		
	Cl 1B, Gr 1		2 Ni-¾ Cr-¼ Mo					K24040		150	130																	2122		
	Cl 1B, Gr 2		2 Ni-¾ Cr-¼ Mo					K24040		100	65																	2122		
	Cl 2		C-Si Stl					K05001		75	37.5																	2122		
	Cl 3		1 Cr-¼ Mo					K13047		60	30																	2122		

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SA-649	Cl 4		C-Si Stl							60	30																	2122		
(Con't)	Cl 5, Gr 1		C-Mn-Si/Ni Cr Mo							150	130																	2122		
	Cl 5, Gr 2		C-Mn-Si/Ni Cr Mo	Fo Cor Ro						100	65																	2122		
SA-660	Gr WCA		C-Si Stl	CCP		1	1	J02504	WCA	60	30	√	√					√									√			
	Gr WCB		C-Si Stl			1	2	J03003	WCB	70	36	√	√					√									√			
	Gr WCC		C-Mn-Si Stl			1	2	J02505	WCC	70	40	√	√					√									√			
SA-662	Gr A		C-Mn-Si Stl	Pl		1	1	K01701		58-78	40			√					√								√		
	Gr B		C-Mn-Si Stl			1	1	K02203		65-85	40			√					√								√		
	Gr C		C-Mn-Si Stl			1	2	K02007		70-90	43			√					√								√		
SA-666	Ty 201-1	Annealed	17 Cr-4 Ni-6 Mn	Sh, Str, Pl & Ba		8	3	S20100		95	38			√													√		
	Ty 201-2		17 Cr-4 Ni-6 Mn			8	3	S20100		95	45			√													√		
	Ty 201	1/16 Hard	17 Cr-4 Ni-6 Mn					S20100		95	45																		Pl, Sh & Str
	Ty 201	1/16 Hard	17 Cr-4 Ni-6 Mn					S20100		75	40																		Forged bar
	Ty 201	1/8 Hard	17 Cr-4 Ni-6 Mn					S20100		100	55																		
	Ty 201	1/4 Hard	17 Cr-4 Ni-6 Mn					S20100		125	75																		
	Ty 201	1/2 Hard	17 Cr-4 Ni-6 Mn					S20100		150	110																		
	Ty 201	3/4 Hard	17 Cr-4 Ni-6 Mn					S20100		175	135																		
	Ty 201	Full Hard	17 Cr-4 Ni-6 Mn					S20100		185	140																		
	Ty 202	Annealed	18 Cr-5 Ni-9 Mn					S20200		90	38																		
	Ty 202	1/4 Hard	18 Cr-5 Ni-9 Mn					S20200		125	75																		
	-----	Annealed	16 Cr-2 Ni-8 Mn-N					S20400	Nitronic 30	95	48																		
	-----	1/4 Hard	16 Cr-2 Ni-8 Mn-N					S20400	Nitronic 30	140	100																		
	Ty 205	Annealed	17 Cr-1½ Ni-15 Mn					S20500		115	65																		
	Ty 205	1/16 Hard	17 Cr-1½ Ni-15 Mn					S20500		115	65																		
	Ty 205	1/8 Hard	17 Cr-1½ Ni-15 Mn					S20500		115	65																		
	Ty 205	1/4 Hard	17 Cr-1½ Ni-15 Mn					S20500		125	75																		
	Ty 205	1/2 Hard	17 Cr-1½ Ni-15 Mn					S20500		150	110																		
	Ty 205	3/4 Hard	17 Cr-1½ Ni-15 Mn					S20500		175	135																		
	Ty 205	Full Hard	17 Cr-1½ Ni-15 Mn					S20500		185	140																		
	-----	Annealed	18 Cr-5½ Ni-15 Mn					S21460	XM-14, Tenelon	105	55																		
	-----	Annealed	21 Cr-6 Ni-9 Mn			8	3	S21904	XM-11	100	60																√			Sh & Str

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-666	-----	Annealed	21 Cr-6 Ni-9 Mn					S21904	XM-11	90	50			√					√											Pl
(Con't)	-----	¼ Hard	21 Cr-6 Ni-9 Mn					S21904	XM-11	130	115																			
	Ty 301	Annealed	17 Cr-7 Ni	Sh, Str, Pl, Ba				S30100		90	30																			
	Ty 301	1/16 Hard	17 Cr-7 Ni					S30100		90	45																			
	Ty 301	⅛ Hard	17 Cr-7 Ni					S30100		100	55																			
	Ty 301	¼ Hard	17 Cr-7 Ni					S30100		125	75																			
	Ty 301	½ Hard	17 Cr-7 Ni					S30100		150	110																			
	Ty 301	¾ Hard	17 Cr-7 Ni					S30100		175	135																			
	Ty 301	Full Hard	17 Cr-7 Ni					S30100		185	140																			
	Ty 302	Annealed	18 Cr-8 Ni			8	1	S30200		75	30																√			
	Ty 302	1/16 Hard	18 Cr-8 Ni					S30200		85	45																			Pl, Sh & Str
	Ty 302	1/16 Hard	18 Cr-8 Ni					S30200		90	45																			Forged Bar
	Ty 302	⅛ Hard	18 Cr-8 Ni					S30200		100	55																			
	Ty 302	¼ Hard	18 Cr-8 Ni					S30200		125	75																			
	Ty 302	½ Hard	18 Cr-8 Ni					S30200		150	110																			
	Ty 302	¾ Hard	18 Cr-8 Ni					S30200		175	135																			
	Ty 302	Full Hard	18 Cr-8 Ni					S30200		185	140																			
	Ty 304	Annealed	18 Cr-8 Ni			8	1	S30400		75	30																√			
	Ty 304	1/16 Hard	18 Cr-8 Ni					S30400		80	45																			Pl, Sh & Str
	Ty 304	1/16 Hard	18 Cr-8 Ni					S30400		90	45																			Forged Bar
	Ty 304	⅛ Hard	18 Cr-8 Ni					S30400		100	55																			
	Ty 304	¼ Hard	18 Cr-8 Ni					S30400		125	75																			
	Ty 304	½ Hard	18 Cr-8 Ni					S30400		150	110																			
	Ty 304L	Annealed	18 Cr-8 Ni			8	1	S30403		70	25																√			
	Ty 304L	1/16 Hard	18 Cr-8 Ni					S30403		80	45																			
	Ty 304L	⅛ Hard	18 Cr-8 Ni					S30403		100	55																			
	Ty 304L	¼ Hard	18 Cr-8 Ni					S30403		125	75																			
	Ty 304L	½ Hard	18 Cr-8 Ni					S30403		150	110																			
	Ty 304N	Annealed	18 Cr-8 Ni-N			8	1	S30451		80	35																√			
	Ty 304N	1/16 Hard	18 Cr-8 Ni-N					S30451		90	45																			

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SA-666	Ty 304N	⅛ Hard	18 Cr-8 Ni-N					S30451		100	55																			
(Con't)	Ty 304N	¼ Hard	18 Cr-8 Ni-N					S30451		125	75																			
	Ty 304N	½ Hard	18 Cr-8 Ni-N					S30451		150	110																			
	Ty 304LN	Annealed	18 Cr-8 Ni-N	Sh, Str, Pl, Ba		8	1	S30453		80	35																√			
	Ty 304LN	1/16 Hard	18 Cr-8 Ni-N					S30453		90	45																			
	Ty 304LN	⅛ Hard	18 Cr-8 Ni-N					S30453		100	55																			
	Ty 304LN	¼ Hard	18 Cr-8 Ni-N					S30453		125	75																			
	Ty 304LN	½ Hard	18 Cr-8 Ni-N					S30453		150	110																			
	Ty 316	Annealed	16 Cr-12 Ni-2 Mo			8	1	S31600		75	30																√			
	Ty 316	1/16 Hard	16 Cr-12 Ni-2 Mo					S31600		85	45																			Pl, Sh & Str
	Ty 316	1/16 Hard	16 Cr-12 Ni-2 Mo					S31600		90	45																			Forged bar
	Ty 316	⅛ Hard	16 Cr-12 Ni-2 Mo					S31600		100	55																			
	Ty 316	¼ Hard	16 Cr-12 Ni-2 Mo					S31600		125	75																			
	Ty 316	½ Hard	16 Cr-12 Ni-2 Mo					S31600		150	110																			
	Ty 316L	Annealed	16 Cr-12 Ni-2 Mo			8	1	S31603		70	25																√			
	Ty 316L	1/16 Hard	16 Cr-12 Ni-2 Mo					S31603		85	45																			
	Ty 316L	⅛ Hard	16 Cr-12 Ni-2 Mo					S31603		100	55																			
	Ty 316L	¼ Hard	16 Cr-12 Ni-2 Mo					S31603		125	75																			
	Ty 316L	½ Hard	16 Cr-12 Ni-2 Mo					S31603		150	110																			
	Ty 316N	Annealed	16 Cr-12 Ni-2 Mo-N			8	1	S31651		80	35																√			
	Ty 316N	1/16 Hard	16 Cr-12 Ni-2 Mo-N					S31651		90	45																			
	Ty 316N	⅛ Hard	16 Cr-12 Ni-2 Mo-N					S31651		100	55																			
	Ty 316N	¼ Hard	16 Cr-12 Ni-2 Mo-N					S31651		125	75																			
	Ty 316N	½ Hard	16 Cr-12 Ni-2 Mo-N					S31651		150	110																			
SA-667	-----		White/Gray Cast Iron	CC						(16)																				
SA-671	Gr CA55		C Stl	WP		1	1	K02801	SA-285, Gr C	55	30		√					√									√			
	Gr CB60		C-Si Stl			1	1	K02401	SA-515, Gr 60	60	32		√					√									√			
	Gr CB65		C-Si Stl			1	1	K02800	SA-515, Gr 65	65	35		√					√									√			
	Gr CB70		C-Si Stl			1	2	K03101	SA-515, Gr 70	70	38		√					√									√			
	Gr CC60		C-Mn-Si Stl			1	1	K02100	SA-516, Gr 60	60	32		√					√									√			
	Gr CC65		C-Mn-Si Stl			1	1	K02403	SA-516, Gr 65	65	35		√					√									√			
	Gr CC70		C-Mn-Si Stl			1	2	K02700	SA-516, Gr 70	70	38		√					√									√			

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SA-671	Gr CD70		C-Mn-Si Stl			1	2	K12437	SA-537, Cl 1	70	50		√					√									√			
(Con't)	Gr CD80		C-Mn-Si Stl			1	3	K12437	SA-537, Cl 2	80	60		√					√									√			
	Gr CE55		C-Mn-Si Stl			1	1	K02202	SA-442, Gr 55	55	30		√					√									√			
	Gr CE60		C-Mn-Si Stl	WP		1	1	K02402	SA-442, Gr 60	60	32		√					√									√			
	Gr CF65		2½ Ni						SA-203, Gr A																					
	Gr CF70		2½ Ni						SA-203, Gr B																					
	Gr CF66		3½ Ni						SA-203, Gr D																					
	Gr CF71		3½ Ni						SA-203, Gr E																					
	Gr CJ101		½ Cr-¼ Mo-Si						SA-517, Gr A																					
	Gr CJ102		½ Cr- ⅛ Mo-V						SA-517, Gr B																					
	Gr CJ103		1¼ Mn-¼ Mo-B						SA-517, Gr C																					
	Gr CJ104		1 Cr- ⅛ Mo-Ti						SA-517, Gr D																					
	Gr CJ105		1¾ Cr-½ Mo-Ti						SA-517, Gr E																					
	Gr CJ106		¾ Ni-½ Cr-½ Mo-V						SA-517, Gr F																					
	Gr CJ107								SA-517, Gr G																					
	Gr CJ108		1¼ Mn -¼ Mo -½ Ni -½ Cr -V -B						SA-517, Gr H																					
	Gr CJ109		C-½ Mo						SA-517, Gr J																					
	Gr CJ110		1¼ Mn -½ Mo -B						SA-517, Gr K																					
	Gr CJ111								SA-517, Gr L																					
	Gr CJ112		½ Mn-½ Mo-1¼ Ni-B					K11683	SA-517, Gr M																					
	Gr CJ113		1¼ Ni-1 Cr-½ Mo						SA-517, Gr P																					
	Gr CK75		C-Mn-Si Stl			1	2	K02803	SA-299	75	40		√					√									√			
	Gr CP65		Mn-½ Mo						SA-736, Gr 2																					
	Gr CP75		Mn-½ Mo						SA-736, Gr 3																					
SA-672	Gr A45		C Stl	WP		1	1	K01700	SA-285, Gr A	45	24		√					√									√			
	Gr A50		C Stl			1	1	K02200	SA-285, Gr B	50	27		√					√									√			
	Gr A55		C Stl			1	1	K02801	SA-285, Gr C	55	30		√					√									√			
	Gr B55		C-Si Stl			1	1	K02001		55	30		√					√									√			
	Gr B60		C-Si Stl			1	1	K02401	SA-515, Gr 60	60	32		√					√									√			
	Gr B65		C-Si Stl			1	1	K02800	SA-515, Gr 65	65	35		√					√									√			
	Gr B70		C-Si Stl			1	2	K03101	SA-515, Gr 70	70	38		√					√									√			
	Gr C55		C-Si Stl			1	1	K01800	SA-516, Gr 55	55	30		√					√									√			

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SA-672	Gr C60		C-Mn-Si Stl			1	1	K02100	SA-516, Gr 60	60	32		√					√									√			
(Con't)	Gr C65		C-Mn-Si Stl			1	1	K02403	SA-516, Gr 65	65	35		√					√									√			
	Gr C70		C-Mn-Si Stl			1	2	K02700	SA-516, Gr 70	70	38		√					√									√			
	Gr D70		C-Mn-Si Stl			1	2	K12437	SA-537, Cl 1	70	50		√					√									√			
	Gr D80		C-Mn-Si Stl	WP		1	3	K12437	SA-537, Cl 2	80	60		√					√									√			
	Gr E55		C-Mn-Si Stl			1	1	K02202		55	30		√					√									√			
	Gr E60		C-Mn-Si Stl			1	1	K02402		60	32		√					√									√			
	Gr H75		Mn-½ Mo			3	2	K12021	SA-302, Gr A	75	45		√					√									√			
	Gr H80		Mn-½ Mo			3	3	K12022	SA-302, Gr B	80	50							√									√			
	Gr H80		Mn-½ Mo-½ Ni			3	3	K12039	SA-302, Gr C	80	50		√														√			
	Gr H80		Mn-½ Mo-¾ Ni			3	3	K12054	SA-302, Gr D	80																	√			
	Gr J80		Mn-½ Mo			3	3	K12521	SA-533, Gr A, Cl 1	80																	√			
	Gr J80		Mn-½ Mo-½ Ni			3	3	K12539	SA-533, Gr B, Cl 1	80	50		√					√									√			
	Gr J80		Mn-½ Mo-¾ Ni			3	3	K12554	SA-533, Gr C, Cl 1	80																	√			
	Gr J80		Mn-½ Mo-¼ Ni			3	3	K12539	SA-533, Gr D, Cl 1	80																	√			
	Gr J90		Mn-½ Mo			3	3	K12521	SA-533, Gr A, Cl 2	90																	√			
	Gr J90		Mn-½ Mo-½ Ni			3	3	K12539	SA-533, Gr B, Cl 2	90	70		√					√									√			
	Gr J90		Mn-½ Mo-¾ Ni			3	3	K12554	SA-533, Gr C, Cl 2	90																	√			
	Gr J90		Mn-½ Mo-¼ Ni			3	3	K12529	SA-533, Gr D, Cl 2	90																	√			
	Gr J100		Mn-½ Mo			11A	4	K12521	SA-533, Gr A, Cl 3	100																	√			
	Gr J100		Mn-½ Mo-½ Ni			11A	4	K12539	SA-533, Gr B, Cl 3	100	83		√					√									√			
	Gr J100		Mn-½ Mo-¾ Ni			11A	4	K12554	SA-533, Gr C, Cl 3	100																	√			
	Gr J100		Mn-½ Mo-¼ Ni			11A	4	K12529	SA-533, Gr D, Cl 3	100																	√			
	Gr L65		C-½ Mo			3	1	K11820	SA-204, Gr A	65	37		√					√									√			
	Gr L70		C-½ Mo			3	2	K12020	SA-204, Gr B	70	40		√					√									√			
	Gr L75		C-½ Mo			3	2	K12320	SA-204, Gr C	75	43		√					√									√			
	Gr N75		C-Mn-Si Stl			1	2	K02803	SA-299	75	40		√					√									√			
SA-675	Gr 45		C Stl	Ba & Sa		1	1			45-55	YP 22.5		√	√					√								√			
	Gr 50		C Stl			1	1			50-60	YP 25	√	√	√				√	√								√			
	Gr 55		C Stl			1	1			55-65	YP 27.5	√	√	√				√	√								√			
	Gr 60		C Stl			1	1			60-72	YP 30	√	√	√				√	√								√			

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SA-675 (Con't)	Gr 65		C Stl			1	1			65-77	YP 32.5	√	√	√					√								√		N71	
	Gr 70		C Stl			1	2			70-85	YP 35	√	√	√					√								√		N71	
	Gr 75		C Stl							75-90	YP 37.5																			
	Gr 80		C Stl							80	YP 40																			
	Gr 90		C Stl	Ba & Sa						90	YP 55																			
SA-688	Gr TP304		18 Cr-8 Ni	WT		8	1	S30400		75	30		√	√				√	√								√			
	Gr TP304L		18 Cr-8 Ni			8	1	S30403		70	25		√	√				√	√								√			
	Gr TP304N		18 Cr-8 Ni-N			8	1	S30451		80	35		√	√				√									√			
	Gr TP304LN		18 Cr-8 Ni-N			8	1	S30453		75	30		√					√									√			
	Gr TP 316		16 Cr-12 Ni-2 Mo			8	1	S31600		75	30		√	√				√	√								√			
	Gr TP 316L		16 Cr-12 Ni-2 Mo			8	1	S31603		70	25		√	√				√	√								√			
	Gr TP 316N		16 Cr-12 Ni-2 Mo-N			8	1	S31651		80	35		√					√									√			
	Gr TP 316LN		16 Cr-12 Ni-2 Mo-N			8	1	S31653		75	30		√					√									√			
	Gr TPXM-29		18 Cr-3 Ni-12 Mn			8	3	S24000	18-3 Mn, JS-33	100	55			√													√			
SA-691	Gr CM65		C-½ Mo	WP		3	1	K11820	A204, Gr A	65	37		√					√									√			
	Gr CM70		C-½ Mo			3	2	K12020	A204, Gr B	70	40		√					√									√			
	Gr CM75		C-½ Mo			3	2	K12320	A204, Gr C	75	43		√					√									√			
	Gr CMSH-70		C-Mn-Si Stl			1	2	K12437	A537, Cl 1	70	50		√					√									√			
	Gr CMS-75		C-Mn-Si Stl			1	2	K02803	A299	75	40		√					√									√			
	Gr CMSH-80		C-Mn-Si Stl			1	3	K12437	A537, Cl 2	80	60		√					√									√			
	Gr ½ CR		½ Cr-½ Mo			3	1 & 2	K12143	A387, Gr 2	55 70			√					√									√ √			
	Gr 1 CR		1 Cr-½ Mo			4	1	K11757	A387, Gr 12	55 65			√					√									√ √			
	Gr 1¼ CR		1¼ Cr-½ Mo-Si			4	1	K11789	A387, Gr 11	60 75			√					√									√ √			
	Gr 2¼ CR		2¼ Cr-1 Mo			5A	1	K21590	A387, Gr 22	60 75			√					√									√ √		N201, 253	
	Gr 3 CR		3 Cr-1 Mo			5A	1	K31545	A387, Gr 21	60 75																	√ √			
	Gr 5 CR		5 Cr-½ Mo			5B	1	K41545	A387, Gr 5	60 75			√					√									√ √			
	Gr 9 CR		9 Cr-1 Mo						A387, Gr 9																					

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SA-693	Ty 630	Sol'n Treated	17 Cr-4 Ni-4 Cu	Pl, Sh, Str				S17400	17-4 PH	185	160																			
	Ty 630	H900	17 Cr-4 Ni-4 Cu		≤ 4.0			S17400	17-4 PH	190	170																			
	Ty 630	H925	17 Cr-4 Ni-4 Cu		≤ 4.0			S17400	17-4 PH	170	155																			
	Ty 630	H1025	17 Cr-4 Ni-4 Cu		≤ 4.0			S17400	17-4 PH	155	145																			
	Ty 630	H1075	17 Cr-4 Ni-4 Cu		≤ 4.0			S17400	17-4 PH	145	125		√					√										N249		
	Ty 630	H1100	17 Cr-4 Ni-4 Cu	Pl, Sh, Str	≤ 4.0			S17400	17-4 PH	140	115		√					√										2223	N249	
	Ty 630	H1150	17 Cr-4 Ni-4 Cu		≤ 4.0			S17400	17-4 PH	135	105		√					√										2223	N249	
	Ty 630	H1150M	17 Cr-4 Ni-4 Cu		≤ 4.0			S17400	17-4 PH	115	75																			
	Ty 631	Sol'n Treated	17 Cr-7 Ni-1 Al		≤ .010			S17700	17-7 PH	150	65																			
	Ty 631	Sol'n Treated	17 Cr-7 Ni-1 Al		> .010 to 4			S17700	17-7 PH	150	55																			
	Ty 631	Aged 1400°F + 1050°F	17 Cr-7 Ni-1 Al		.0015 to .1874			S17700	17-7 PH	180	150																			
	Ty 631	Aged 1400°F + 1050°F	17 Cr-7 Ni-1 Al		.1875 to .625			S17700	17-7 PH	170	140																			
	Ty 631	Aged 1750°F + 950°F	17 Cr-7 Ni-1 Al		.0015 to .1874			S17700	17-7 PH	210	190																			
	Ty 631	Aged 1750°F + 950°F	17 Cr-7 Ni-1 Al		.1875 to .625			S17700	17-7 PH	200	180																			
	Ty 631	CR	17 Cr-7 Ni-1 Al		.0015 to .050			S17700	17-7 PH	200	175																			
	Ty 631	CR + 900°F	17 Cr-7 Ni-1 Al		.0015 to .050			S17700	17-7 PH	240	230																			
	Ty 632	Sol'n Treated	15 Cr-7 Ni-2½ Mo-1 Al		.0015 to 4.0			S15700	15-7 Mo PH	150	65																			
	Ty 632	Aged 1400°F + 1050°F	15 Cr-7 Ni-2½ Mo-1 Al		.0015 to .625			S15700	15-7 Mo PH	190	170																			
	Ty 632	Aged 1750°F + 950°F	15 Cr-7 Ni-2½ Mo-1 Al		.0015 to .625			S15700	15-7 Mo PH	225	200																			
	Ty 632	CR	15 Cr-7 Ni-2½ Mo-1 Al		.0015 to .050			S15700	15-7 Mo PH	200	175																			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-693 (Con't)	Ty 632	CR + 900°F	15 Cr-7 Ni-2½ Mo-1 Al		.0015 to .050			S15700	15-7 Mo PH	240	230																			
	Ty 633	Sol'n Treated	16 Cr-4 Ni-3 Mo		.001 to .0015			S35000	AM-350	200	90																			
	Ty 633	Sol'n Treated	16 Cr-4 Ni-3 Mo		.0015 to .002			S35000	AM-350	200	88																			
	Ty 633	Sol'n Treated	16 Cr-4 Ni-3 Mo		.002 to .005			S35000	AM-350	200	86																			
	Ty 633	Sol'n Treated	16 Cr-4 Ni-3 Mo	Pl, Sh, Str	> .005			S35000	AM-350	200	85																			
	Ty 633	Aged 850°F	16 Cr-4 Ni-3 Mo		.0005 to .1875			S35000	AM-350	185	150																			
	Ty 633	Aged 1000°F	16 Cr-4 Ni-3 Mo		.0005 to .1875			S35000	AM-350	165	145																			
	Ty 634	Sol'n Treated	15 Cr-4 Ni-3 Mo		Plate			S35500	AM-355																					40 HRC max.
	Ty 634	Aged 850°F	15 Cr-4 Ni-3 Mo					S35500	AM-355	190	165																			
	Ty 634	Aged 1000°F	15 Cr-4 Ni-3 Mo					S35500	AM-355	170	150																			
	Ty 635	Sol'n Treated	17 Cr-7 Ni-Al-Ti					S17600	Stainless W	120	75																			
	Ty 635	Aged 950°F	17 Cr-7 Ni-Al-Ti					S17600	Stainless W	190	170																			
	Ty 635	Aged 1000°F	17 Cr-7 Ni-Al-Ti					S17600	Stainless W	180	160																			
	Ty 635	Aged 1050°F	17 Cr-7 Ni-Al-Ti					S17600	Stainless W	170	150																			
	Ty XM-9	Sol'n Treated	14 Cr-6 Ni-Ti		> .010			S36200	Almar 362	150	125																			
	Ty XM-9	Aged 900 °F	14 Cr-6 Ni-Ti					S36200	Almar 362	180	160																			
	Ty XM-12	Sol'n Treated	15 Cr-5 Ni-3 Mo		.0015 to 4.00			S15500	15-5 PH																					38 HRC max.
	Ty XM-12	Aged 900°F	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	190	170																			
	Ty XM-12	Aged 925°F	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	170	155																			
	Ty XM-12	Aged 1025°F	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	155	145																			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-693 (Con't)	Ty XM-12	Aged 1075°F	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	145	125																			
	Ty XM-12	Aged 1100°F	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	140	115																			
	Ty XM-12	Aged 1150°F	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	135	105																			
	Ty XM-12	Aged 1400°F + 1150°F	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	115	75																			
	Ty XM-13	Sol'n Treated	13 Cr-8 Ni-2 Mo	Pl, Sh, Str	.0015 to 4.00			S13800	13-8 Mo PH																					38 HRC max.
	Ty XM-13	Aged 950°F	13 Cr-8 Ni-2 Mo		≤ 4.0			S13800	13-8 Mo PH	220	205																			
	Ty XM-13	Aged 1000°F	13 Cr-8 Ni-2 Mo		≤ 4.0			S13800	13-8 Mo PH	200	190																			
	Ty XM-16	Sol'n Treated	12 Cr-8 Ni-Cu-Ti		≥ .010			S45500	Custom 455	175	160																			
	Ty XM-16	Aged 950°F	12 Cr-8 Ni-Cu-Ti					S45500	Custom 455	222	205																			
	Ty XM-25	Sol'n Treated	15 Cr-6 Ni-Cu-Mo		≥ .010			S45000	Custom 450	165	150																			
	Ty XM-25	Aged 900°F	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	180	170																			
	Ty XM-25	Aged 1000°F	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	160	150																			
	Ty XM-25	Aged 1150°F	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	125	75																			
SA-695	Ty B, Gr 35		C-Mn-Si Stl	Ba		1	1	K03504		60	35		√	√				√								√			
	Ty B, Gr 40		C-Mn-Si Stl			1	2	K03504		70	40		√	√				√								√			
SA-696	Gr B		C-Mn-Si Stl	Ba		1	1	K03200		60	35		√					√								√			
	Gr C		C-Mn-Si Stl			1	2	K03200		70	40		√					√								√			
SA-705	Ty 630	Sol'n Treated	17 Cr-4 Ni-4 Cu	Fo				S17400	17-4 PH																					38 HRC max.
	Ty 630	Aged 900°F	17 Cr-4 Ni-4 Cu					S17400	17-4 PH	190	170																			
	Ty 630	Aged 925°F	17 Cr-4 Ni-4 Cu					S17400	17-4 PH	170	155																			
	Ty 630	Aged 1025°F	17 Cr-4 Ni-4 Cu					S17400	17-4 PH	155	145																			

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SA-705 (Con't)	Ty 630	Aged 1075°F	17 Cr-4 Ni-4 Cu					S17400	17-4 PH	145	125		√					√												
	Ty 630	Aged 1100°F	17 Cr-4 Ni-4 Cu					S17400	17-4 PH	140	115		√					√				√	√		√			2223		
	Ty 630	Aged 1150°F	17 Cr-4 Ni-4 Cu					S17400	17-4 PH	135	105		√					√										2223		
	Ty 630	Aged 1400°F + 1150°F	17 Cr-4 Ni-4 Cu					S17400	17-4 PH	115	75																			
	Ty 631	Sol'n Treated	17 Cr-7 Ni-1 Al	Fo				S17700	17-7 PH																					89 HRB max.
	Ty 631	Aged 1750°F + 950°F	17 Cr-7 Ni-1 Al					S17700	17-7 PH	185	150																			
	Ty 631	Aged 1400°F + 1050°F	17 Cr-7 Ni-1 Al					S17700	17-7 PH	170	140																			
	Ty 632	Sol'n Treated	15 Cr-7 Ni-2½ Mo-1 Al					S15700	15-7 Mo PH																					100 HRB max.
	Ty 632	Aged 1750°F + 950°F	15 Cr-7 Ni-2½ Mo-1 Al					S15700	15-7 Mo PH	200	175																			
	Ty 632	Aged 1400°F + 1050°F	15 Cr-7 Ni-2½ Mo-1 Al					S15700	15-7 Mo PH	180	160																			
	Ty 634	Sol'n Treated	15 Cr-4 Ni-3 Mo					S35500	AM-355																					363 HB max.
	Ty 634	Aged 1750°F + 1000°F	15 Cr-4 Ni-3 Mo					S35500	AM-355	170	155																			
	Ty 635	Sol'n Treated	17 Cr-7 Ni-Al-Ti					S17600	Stainless W	120	75																			
	Ty 635	Aged 950°F	17 Cr-7 Ni-Al-Ti					S17600	Stainless W	190	170																			
	Ty 635	Aged 1000°F	17 Cr-7 Ni-Al-Ti					S17600	Stainless W	180	160																			
	Ty 635	Aged 1050°F	17 Cr-7 Ni-Al-Ti					S17600	Stainless W	170	150																			
	Ty XM-12	Sol'n Treated	15 Cr-5 Ni-3 Mo					S15500	15-5 PH																					38 HRC max.

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SA-705 (Con't)	Ty XM-12	Aged 900°F	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	190	170																			
	Ty XM-12	Aged 925°F	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	170	155																			
	Ty XM-12	Aged 1025°F	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	155	145																			
	Ty XM-12	Aged 1075°F	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	145	125																			
	Ty XM-12	Aged 1100°F	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	140	115																			
	Ty XM-12	Aged 1050°F	15 Cr-5 Ni-3 Mo	Fo				S15500	15-5 PH	135	105																			
	Ty XM-12	Aged 1400°F + 1150°F	15 Cr-5 Ni-3 Mo					S15500	15-5 PH	115	75																			
	Ty XM-13	Sol'n Treated	13 Cr-8 Ni-2 Mo					S13800	13-8 Mo PH																					38 HRC max.
	Ty XM-13	Aged 950°F	13 Cr-8 Ni-2 Mo					S13800	13-8 Mo PH	220	205																			
	Ty XM-13	Aged 1000°F	13 Cr-8 Ni-2 Mo					S13800	13-8 Mo PH	205	190																			
	Ty XM-13	Aged 1025°F	13 Cr-8 Ni-2 Mo					S13800	13-8 Mo PH	185	175																			
	Ty XM-13	Aged 1050°F	13 Cr-8 Ni-2 Mo					S13800	13-8 Mo PH	175	165																			
	Ty XM-13	Aged 1100°F	13 Cr-8 Ni-2 Mo					S13800	13-8 Mo PH	150	135							√											N370	
	Ty XM-13	Aged 1150°F	13 Cr-8 Ni-2 Mo					S13800	13-8 Mo PH	135	90																			
	Ty XM-13	Aged 1400°F + 1150°F	13 Cr-8 Ni-2 Mo					S13800	13-8 Mo PH	125	85																			
	Ty XM-16	Sol'n Treated	12 Cr-8 Ni-Cu-Ti					S45500	Custom 455																					36 HRC max.
	Ty XM-16	Aged 900°F	12 Cr-8 Ni-Cu-Ti					S45500	Custom 455	235	220																			
	Ty XM-16	Aged 950°F	12 Cr-8 Ni-Cu-Ti					S45500	Custom 455	220	205																			
	Ty XM-16	Aged 1000°F	12 Cr-8 Ni-Cu-Ti					S45500	Custom 455	205	185																			

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SA-705 (Con't)	Ty XM-25	Sol'n Treated	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	125	95																		
	Ty XM-25	Aged 900°F	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	180	170																		
	Ty XM-25	Aged 950°F	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	170	160																		
	Ty XM-25	Aged 1000°F	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	160	150																		
	Ty XM-25	Aged 1025°F	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	150	140																		
	Ty XM-25	Aged 1050°F	15 Cr-6 Ni-Cu-Mo	Fo				S45000	Custom 450	145	135																		
	Ty XM-25	Aged 1100°F	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	130	105																		
	Ty XM-25	Aged 1150°F	15 Cr-6 Ni-Cu-Mo					S45000	Custom 450	125	75																		
	-----	Sol'n Treated	12 Cr-8 Ni-Cu-Ti					S45503																					36 HRC max.
	-----	Aged 900°F	12 Cr-8 Ni-Cu-Ti					S45503		235	220																		
	-----	Aged 950°F	12 Cr-8 Ni-Cu-Ti					S45503		220	205																		
	-----	Aged 1000°F	12 Cr-8 Ni-Cu-Ti					S45503		205	185																		
SA-723	Gr 1, Cl 1		2 Ni-1½ Cr-¼ Mo-V	Fo				K23550		115	100		√					√	√										
	Gr 1, Cl 2		2 Ni-1½ Cr-¼ Mo-V					K23550		135	120		√					√	√										
	Gr 1, Cl 3		2 Ni-1½ Cr-¼ Mo-V					K23550		155	140		√					√											
	Gr 1, Cl 4		2 Ni-1½ Cr-¼ Mo-V					K23550		175	160		√					√											
	Gr 1, Cl 5		2 Ni-1½ Cr-¼ Mo-V					K23550		190	180		√					√											
	Gr 2, Cl 1		2¾ Ni-1½ Cr-½ Mo-V					K34035		115	100		√					√	√										
	Gr 2, Cl 2		2¾ Ni-1½ Cr-½ Mo-V					K34035		135	120		√					√	√										
	Gr 2, Cl 3		2¾ Ni-1½ Cr-½ Mo-V					K34035		155	140		√					√											
	Gr 2, Cl 4		2¾ Ni-1½ Cr-½ Mo-V					K34035		175	160		√					√											
	Gr 2, Cl 5		2¾ Ni-1½ Cr-½ Mo-V					K34035		190	180		√					√											
	Gr 3, Cl 1		4 Ni-1½ Cr-½ Mo-V					K44045		115	100		√					√	√										
	Gr 3, Cl 2		4 Ni-1½ Cr-½ Mo-V					K44045		135	120		√					√	√										
	Gr 3, Cl 3		4 Ni-1½ Cr-½ Mo-V					K44045		155	140		√					√											
	Gr 3, Cl 4		4 Ni-1½ Cr-½ Mo-V					K44045		175	160		√					√											

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SA-723	Gr 3, Cl 5		4 Ni-1½ Cr-½ Mo-V					K44045		190	180		√					√									√			
(Con't)	Gr 1, Cl 2a		2 Ni-1½ Cr-¼ Mo-V					K23550		145	130																			
	Gr 2, Cl 2a		2¾ Ni-1½ Cr-½ Mo-V					K34035		145	130																			
	Gr 3, Cl 2a		4 Ni-1½ Cr-½ Mo-V					K44045		145	130																			
SA-724	Gr A		C-Mn-Si Stl	Pl	⅝ max.	1	4	K11831		90-110	70			√					√								√			
	Gr B		C-Mn-Si Stl		⅝ max	1	4	K12031		95-115	75			√					√								√			
	Gr C		C-Mn-Si Stl	Pl	2 max.	1	4	K12037		90-110	70			√					√								√			
SA-727	-----		C-Mn-Si Stl	Fo		1	1	K02506		60-85	36		√	√				√	√								√			
SA-731	Gr 18 Cr-2 Mo		18 Cr-2 Mo	Sm & WP		7	2	S44400	18-2	60	40																√			
	Gr TPXM-33		27 Cr-1 Mo-Ti			10I	1	S44626	26-1	65	40			√													√			
	Gr TPXM-27		27 Cr-1 Mo			10I	1	S44627		65	40			√													√			
	Gr TP439		17 Cr-Ti			7	2	S43035	XM-8	60	30																√	2165		
	Gr 29-4		29 Cr-4 Mo			10J	1	S44700	29-4	80	60																√			
	Gr 29-4-2		29 Cr-4 Mo-2 Ni			10K	1	S44800		80	60																√			
	Gr 26-3-3		26 Cr-3 Ni-3 Mo			10K	1	S44660	SC-1	85	65																√			
	Gr S41500		13 Cr-4½ Ni-Mo			6	4	S41500	(F6NM)	115	90																√			
SA-736	Gr A, Cl 1		Ni-Cu-Cr-Mo-Cb	Pl	≤ ¾			K20747		90-110	80																			
	Gr A, Cl 2		Ni-Cu-Cr-Mo-Cb		≤ 1			K20747		72-92	65																			
	Gr A, Cl 2		Ni-Cu-Cr-Mo-Cb		> 1 to 2 incl.			K20747		72-92	60																			
	Gr A, Cl 2		Ni-Cu-Cr-Mo-Cb		> 2 to 4 incl.			K20747		65-85	55																			
	Gr A, Cl 2		Ni-Cu-Cr-Mo-Cb		> 4			K20747		60-80	50																			
	Gr A, Cl 3		Ni-Cu-Cr-Mo-Cb		≤ 2			K20747		85-105	75																			
	Gr A, Cl 3		Ni-Cu-Cr-Mo-Cb		> 2 to 4 incl.			K20747		75-95	65																			
	Gr A, Cl 3		Ni-Cu-Cr-Mo-Cb		> 4			K20747		70-90	60																			
	Gr C, Cl 1		Ni-Cu-Cr-Mn-Cb		≤ ¾					100-120	90																			
	Gr C, Cl 3		Ni-Cu-Cr-Mn-Cb		≤ ¾					95-115	85																			

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SA-736 (Con't)	Gr C, Cl 3		Ni-Cu-Cr-Mn-Cb		> ¾ to 2 incl.					90-110	80																			
SA-737	Gr B		C-Mn-Si (Cb)	Pl		1	2	K12001		70-90	50		√	√				√	√								√			
	Gr C		C-Mn-Si (V)			1	3	K12202		80-100	60		√	√				√	√								√			
SA-738	Gr A		C-Mn-Si Stl	Pl	≤ 6	1	2	K12447		75-95	45			√					√								√	2213		
	Gr B		C-Mn-Si Stl		≤ 2½	1	3	K12001		85-102	60			√					√								√			
	Gr C		C-Mn-Si Stl		≤ 2½	1	3			80-100	60		√	√					√								√			
	Gr C		C-Mn-Si Stl		> 2½ to 4 incl.	1	3			75-95	55		√	√					√								√			
	Gr C		C-Mn-Si Stl	Pl	> 4 to 6 incl.	1	3			70-90	46		√	√					√								√			
SA-739	Gr B11		1¼ Cr-½ Mo	Ba		4	1	K11797		70-95	45		√	√				√	√								√			
	Gr B22		2¼ Cr-1 Mo			5A	1	K21390		75-95	45		√	√				√	√								√			
SA-747	CB7 Cu-1	Aged 1025°F	16 Cr-4 Ni-3 Cu	Ca				J92180		150	140			√																
SA-748	Cl 20		White/gray cast iron	Static Cast Rolls					Dual metal	(20)																				
	Cl 25		White/gray cast iron						Dual metal	(25)																				
	Cl 30		White/gray cast iron						Dual metal	(30)																				
	Cl 35		White/gray cast iron						Dual metal	(35)																				
SA-765	Gr I		C-Mn Stl	Fo		1	1	K03046		60-85	30			√					√								√			
	Gr II		C-Mn-Si Stl			1	2	K03047		70-95	36			√					√								√			
	Gr III		3½ Ni			9B	1	K32026		70-95	37.5			√					√								√			
	Gr IV		C-Mn-Si Stl							80-105	50																			
SA-789	-----		22 Cr-5 Ni-3 Mo-N	Sm & WT		10H	1	S31803	2205	90	65			√													√	2067		
	-----		18 Cr-5 Ni-3 Mo-N			10H	1	S31500	3RE60	92	64			√					√								√			
	-----		25 Cr-5 Ni-3 Cu -2 Mo			10H	1	S32550	Ferralium 255	110	80			√													√			
	-----		25 Cr-6 Ni-Mo-N			10H	1	S31200	44LN	100	65																√			
	-----		26 Cr-4 Ni-Mo-N			10H	1	S32950	7 Mo Plus	100	70			√													√			
	-----		26 Cr-4 Ni-Mo			10H	1	S32900		90	70			√													√			
	-----		25 Cr-6 Ni-3 Mo-N			10H	1	S31260	DP-3	100	65			√													√			
	-----		23 Cr-4 Ni-Mo-Cu-N		> 1	10H	1	S32304	2304	87	58			√													√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-789	-----		23 Cr-4 Ni-Mo-Cu-N		≤ 1			S32304	2304	100	65																	2058		
(Con't)	-----		25 Cr-7 Ni-3 Mo-2 W-Cu-N					S32740		116	80																			
	-----		25 Cr-7 Ni-4 Mo-N			10H	1	S32750	2507	116	80			√													√			
	-----		25 Cr-7Ni-3 Mo-Cu-N					S32760	Zeron 100	109-130	80																			
SA-790	-----		22 Cr-5 Ni-3 Mo-N	Sm & WP		10H	1	S31803	2205	90	65			√													√	2067		
	-----		18 Cr-5 Ni-3 Mo-N			10H	1	S31500	3RE60	92	64			√					√								√			
	-----		25 Cr-5 Ni-3 Cu -2 Mo			10H	1	S32550	Ferralium 255	110	80			√													√			
	-----		25 Cr-6 Ni-Mo-N			10H	1	S31200	44LN	100	65																√			
	-----		25 Cr-6 Ni-3 Mo-N			10H	1	S31260	DP-3	100	65			√													√			
	-----		23 Cr-4 Ni-Mo-Cu-N			10H	1	S32304	2304	87	58			√													√			
	-----		26 Cr-4 Ni-Mo-N	Sm & WP		10H	1	S32950	7 Mo Plus	90	70			√													√			
	-----		26 Cr-4 Ni-Mo			10H	1	S32900		90	70			√													√			
	-----		25 Cr-7 Ni-3 Mo-2 W-Cu-N					S32740		116	80																			
	-----		25 Cr-7 Ni-4 Mo-N			10H	1	S32750	2507	116	80			√													√			
	-----		25 Cr-7 Ni-3 Mo-Cu-N					S32760	Zeron 100	109-130	80																			
SA-803	Gr TP409		11 Cr-Ti	WT				S40900		55	30																			207 HB max.
	Gr TP439		17 Cr-Ti			7	2	S43035	XM-8	60	30			√													√			207 HB max.
	Gr TPXM-27		27 Cr- 1 Mo					S44627	E-Brite	65	40																			241 HB max.
	Gr TPXM-33		27 Cr-1 Mo-Ti					S44626	26-1	68	45																			241 HB max.
	25-4-4		25 Cr-4 Ni-4 Mo-Ti					S44635		90	75																			270 HB max.
	26-3-3		26 Cr-3 Ni-3 Mo-Ti			10K	1	S44660	SC-1	85	65			√					√								√			265 HB max.
	29-4		29 Cr-4 Mo					S44700		80	60																			241 HB max.
	29-4-2		29 Cr-4 Mo-2 Ni					S44800		80	60																			241 HB max.
	18-2		18 Cr-2 Mo					S44400		60	35																			217 HB max.
	29-4C		29 Cr-4 Mo-Ti					S44735		75	60																			241 HB max.

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-812	Gr 65		C-Mn-Cb Stl	Sh				K12001		85-110	65			√					√								√			
	Gr 80		C-Mn-Si-Cb					K12001		100-125	80			√					√											
SA-813*	Gr TP304		18 Cr-8 Ni	WP		8	1	S30400		75	30		√					√									√			
	Gr TP304H		18 Cr-8 Ni			8	1	S30409		75	30		√					√									√			
	Gr TP304L		18 Cr-8 Ni			8	1	S30403		70	25		√					√									√			
	Gr TP304N		18 Cr-8 Ni-N			8	1	S30451		80	35		√					√									√			
	Gr TP304LN		18 Cr-8 Ni-N			8	1	S30453		75	30		√					√									√			
	Gr TP309Cb		23 Cr-12 Ni-Cb			8	2	S30940		75	30		√						√								√			
	Gr TP309S		23 Cr-12 Ni			8	2	S30908		75	30	√		√					√								√			
	Gr TP310Cb		25 Cr-20 Ni-Cb			8	2	S31040		75	30			√					√								√			
	Gr TP310S		25 Cr-20 Ni	WP		8	2	S31008		75	30			√					√								√			
	Gr TP316		16 Cr-12 Ni-2 Mo			8	1	S31600		75	30		√					√									√			
	Gr TP316H		16 Cr-12 Ni-2 Mo			8	1	S31609		75	30		√					√									√			
	Gr TP316L		16 Cr-12 Ni-2 Mo			8	1	S31603		70	25		√					√									√			
	Gr TP316N		16 Cr-12 Ni-2 Mo-N			8	1	S31651		80	35		√					√									√			
	Gr TP316LN		16 Cr-12 Ni-2 Mo-N			8	1	S31653		75	30							√									√			
	Gr TP317		18 Cr-13 Ni-3 Mo			8	1	S31700		75	30																√			
	Gr TP317L		18 Cr-13 Ni-3 Mo			8	1	S31703		75	30																√			
	Gr TP321		18 Cr-10 Ni-Ti			8	1	S32100		75	30		√					√									√			
	Gr TP321H		18 Cr-10 Ni-Ti			8	1	S32109		75	30		√					√									√			
	Gr TP347		18 Cr-10 Ni-Cb			8	1	S34700		75	30		√					√									√			
	Gr TP347H		18 Cr-10 Ni-Cb			8	1	S34709		75	30		√					√									√			
	Gr TP348		18 Cr-10 Ni-Cb			8	1	S34800		75	30		√					√									√			
	Gr TP348H		18 Cr-10 Ni-Cb			8	1	S34809		75	30		√					√									√			
	Gr TPXM-10		21 Cr-6 Ni-9 Mn					S21900		90	50																			
	Gr TPXM-11		21 Cr-6 Ni-9 Mn			8	3	S21904		90	50																√			
	Gr TPXM-15		18 Cr-18 Ni-2 Si			8	1	S38100	18-18-2	75	30																√			
	Gr TPXM-19		22 Cr-13 Ni-5 Mn			8	3	S20910		100	55		√					√									√			
	Gr TPXM-29		18 Cr-3 Ni-12 Mn			8	3	S24000	18-3 Mn	100	55																√			
	-----		20Cr-18Ni-6Mo-Cu-N			8	4	S31254	254 SMO	94	44																√			

*Note: SA-813 grades are available as: Class SW - single welded with no addition of filler metal, and
Class DW - double welded with no addition of filler metal

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-813* (Con't)	-----		21 Cr-11 Ni-N			8	2	S30815	253 MA	87	45																√			
SA-814*	Gr TP304		18 Cr-8 Ni	CWWP		8	1	S30400		75	30		√					√									√			
	Gr TP304H		18 Cr-8 Ni			8	1	S30409		75	30		√					√									√			
	Gr TP304L		18 Cr-8 Ni			8	1	S30403		70	25		√					√									√			
	Gr TP304N		18 Cr-8 Ni-N			8	1	S30451		80	35		√					√									√			
	Gr TP304LN		18 Cr-8 Ni-N			8	1	S30453		75	30		√					√									√			
	Gr TP309S		23 Cr-12 Ni			8	2	S30908		75	30			√					√								√			
	Gr TP309Cb		23 Cr-12 Ni-Cb			8	2	S30940		75	30			√					√								√			
	Gr TP310S		25 Cr-20 Ni			8	2	S31008		75	30			√					√								√			
	Gr TP310Cb		25 Cr-20 Ni-Cb			8	2	S31040		75	30			√					√								√			
	Gr TP 316		16 Cr-12 Ni-2 Mo			8	1	S31600		75	30		√					√									√			
	Gr TP 316H		16 Cr-12 Ni-2 Mo			8	1	S31609		75	30		√					√									√			
	Gr TP 316L		16 Cr-12 Ni-2 Mo			8	1	S31603		70	25		√					√									√			
	Gr TP 316N		16 Cr-12 Ni-2 Mo-N	CWWP		8	1	S31651		80	35		√					√									√			
	Gr TP 316LN		16 Cr-12 Ni-2 Mo-N			8	1	S31653		75	30							√									√			
	Gr TP 317		18 Cr-13 Ni-3 Mo			8	1	S31700		75	30																√			
	Gr TP 317L		18 Cr-13 Ni-3 Mo			8	1	S31703		75	30																√			
	Gr TP321		18 Cr-10 Ni-Ti			8	1	S32100		75	30		√					√									√			
	Gr TP321H		18 Cr-10 Ni-Ti			8	1	S32109		75	30		√					√									√			
	Gr TP347		18 Cr-10 Ni-Cb			8	1	S34700		75	30							√									√			
	Gr TP347H		18 Cr-10 Ni-Cb			8	1	S34709		75	30		√					√									√			
	Gr TP348		18 Cr-10 Ni-Cb			8	1	S34800		75	30		√					√									√			
	Gr TP348H		18 Cr-10 Ni-Cb			8	1	S34809		75	30		√					√									√			
	Gr TPXM-10		21 Cr-6 Ni-9 Mn					S21900		90	50																			
	Gr TPXM-11		21 Cr-6 Ni-9 Mn			8	3	S21904		90	50																√			
	Gr TPXM-15		18 Cr-18 Ni-2 Si			8	1	S38100	18-18-2	75	30																√			
	Gr TPXM-19		22 Cr-13 Ni-5 Mn			8	3	S20910		100	55		√					√									√			
	Gr TPXM-29		18 Cr-3 Ni-12 Mn			8	3	S24000	18-3 Mn	100	55																√			
	-----		20Cr-18Ni-6Mo-Cu-N			8	4	S31254	254 SMO	94	44																√			
	-----		21 Cr-11 Ni-N			8	2	S30815	253 MA	87	45																√			

*Note: SA-813 grades are available as: Class SW - single welded with no addition of filler metal, and Class DW - double welded with no addition of filler metal

*Note: SA-814 grades are available as: Class SW - single welded with no addition of filler metal, and Class DW - double welded with no addition of filler metal

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-815	Gr WP27		27 Cr-1 Mo	Fi				S44627		65-90	40																			
	Gr WP33		27 Cr-1 Mo-Ti					S44626	26-1	68-93	45																			
	Gr WP429		15 Cr					S42900		60-85	35																			
	Gr WP430		17 Cr					S43000		65-90	35																			
	Gr WP430Ti		18 Cr-Ti-Cb					S43036		60-85	35																			
	Gr WP410		13 Cr					S41000		70-95	30																			
	Gr WP446		27 Cr					S44600		70-95	40																			
	Gr S31803		22 Cr-5 Ni-3 Mo-N			10H	1	S31803	2205	90-115	65																√			
	Gr S41500		13 Cr-4½ Ni-Mo			6	4	S41500		110-135	90																√			
	Gr S32950		26 Cr-4 Ni-Mn-N					S32950	7 Mo Plus	100	70																			
	Gr S32750		25 Cr-7 Ni-4 Mo-N					S32750	2507	116-140	80																			
	Gr S32760		25 Cr-7 Ni-3 Mo-Cu-W					S32760	Zeron 100	109-130	80																			
	Gr S39274		25 Cr-7 Ni-3 Mo-2 W-N					S39274	DP3W	116	80																			
SA-832	Gr 21V		3 Cr-1 Mo-¼ V	Pl		5C	1	K31830		85-110	60			√					√								√	2151		
	Gr 22V		2¼ Cr-1 Mo-¼ V							85-110	60																	2098		
	Gr 23V		3 Cr-1 Mo-¼ V							85-110	60																			
SA-836	-----		C-Si-Ti Stl	Fo & Fi		1	1			55	25			√													√	2043		
SA-841	TMCP Stl		C-Mn-Si+X	Pl	≤ 2½	10C	1			70-90	50																√	2130		
	TMCP Stl		C-Mn-Si+X		> 2½	10C	1			65-85	45																√	2130		
SA-905	Cl 1		C-Si Stl	Wire, CR	0.020					296	260																			
	Cl 2		C-Si Stl		0.020					268	232																			
	Cl 1		C-Si Stl		0.030					290	255																			
	Cl 2		C-Si Stl		0.030					262	226																			
	Cl 1		C-Si Stl		0.040					285	250																			
	Cl 2		C-Si Stl		0.040					256	221																			
	Cl 1		C-Si Stl		0.051					280	243																			
	Cl 2		C-Si Stl		0.051					250	214																			
	Cl 1		C-Si-Stl		0.059					275	239																			
	Cl 2		C-Si Stl		0.059					246	210																			
SF-568				Metric Fasteners																										

Chapter 8

NONFERROUS CODE MATERIALS SPECIFICATIONS BY SECTION USE

Including:

- Heat treatment condition/temper
- Nominal composition designation
- Product form
- Size limits
- Welding P number and Group number
- UNS number
- Trade name or common designation
- Strength level (ultimate tensile strength and yield strength)
- Inclusion in ASME Section IX's QW-422
- Code case coverage (by number)

PRODUCT FORM ABBREVIATIONS

Abbreviation	Product Form	Abbreviation	Product Form
Ba	Bars	Sm	Seamless
Ca	Castings	Sm & WP	Seamless and Welded Pipe
CC	Centrifugal Castings	Sm & WT	Seamless and Welded Tubes
Fo	Forgings	SP	Seamless Pipe
Hex(s)	Hexagonal(s) (shape)	Sq(s)	Square(s) (shape)
Pl	Plates	St	Structural
Oct(s)	Octagonal(s) (shape)	ST	Seamless Tube
Rect's	Rectagonals	Str	Strip
Ro	Rods	W Fi	Welded Fittings
Sa	Shapes	WP	Welded Pipe
SFT	Seamless/Finned Tubes	WT	Welded Tubes
Sh	Sheet		

HEAT TREAT CONDITIONS & OTHER ABBREVIATIONS

Abbreviation	Term
Cond'n (Treated)	Condition (Treated)
HT	Heat Treated
SHT	Solution Heat Treated
Stab	Stabilized
PH	Precipitation Hardened
HR	Hot Rolled
HF	Hot Finished
HW	Hot Worked
CD	Cold Drawn
CR	Cold Rolled
CW	Cold Worked
SR	Stress Relieved
WT	Wall Thickness
incl.	inclusive

General Requirements & Testing Specifications	
Spec. No.	**Title**
SB-248	Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip and Rolled Bar
SB-249	Specification for General Requirements for Wrought Copper and Copper-Alloy for Rod, Bar and Shapes
SB-251	Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tubes
SB-548	Method and Specification for Ultrasonic Inspection of Aluminum-Alloy Plate for Pressure Vessels
SB-751	Specification for General Requirements for Nickel and Nickel Alloy Welded Tubes
SB-775	Specification for General Requirements for Nickel and Nickel Alloy Seamless and Welded Pipe
SB-824	Specification for General Reuirements for Copper Alloy Castings
SB-829	Specification for General Requirements for Nickel and Nickel Alloy Seamless Pipe and Tube
SB-858	Test Method for Determination of Susceptibility to Stress Corrosion Cracking in Copper Alloys Using an Ammonia Vapor Test

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SB-26	204.0	T4	Al-Cu-Mg	Ca				A02040		45	28						√												
	356.0	T6	Al-Si-Mg					A03560	Old SG 70A	30	20					√	√												
	356.0	T71	Al-Si-Mg					A03560	Old SG 70A	25	18					√	√												
	B443.0	F	Al-Si					A24430	Old S5A	17	6					√	√												
SB-42	C10200	061	99.95 Cu	SP		31		C10200	OF Cu	30	9				√	√	√										√		
	C10200	H80	99.95 Cu		⅛ to 2	31		C10200	OF Cu	45	40				√	√	√										√		
	C10200	H55	99.95 Cu		2½ to 12	31		C10200	OF Cu	36	30				√	√	√										√		
	C12000	061	99.90 Cu + P			31		C12000	DLP Cu	30	9				√	√	√										√		
	C12000	H80	99.90 Cu + P		⅛ to 2	31		C12000	DLP Cu	45	40				√	√	√										√		
	C12000	H55	99.90 Cu + P		2½ to 12	31		C12000	DLP Cu	36	30				√	√	√										√		
	C12200	061	99.9 Cu + P			31		C12200	DHP Cu	30	9				√	√	√										√		
	C12200	H80	99.9 Cu + P		⅛ to 2	31		C12200	DHP Cu	45	40				√	√	√										√		
	C12200	H55	99.9 Cu + P		2½ to 12	31		C12200	DHP Cu	36	30				√	√	√										√		
SB-43	C23000	061	85 Cu-15 Zn	SP		32		C23000	Red Brass	40	12				√	√	√										√		
	(Case only)	058	85 Cu-15 Zn					C23000	Red Brass	40	12																	2172	
SB-61	C92200		88 Cu-Sn-Zn-Pb	Ca				C92200	Alloy 2A Valve Bronze	34	16				√	√	√												
SB-62	C83600		85 Cu-5 Sn-5 Zn-5 Pb	Ca				C83600	Alloy 85 or 85-5-5-5	30	14				√	√	√												
SB-75	C10200	050	99.95 Cu	ST		31		C10200	OF Cu	30	9				√	√	√										√		
	C10200	060	99.95 Cu			31		C10200	OF Cu	30	9				√	√	√										√		
	C10200	H55	99.95 Cu			31		C10200	OF Cu	36-47	30				√	√	√										√		
	C10200	H80	99.95 Cu			31		C10200	OF Cu	45	40				√	√	√										√		
	C12000	050	99.90 Cu + P			31		C12000	DLP Cu	30	9					√											√		
	C12000	060	99.90 Cu + P			31		C12000	DLP Cu	30	9				√	√	√										√		
	C12000	H55	99.90 Cu + P			31		C12000	DLP Cu	36-47	30				√	√	√										√		
	C12000	H80	99.90 Cu + P			31		C12000	DLP Cu	45	40				√	√	√										√		
	C12200	050	99.9 Cu + P			31		C12200	DHP Cu	30	9					√	√										√		
	C12200	060	99.9 Cu + P			31		C12200	DHP Cu	30	9				√	√											√		
	C12200	H55	99.9 Cu + P			31		C12200	DHP Cu	36-47	30				√	√	√										√		
	C12200	H80	99.9 Cu + P			31		C12200	DHP Cu	45	40				√	√	√										√		
	C14200	050	99.40 Cu + As + P			31		C14200	DPA Cu	30	9					√											√		
	C14200	060	99.40 Cu + As + P			31		C14200	DPA Cu	30	9				√	√	√										√		
	C14200	H55	99.40 Cu + As + P			31		C14200	DPA Cu	36-47	30				√	√	√										√		
	C14200	H80	99.40 Cu + As + P			31		C14200	DPA Cu	45	40				√	√	√										√		

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-96	C65500	061	97 Cu-3 Si	Pl, Sh, Str & Ba		33		C65500	Cu-Si Alloy A	50-67	18					√	√				√						√			
SB-98	C65100	060	98.5 Cu-1.5 Si	Ro, Ba & Sa		33		C65100	Cu-Si Alloy B	40	12					√	√					√	√	√			√			
	C65100	H02	98.5 Cu-1.5 Si			33		C65100	Cu-Si Alloy B	55	20					√	√										√			
	C65100	H06	98.5 Cu-1.5 Si		≤ ½	33		C65100	Cu-Si Alloy B	85	55											√	√	√			√			
	C65100	H06	98.5 Cu-1.5 Si		> ½ to 1, incl.	33		C65100	Cu-Si Alloy B	75	45											√	√	√			√			
	C65100	H06	98.5 Cu-1.5 Si		> 1 to 1½, incl.	33		C65100	Cu-Si Alloy B	75	40											√	√	√			√			
	C65500	060	97 Cu-3 Si			33		C65500	Cu-Si Alloy A	52	15					√						√	√	√			√			
	C65500	H01	97 Cu-3 Si			33		C65500	Cu-Si Alloy A	55	24													√			√			
	C65500	H02	97 Cu-3 Si			33		C65500	Cu-Si Alloy A	70	38					√								√			√			
	C66100	060	94 Cu-3 Si-Pb			33		C66100	Cu-Si Alloy D	52	15					√	√					√	√	√			√			
	C66100	H01	94 Cu-3 Si-Pb			33		C66100	Cu-Si Alloy D	55	24											√		√			√			
	C66100	H02	94 Cu-3 Si-Pb			33		C66100	Cu-Si Alloy D	70	38					√	√					√		√			√			
SB-108	204.0	T4	Al-Cu-Mg	Ca				A02040		48	29						√													
	356.0	T6	Al-Si-Mg					A03560	Old SG70A	33	22						√											2153		
SB-111	C10200	H55	99.95 Cu	ST		31		C10200	OF Cu	36	30					√	√										√			
	C10200	H80	99.95 Cu			31		C10200	OF Cu	45	40					√	√										√			
	C12000	H55	99.90 Cu			31		C12000	DLP Cu	36	30					√	√										√			
	C12000	H80	99.90 Cu			31		C12000	DLP Cu	45	40					√	√										√			
	C12200	H55	99.9 Cu + P			31		C12200	DHP Cu	36	30					√	√										√			
	C12200	H80	99.9 Cu + P			31		C12200	DHP Cu	45	40					√	√										√			
	C14200	H55	99.40 Cu + As + P			31		C14200	DPA Cu	36	30					√	√										√			
	C14200	H80	99.40 Cu + As + P			31		C14200	DPA Cu	45	40					√	√										√			
	C19200	061	98.7 Cu + Fe + P			31		C19200	Phosphorized 1% iron	38	12						√										√			
	C23000	061	85 Cu-15 Zn			32		C23000	Red brass	40	12					√	√										√			
	C28000	061	60 Cu-40 Zn			32		C28000	Muntz metal	50	20				√	√	√				√						√			
	C44300	061	71 Cu-28 Zn-1 Sn			32		C44300	Admiralty B or Arsenical	45	15				√	√	√				√						√			
	C44400	061	71 Cu-28 Zn-1 Sn			32		C44400	Admiralty C or Antimonial	45	15				√	√	√				√						√			
	C44500	061	71 Cu-28 Zn-1 Sn			32		C44500	Admiralty D or Phosphorized	45	15				√	√	√				√						√			
	C60800	061	95 Cu-5 Al			35		C60800	Al bronze	50	19					√	√				√						√			
	C68700	061	78 Cu-20 Zn-2 Al			32		C68700	Al brass B	50	18					√	√										√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-111	C70400	061	95 Cu-5 Ni	ST		34		C70400	95-5 Cu-Ni	38	12					√	√										√			
(Con't)	C70400	H55	95 Cu-5 Ni			34		C70400	95-5 Cu-Ni	40	30					√	√										√			
	C70600	061	90 Cu-10 Ni			34		C70600	90-10 Cu-Ni	40	15				√	√	√				√						√			
	C70600	H55	90 Cu-10 Ni			34		C70600	90-10 Cu-Ni	45	35					√	√										√			
	C71000	061	80 Cu-20 Ni			34		C71000	80-20 Cu-Ni	45	16				√	√	√										√			
	C71500	061	70 Cu-30 Ni			34		C71500	70-30 Cu-Ni	52	18				√	√	√			√	√						√			
	C71500	HR50	70 Cu-30 Ni			34		C71500	70-30 Cu-Ni	72	50					√	√			√							√			
	C71640	061	66 Cu-30 Ni-2 Fe-2Mn			34		C71640		63	25																√	1868		
	C71640	HR50	66 Cu-30 Ni-2 Fe-2Mn			34		C71640		81	58																√	1868		
	C72200	061	80 Cu-16 Ni-Mn-Zn-Cr			34		C72200		45	16						√										√			
	C72200	H55	80 Cu-16 Ni-Mn-Zn-Cr			34		C72200		50	30						√										√			
SB-127	Ni-Cu		67 Ni-30 Cu	Pl, Sh & Str		42		N04400	Alloy 400	70	28					√	√			√	√						√			Annealed; HR
	Ni-Cu		67 Ni-30 Cu			42		N04400	Alloy 400	75	40					√	√			√	√						√			As-rolled; HR plate
	Ni-Cu		67 Ni-30 Cu			42		N04400	Alloy 400	70-85	28									√	√						√			Annealed; CR Sh & Str
	Ni-Cu	Hard	67 Ni-30 Cu					N04400	Alloy 400																					CR Sh & Str
SB-135	C23000	060	85 Cu-15 Zn	ST		32		C23000	Red brass	40	12					√	√										√			
	C23000	050	85 Cu-15 Zn			32		C23000	Red brass	40	12					√											√			
SB-148	Cu No. 952		88 Cu-9 Al-3 Fe	Sand Ca		35		C95200	Al bronze 9A	65	25					√	√										√		N133	
	Cu No. 954		85 Cu-11 Al-4 Fe			35		C95400	Al bronze 9C	75	30					√	√										√		N133	
SB-150	C61400	HR50	90 Cu-7 Al-3 Fe	Ro & Ba	≤ ½	35		C61400	Al bronze 3	80	40											√	√	√			√			
	C61400	HR50	90 Cu-7 Al-3 Fe		> ½ to 1, incl.	35		C61400	Al bronze 3	75	35											√	√	√			√			
	C61400	HR50	90 Cu-7 Al-3 Fe		> 1 to 2, incl.	35		C61400	Al bronze 3	70	32											√	√	√			√			
	C61400	HR50	90 Cu-7 Al-3 Fe	Ro & Ba	> 2 to 3, incl.	35		C61400	Al bronze 3	70	30												√	√			√		N249	
	C62300	HR50	88 Cu-9 Al-3 Fe		≤ ½	35		C62300		90	50											√	√	√			√			
	C62300	HR50	88 Cu-9 Al-3 Fe		> ½ to 1, incl.	35		C62300		88	44											√	√	√			√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-150 (Con't)	C62300	HR50	88 Cu-9 Al-3 Fe		> 1 to 2, incl.	35		C62300		84	40											√	√	√			√			
	C62300	HR50	88 Cu-9 Al-3 Fe		> 2 to 3, incl.	35		C62300		76	37											√	√	√			√			
	C62300	M20	88 Cu-9 Al-3 Fe		Rounds	35		C62300		75	30												√	√			√			
	C62300	M30	88 Cu-9 Al-3 Fe		Rounds	35		C62300		75	30												√	√			√			
	C62300	020	88 Cu-9 Al-3 Fe		Rounds	35		C62300		75	30												√	√			√			
	C62300	025	88 Cu-9 Al-3 Fe		Rounds	35		C62300		75	30													√			√			
	C62300	030	88 Cu-9 Al-3 Fe		Rounds	35		C62300		75	30													√			√			
	C62300	HR50	88 Cu-9 Al-3 Fe		Rounds	35		C62300		75	30											√	√	√			√			
	C62300	HR50	88 Cu-9 Al-3 Fe		≤ 1	35		C62300		80	35																√			Hex/Oct
	C62300	HR50	88 Cu-9 Al-3 Fe		> 1 to 2, incl.	35		C62300		78	32																√			Hex/Oct
	C62300	HR50	88 Cu-9 Al-3 Fe		> 2	35		C62300		75	30																√			Hex/Oct
	C63000	HR50	81 Cu-10 Al-3 Fe		½ to 1, incl.	35		C63000	Al bronze 2	100	50											√	√	√			√			Ro
	C63000	HR50	81 Cu-10 Al-3 Fe		> 1 to 2, incl.	35		C63000	Al bronze 2	90	45											√	√	√			√			Ro
	C63000	HR50	81 Cu-10 Al-3 Fe		> 2 to 3, incl.	35		C63000	Al bronze 2	85	42.5											√	√	√			√		N249	Ro
	C63000	M20	81 Cu-10 Al-3 Fe		> 3 to 4, incl.	35		C63000	Al bronze 2	85	42.5												√	√			√		N249	Ro
	C63000	HR50	81 Cu-10 Al-3 Fe		½ to 1, incl.	35		C63000	Al bronze 2	100	50											√	√	√			√			Ba
	C63000	HR50	81 Cu-10 Al-3 Fe		> 1 to 2, incl.	35		C63000	Al bronze 2	90	45											√	√	√			√			Ba
	C63000	M20	81 Cu-10 Al-3 Fe		> 2 to 4, incl.	35		C63000	Al bronze 2	85	42.5											√					√		N249	Ba
	C64200	HR50	91 Cu-7 Al-2 Si		≤ ½	35		C64200	Al bronze 1	90	45											√	√	√			√			Ro & Ba
	C64200	HR50	91 Cu-7 Al-2 Si		> ½ to 1, incl.	35		C64200	Al bronze 1	85	45											√	√	√			√			
	C64200	HR50	91 Cu-7 Al-2 Si		> 1 to 2, incl.	35		C64200	Al bronze 1	80	42											√	√	√			√			
	C64200	HR50	91 Cu-7 Al-2 Si		> 2 to 3, incl.	35		C64200	Al bronze 1	75	35											√	√	√			√			
	C64200	M10	91 Cu-7 Al-2 Si	Ro & Ba	> 3 to 4, incl.	35		C64200	Al bronze 1	70	30											√	√	√			√			
	C64200	M20	91 Cu-7 Al-2 Si		> 4	35		C64200	Al bronze 1	70	25													√			√		N249	
	C64200	M30	91 Cu-7 Al-2 Si		> 4	35		C64200	Al bronze 1	70	25													√			√		N249	
SB-151	C70600	060	90 Cu-10 Ni	Ro & Ba		34		C70600	90-10 Cu-Ni	38	15					√											√			

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SB-151	C71500	H01	70 Cu- 30 Ni		≤ ½			C71500		65	50																			
(Con't)	C71500	H01	70 Cu- 30 Ni		> ½ to 1, incl.			C71500		60	45																			
	C71500	H01	70 Cu- 30 Ni		> 1 to 3, incl.			C71500		55	35																			
SB-152	C10200	025/060	99.95 Cu	Sh, Str, Pl & Ba		31		C10200	OF Cu	30-38	10					√	√										√			
	C10400	025/060	99.95 Cu + Ag			31		C10400	OFS Cu	30-38	10					√	√										√			
	C10500	025/060	99.95 Cu + Ag			31		C10500	OFS Cu	30-38	10					√	√										√			
	C10700	025/060	99.95 Cu + Ag			31		C10700	OFS Cu	30-38	10					√	√										√			
	C11000	025/060	99.90 Cu			31		C11000	ETP Cu	30-38	10						√										√			
	C12200	025/060	99.9 Cu + P			31		C12200	DHP Cu	30-38	10					√	√										√			
	C12300	025/060	99.90 Cu + Ag + P			31		C12300	DPS Cu	30-38	10					√	√										√			
	C12500	025/060	99.88 Cu			31		C12500	FRTP Cu	30-38	10					√											√			
	C14200	025/060	99.40 Cu + As + P			31		C14200	DPA Cu	30-38	10					√	√										√			
SB-160	Nickel	Cold drawn	99.0 Ni	Ro & Ba	Rounds ≤ 1	41		N02200	Alloy 200	80	60																√			
	Nickel	Cold drawn	99.0 Ni		> 1 to 4, incl.	41		N02200	Alloy 200	75	50																√			
	Nickel		99.0 Ni		Squares, hexs & rect's	41		N02200	Alloy 200	65	40											√	√	√			√			
	Nickel	HF	99.0 Ni			41		N02200	Alloy 200	60	15					√	√					√	√	√			√			
	Nickel	Annealed	99.0 Ni			41		N02200	Alloy 200	55	15					√	√				√	√	√	√			√			
	Low C Nickel	HF or Annealed	99.0 Ni - Low C			41		N02201	Alloy 201	50	10					√	√				√	√	√	√			√			
SB-161	Nickel	Annealed	99.0 Ni	SP & ST	≤ 5	41		N02200	Alloy 200	55	15					√	√				√						√			
	Nickel	Annealed	99.0 Ni		> 5	41		N02200	Alloy 200	55	12					√	√				√						√			
	Nickel	Stress relieved	99.0 Ni			41		N02200	Alloy 200	65	40					√	√										√			
	Low C Nickel	Annealed	99.0 Ni - Low C		≤ 5	41		N02201	Alloy 201	50	12					√	√				√						√			
	Low C Nickel	Annealed	99.0 Ni - Low C		> 5	41		N02201	Alloy 201	50	10					√	√				√						√			
	Low C Nickel	Stress relieved	99.0 Ni - Low C	SP & ST		41		N02201	Alloy 201	60	30					√	√										√			
SB-162	Nickel	Annealed	99.0 Ni	Pl, Sh & Str		41		N02200	Alloy 200	55	15					√	√				√						√			
	Nickel	As rec'd hot rolled	99.0 Ni			41		N02200	Alloy 200	55	20					√	√				√						√			Pl

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SB-162	Nickel	CR-Hard	99.0 Ni		Sh, Str only			N02200	Alloy 200	90	70																			
(Con't)	Low C Nickel		99.0 Ni - Low C			41		N02201	Alloy 201	50	12					√	√				√						√			
SB-163	Nickel	Annealed	99.0 Ni	ST		41		N02200	Alloy 200	55	15					√	√				√						√			
	Nickel	Stress relieved	99.0 Ni			41		N02200	Alloy 200	65	40					√	√										√			
	Low C Nickel	Annealed	99.0 Ni - Low C			41		N02201	Alloy 201	50	12					√	√				√						√			
	Low C Nickel	Stress relieved	99.0 Ni - Low C			41		N02201	Alloy 201	60	30					√	√										√			
	Ni-Cu	Annealed	67 Ni-30 Cu			42		N04400	Alloy 400	70	28					√	√			√	√						√			
	Ni-Cu	Stress relieved	67 Ni-30 Cu			42		N04400	Alloy 400	85	55					√	√			√	√						√			
	Ni-Cr-Fe	Annealed	72 Ni-15 Cr-8 Fe			43		N06600	Alloy 600	80	35					√	√			√	√						√	1827	N253	
	Ni-Cr-Fe	Annealed	58 Ni-29 Cr- 9 Fe			43		N06690	Alloy 690	85	35									√							√		N474	
	Ni-Cr-Fe	Annealed	46 Ni-27 Cr-23 Fe-2.75 Si					N06045	Nicrofer 45	90	35																	2188		
	Ni-Cr-Fe	Annealed	62 Ni-25 Cr-10 Fe-Al					N06025	Nicrofer 6025 HT	94	43																			
	Ni-Fe-Cr	Annealed	33 Ni-42 Fe-21 Cr			45		N08800	Alloy 800	75	30					√	√			√	√						√	1325	N253	
	Ni-Fe-Cr	Cold worked	33 Ni-42 Fe-21 Cr					N08800	Alloy 800	83	47																		N20	
	Ni-Fe-Cr	Annealed	33 Ni-42 Fe-21 Cr			45		N08810	Alloy 800H	65	25					√	√			√	√						√	1325	N201, 253	
	Ni-Fe-Cr-Mo-Cu	Annealed	42 Ni-21.5 Cr-5 Mo-2.3 Cu			45		N08825	Alloy 825	85	35					√	√			√	√						√			
	(Case only)		60 Ni-23 Cr-Fe-1.3 Al					N06601	Alloy 601	80	30																	1500		
	Ni-Fe-Cr		33Ni-42 Fe-21 Cr					N08801	Alloy 801	65	25																	1671		
	Ni-Fe-Cr		33Ni-42 Fe-21 Cr					N08811	Alloy 800HT	65	25																	1987		
	(Case only)		72 Ni-15 Cr-8 Fe					N06600	Alloy 600	80	40-65																		N20	
	(Case only)		58 Ni-29 Cr-9 Fe					N06690	Alloy 690	80	40-65																		N20	
	(Case only)		33 Ni-42 Fe-21 Cr					N08800	Alloy 800	80	40-65																		N20	
SB-164	N04400	Cold worked	67 Ni-30 Cu	Ro & Ba	Rounds < ½	42		N04400	Alloy 400	110	85														√		√			
	N04400	Cold worked	67 Ni-30 Cu		Squares, hexs & rect's	42		N04400	Alloy 400	85	55											√	√	√	√		√			
	N04400	CW, stress relieved	67 Ni-30 Cu		Rounds < ½	42		N04400	Alloy 400	84	50																√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-164 (Con't)	N04400	CW, stress relieved	67 Ni-30 Cu		Rounds ½ to 3½	42		N04400	Alloy 400	87	60												√	√	√		√			
	N04400	CW, stress relieved	67 Ni-30 Cu		Rounds 3½ to 4	42		N04400	Alloy 400	84	55														√		√			
	N04400	CW, stress relieved	67 Ni-30 Cu		Squares, hexs & rect's ≤ 2	42		N04400	Alloy 400	84	50											√	√	√	√		√			
	N04400	CW, stress relieved	67 Ni-30 Cu		Squares, hexs & rect's > 2 to 3 ⅛	42		N04400	Alloy 400	80	50														√		√			
	N04400	Hot Worked	67 Ni-30 Cu		Round, sq, rect to 12 hexs ≤2 ⅛	42		N04400	Alloy 400	80	40					√	√					√	√	√	√		√			
	N04400	Hot Worked	67 Ni-30 Cu		Rounds, sq, rect > 12 to 14	42		N04400	Alloy 400	75	40						√			√							√			
	N04400	Hot Worked	67 Ni-30 Cu		Hexs > 2 ⅛ to 4	42		N04400	Alloy 400	75	30					√	√			√		√	√	√	√		√			
	N04400	Annealed	67 Ni-30 Cu			42		N04400	Alloy 400	70	25					√	√			√	√	√	√	√	√		√			
	N04405	Cold Worked	67 Ni-30 Cu-S		Rounds to 3 Hex, sq ≤ 2	42		N04405	Alloy 405	85	50											√	√		√		√			
	N04405	Cold Worked	67 Ni-30 Cu-S		Rounds > 3 to 4	42		N04405	Alloy 405	80	50																√			
	N04405	Cold Worked	67 Ni-30 Cu-S		Hex, sq > 2 to 3 ⅛	42		N04405	Alloy 405	80	45																√			
	N04405	Hot Worked	67 Ni-30 Cu-S		Rounds ≤ 3 Hex, sq ≤ 2 ⅛	42		N04405	Alloy 405	75	35					√	√			√		√	√		√		√			
	N04405	Hot Worked	67 Ni-30 Cu-S		Hexs, sq > 2 ⅛ to 4	42		N04405	Alloy 405	70	30																√			
	N04405	Annealed	67 Ni-30 Cu-S	Ro & Ba		42		N04405	Alloy 405	70	25					√	√			√	√	√	√		√		√			
	(Case only)	CF/HF, annld & age hardened	67 Ni-28 Cu-3 Al							130	90																	1192		
	(Case only)	HF & age hardened	67 Ni-28 Cu-3 Al							140	100																	1192		
SB-165	Ni-Cu	Annealed	67 Ni-30 Cu	SP & ST	≤ 5	42		N04400	Alloy 400	70	28					√	√			√	√						√			
	Ni-Cu	Annealed	67 Ni-30 Cu		> 5	42		N04400	Alloy 400	70	25					√	√			√	√						√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-165 (Con't)	Ni-Cu	Stress relieved	67 Ni-30 Cu	SP & ST		42		N04400	Alloy 400	85	55					√	√			√							√			
SB-166	N06600	Cold worked	72 Ni-15 Cr-8 Fe	Ro & Ba	Rounds < ½			N06600	Alloy 600	120	90																			
	N06600	Cold worked	72 Ni-15 Cr-8 Fe		Rounds ½ to 1, incl.			N06600	Alloy 600	110	85																			
	N06600	Cold worked	72 Ni-15 Cr-8 Fe		Rounds > 1 to 2½			N06600	Alloy 600	105	80																			
	N06600	Cold worked	72 Ni-15 Cr-8 Fe		Shapes ≤ ¼			N06600	Alloy 600	100	80																			
	N06600	Cold worked	72 Ni-15 Cr-8 Fe		Shapes > ¼ to ½			N06600	Alloy 600	95	70																			
	N06600	Hot worked	72 Ni-15 Cr-8 Fe		Rounds ¼ to ½			N06600	Alloy 600	95	45																			
	N06600	Hot worked	72 Ni-15 Cr-8 Fe		Rounds > ½ to 3	43		N06600	Alloy 600	90	40											√	√	√			√	1827		
	N06600	Hot worked	72 Ni-15 Cr-8 Fe		Rounds > 3	43		N06600	Alloy 600	85	35					√	√					√	√	√			√	1827		
	N06600	Hot worked	72 Ni-15 Cr-8 Fe		Shapes - all sizes	43		N06600	Alloy 600	85	35					√	√										√	1827		
	N06600	Annealed	72 Ni - 15 Cr - 8 Fe			43		N06600	Alloy 600	80	35					√	√			√	√	√	√	√			√	1827	N253	
	N06601	Annealed	60 Ni-23 Cr-Fe-1.3 Al					N06601	Alloy 601	80	30																	1500		
	N06617	Annealed	45Ni-22Cr-12Co-9Mo					N06617	Alloy 617	95	35																	1956		
	N06690	Cold worked	58 Ni - 29 Cr - 9 Fe		Rounds < ½			N06690	Alloy 690	120	90																			
	N06690	Cold worked	58 Ni - 29 Cr - 9 Fe		Rounds ½ to 1			N06690	Alloy 690	110	85																			
	N06690	Cold worked	58 Ni - 29 Cr - 9 Fe		Rounds > 1 to 2½			N06690	Alloy 690	105	80																			
	N06690	Cold worked	58 Ni - 29 Cr - 9 Fe		Shapes ≤ ¼			N06690	Alloy 690	100	80																			
	N06690	Cold worked	58 Ni - 29 Cr - 9 Fe	Ro & Ba	Shapes > ¼ to ½			N06690	Alloy 690	95	70																			
	N06690	Hot worked	58 Ni - 29 Cr - 9 Fe		Rounds ¼ to ½	43		N06690	Alloy 690	95	45																√			
	N06690	Hot worked	58 Ni - 29 Cr - 9 Fe		Rounds > ½ to 3	43		N06690	Alloy 690	90	40																√			
	N06690	Hot worked	58 Ni - 29 Cr - 9 Fe		Rounds > 3	43		N06690	Alloy 690	85	35						√										√		N474	

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-166 (Con't)	N06690	Hot worked	58 Ni - 29 Cr - 9 Fe		Shapes - all sizes	43		N06690	Alloy 690	85	35						√										√		N474	
	N06690	Annealed	58 Ni - 29 Cr - 9 Fe			43		N06690	Alloy 690	85	35						√										√			
	(Case only)		46 Ni-27 Cr-23 Fe-2.75 Si					N06045	Nicrofer 45	90	35																	2188		
SB-167	N06600	HF or Annealed	72 Ni-15 Cr-8 Fe	SP & ST	≤ 5	43		N06600	Alloy 600	80	30					√	√			√	√						√	1827	N253, 290	
	N06600	HF or Annealed	72 Ni-15 Cr-8 Fe		> 5	43		N06600	Alloy 600	75	25					√	√			√							√	1827	N253, 290	
	N06600	CD, Annealed	72 Ni-15 Cr-8 Fe		≤ 5	43		N06600	Alloy 600	80	35					√	√			√	√						√	1827	N253	
	N06600	CD, Annealed	72 Ni-15 Cr-8 Fe		> 5	43		N06600	Alloy 600	80	30					√	√			√	√						√	1827	N253	
	N06601	Annealed	60 Ni-23 Cr-Fe-1.3 Al					N06601	Alloy 601	80	30																	1500		
	N06690	HF or Annealed	58 Ni-29 Cr-9 Fe		≤ 5	43		N06690	Alloy 690	85	30																√	2083	N525	
	N06690	HF or Annealed	58 Ni-29 Cr-9 Fe		> 5	43		N06690	Alloy 690	75	25																√			
	N06690	CD, Annealed	58 Ni-29 Cr-9 Fe		≤ 5	43		N06690	Alloy 690	85	35						√										√	2083	N474	
	N06690	CD, Annealed	58 Ni-29 Cr-9 Fe		> 5	43		N06690	Alloy 690	85	30																√		N525	
	N06045	Annealed	46 Ni-27 Cr-23 Fe-2.75 Si					N06045	Nicrofer 45	90	35																	2188		
	N06025	Annealed	62 Ni-25 Cr-10 Fe-Al					N06025	Nicrofer 6025 HT	96	51																			
SB-168	N06600	HR, Annealed	72 Ni-15 Cr-8 Fe	Pl, Sh & Str	Plate	43		N06600	Alloy 600	80	35					√	√			√	√						√	1827	N60, 253, 290	
	N06600	HR, as rolled	72 Ni-15 Cr-8 Fe		Plate	43		N06600	Alloy 600	85	35					√	√										√	1827	290	
	N06600	HR, Annealed	72 Ni-15 Cr-8 Fe		Sheet	43		N06600	Alloy 600	80	35					√	√			√	√						√	1827	N60, 253, 290	
	N06600	CR, Annealed	72 Ni-15 Cr-8 Fe		Sheet	43		N06600	Alloy 600	80	35					√	√			√	√						√	1827	N60, 253	
	N06600	CR, Annealed	72 Ni-15 Cr-8 Fe	Pl, Sh & Str	Strip	43		N06600	Alloy 600	80	35					√	√			√	√						√	1827	N60, 253	
	N06600	Hard	72 Ni-15 Cr-8 Fe		Sheet			N06600	Alloy 600	125	90																			
	N06600	Hard	72 Ni-15 Cr-8 Fe		Strip			N06600	Alloy 600	125	90																			
	N06601	Annealed	60 Ni-23 Cr-Fe-1.3 Al					N06601	Alloy 601	80	30																	1500		
	N06617	Annealed	45 Ni-22 Cr-12 Co-9 Mo					N06617	Alloy 617	95	35																			

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SB-168	N06045	Annealed	46 Ni-27 Cr-23 Fe-2.75 Si		Pl, Sh, Str			N06045	Nicrofer 45	90	35																	2188		
(Con't)	N06025	Annealed	62 Ni-25 Cr-10 Fe-Al		Pl, Sh, Str			N06025	Nicrofer 6025 HT	96	51																			
	N06690	HR, Annealed	58 Ni-29 Cr-9 Fe		Plate	43		N06690	Alloy 690	85	35						√										√		N474	
	N06690	HR, as rolled	58 Ni-29 Cr-9 Fe		Plate	43		N06690	Alloy 690	85	35						√										√		N474	
	N06690	HR, Annealed	58 Ni-29 Cr-9 Fe		Sheet	43		N06690	Alloy 690	85	35						√										√		N474	
	N06690	CR, Annealed	58 Ni-29 Cr-9 Fe		Sheet	43		N06690	Alloy 690	85	35						√										√		N474	
	N06690	CR, Annealed	58 Ni-29 Cr-9 Fe		Strip	43		N06690	Alloy 690	85	35						√										√		N474	
	N06690	Hard	58 Ni-29 Cr-9 Fe		Sheet			N06690	Alloy 690	125	90																			
	N06690	Hard	58 Ni-29 Cr-9 Fe		Strip			N06690	Alloy 690	125	90																			
SB-169	C61400	025, 060 or M20	90 Cu-7 Al-3 Fe	Pl, Sh, Str & Ba	≤ ½	35		C61400	Al bronze D	72	30					√	√										√			
	C61400	025, 060 or M20	90 Cu-7 Al-3 Fe		> ½ to 2	35		C61400	Al bronze D	70	28					√	√				√						√			
	C61400	025, 060 or M20	90 Cu-7 Al-3 Fe		> 2 to 5	35		C61400	Al bronze D	65	26					√	√				√						√		N249	
SB-171	C36500		60 Cu-39 Zn-Pb	Pl	≤ 2	32		C36500	Leaded Muntz, metal	50	20					√	√										√			
	C36500		60 Cu-39 Zn-Pb		> 2 to 3½	32		C36500	Leaded Muntz, metal	45	15					√	√										√			
	C36500		60 Cu-39 Zn-Pb		> 3½ to 5	32		C36500	Leaded Muntz, metal	40	12					√	√										√			
	C44300		71 Cu-28 Zn-1 Sn		≤ 4	32		C44300	Admiralty B (As)	45	15					√	√										√			
	C44400		71 Cu-28 Zn-1 Sn		≤ 4	32		C44400	Admiralty C (Sb)	45	15					√	√										√			
	C44500		71 Cu-28 Zn-1 Sn		≤ 4	32		C44500	Admiralty D (P)	45	15					√	√										√			
	C46400		60 Cu-39 Zn-Sn		≤ 3	32		C46400	Naval brass, uninhibited	50	20					√	√				√						√			
	C46400		60 Cu-39 Zn-Sn		> 3 to 5	32		C46400	Naval brass, uninhibited	50	18					√	√				√						√			
	C46500		60 Cu-39 Zn-Sn-As		≤ 3	32		C46500	Naval brass, arsenical	50	20					√	√										√			
	C46500		60 Cu-39 Zn-Sn-As		> 3 to 5	32		C46500	Naval brass, arsenical	50	18					√	√										√			
	C61400		90 Cu-7 Al-3 Fe		≤ 2	35		C61400	Al bronze D	70	28					√	√										√			
	C61400		90 Cu-7 Al-3 Fe	Pl	> 2 to 5	35		C61400	Al bronze D	65	26					√	√										√			
	C63000		85 Cu-10 Al-Ni		≤ 2	35		C63000	Al-Ni bronze No. 2	90	34					√	√										√			
	C63000		85 Cu-10 Al-Ni		> 2 to 3½	35		C63000	Al-Ni bronze No. 2	85	31					√	√										√			
	C63000		85 Cu-10 Al-Ni		> 3½ to 5	35		C63000	Al-Ni bronze No. 2	80	28					√	√										√			
	C70600		90 Cu-10 Ni		≤ 5	34		C70600	90-10 Cu-Ni	40	15					√	√				√						√			

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SB-171	C71500		70 Cu-30 Ni		≤ 2½	34		C71500	70-30 Cu-Ni	50	20					√	√			√	√						√			
(Con't)	C71500		70 Cu-30 Ni		> 2½ to 5	34		C71500	70-30 Cu-Ni	45	18					√	√			√	√						√			
SB-187	C10200	060	99.95 Cu	Ba, Ro, Sa				C10200	OF Cu	28-37																				
	C11000	060	99.90 Cu					C11000	ETP Cu	28-37																				
SB-209	1060	0	99.60 Al	Sh & Pl	.051-3.000	21		A91060		8-14	2.5					√	√										√			
	1060	H12	99.60 Al		.051-2.000			A91060		11-16	9					√	√													
	1060	H14	99.60 Al		.051-1.000			A91060		12-17	10					√	√													
	1060	H112	99.60 Al		.250 to .499			A91060		11	7					√	√													
	1060	H112	99.60 Al		.500 to 1.000			A91060		10	5					√	√													
	1060	H112	99.60 Al		1.001 to 3.000			A91060		9	4					√	√													
	1100	0	99.0 Al-Cu		.006 to 3.000	21		A91100		11-15.5	3.5					√	√										√			
	1100	H12	99.0 Al-Cu		.051 to 2.000			A91100		14-19	11					√	√													
	1100	H14	99.0 Al-Cu		.009 to 1.000			A91100		16-21	14					√	√													
	1100	H112	99.0 Al-Cu		.250 to .499			A91100		13	7					√	√													
	1100	H112	99.0 Al-Cu		.500 to 2.000			A91100		12	5					√	√													
	1100	H112	99.0 Al-Cu		2.001 to 3.000			A91100		11.5	4					√	√													
	3003	0	Al-Mn-Cu		.006 to 3.000	21		A93003		14-19	5					√	√				√						√			
	3003	H12	Al-Mn-Cu		.017 to 2.000			A93003		17-23	12					√	√													
	3003	H14	Al-Mn-Cu		.009 to 1.000			A93003		20-26	17					√	√													
	3003	H112	Al-Mn-Cu		.250 to .499			A93003		17	10					√	√				√									
	3003	H112	Al-Mn-Cu		.500 to 2.000			A93003		15	6					√	√				√									
	3003	H112	Al-Mn-Cu		2.001 to 3.000			A93003		14.5	6					√	√				√									
	Alclad 3003	0			.051 to .499	21		A83003		13-18	4.5					√	√										√			
	Alclad 3003	0		Sh & Pl	.500 to 3.000	21		A83003		14-19	5					√	√										√			
	Alclad 3003	H12			.017 to .499			A83003		16-22	11					√	√													

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SB-209 (Con't)	Alclad 3003	H12			.500 to 2.000			A83003		17-23	12					√	√													
	Alclad 3003	H14			.009 to .499			A83003		19-25	16					√	√													
	Alclad 3003	H14			.500 to 1.000			A83003		20-26	17					√	√													
	Alclad 3003	H112			.250 to .499			A83003		16	9					√	√													
	Alclad 3003	H112			.500 to 2.000			A83003		15	6					√	√													
	Alclad 3003	H112			2.001 to 3.000			A83003		14.5	6					√	√													
	3004	0	Al-Mn-Mg		.006 to 3.000	22		A93004		22-29	8.5					√	√				√						√			
	3004	H32	Al-Mn-Mg		.051 to 2.000			A93004		28-35	21					√	√													
	3004	H34	Al-Mn-Mg		.051 to 1.000			A93004		32-38	25					√	√													
	3004	H112	Al-Mn-Mg		.250 to 3.000			A93004		23	9					√	√				√									
	Alclad 3004	0			.051 to .499	22				21-28	8					√	√										√			
	Alclad 3004	0			.500 to 3.000	22				22-29	8.5					√	√										√			
	Alclad 3004	H32			.051 to .499					27-34	20					√	√													
	Alclad 3004	H32			.500 to 2.000					28-35	21					√	√													
	Alclad 3004	H34			.051 to .499					31-37	24					√	√													
	Alclad 3004	H34			.500 to 1.000					32-38	25					√	√													
	Alclad 3004	H112			.250 to .499					22	8.5					√	√													
	Alclad 3004	H112			.500 to 3.000					23	9					√	√													
	5052	0	Al-2.5 Mg		.051 to 3.000	22		A95052		25-31	9.5					√	√				√						√			
	5052	H32	Al-2.5 Mg		.051 to 2.000			A95052		31-38	23					√	√													
	5052	H34	Al-2.5 Mg		.051 to 1.000			A95052		34-41	26					√	√													
	5052	H112	Al-2.5 Mg	Sh & Pl	.250 to .499			A95052		28	16					√	√				√									
	5052	H112	Al-2.5 Mg		.500 to 3.000			A95052		25	9.5					√	√				√									

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-209 (Con't)	5083	0	Al-4.4 Mg-Mn		.051 to 1.500	25		A95083		40-51	18-29					√	√				√						√			
	5083	0	Al-4.4 Mg-Mn		1.501 to 3.000	25		A95083		39-50	17-29					√	√				√						√			
	5083	0	Al-4.4 Mg-Mn		3.001 to 5.000	25		A95083		38	16					√	√				√						√			
	5083	0	Al-4.4 Mg-Mn		5.001 to 7.000	25		A95083		37	15					√	√				√						√			
	5083	0	Al-4.4 Mg-Mn		7.001 to 8.000	25		A95083		36	14					√	√				√						√			
	5083	H321	Al-4.4 Mg-Mn		.188 to 1.500			A95083		44-56	31-43					√	√													
	5083	H321	Al-4.4 Mg-Mn		1.501 to 3.000			A95083		41-56	29-43					√	√													
	5083	H112	Al-4.4 Mg-Mn		.250 to 1.500			A95083		40	18					√	√				√									
	5083	H112	Al-4.4 Mg-Mn		1.501 to 3.000			A95083		39	17					√	√				√									
	5086	0	Al-4.0 Mg-Mn		.051 to 2.000	25		A95086		35-44	14					√	√				√						√			
	5086	H32	Al-4.0 Mg-Mn		.051 to 2.000			A95086		40-47	28					√	√													
	5086	H34	Al-4.0 Mg-Mn		.051 to 1.000			A95086		44-51	34					√	√													
	5086	H112	Al-4.0 Mg-Mn		.188 to .499			A95086		36	18					√	√				√									
	5086	H112	Al-4.0 Mg-Mn		.500 to 1.000			A95086		35	16					√	√				√									
	5086	H112	Al-4.0 Mg-Mn		1.001 to 2.000			A95086		35	14					√	√				√									
	5086	H112	Al-4.0 Mg-Mn		2.001 to 3.000	25		A95086		34	14					√	√				√						√			
	5086	H116	Al-4.0 Mg-Mn		.063 to 2.000			A95086		40	28						√													
	5154	0	Al-3.5 Mg		.051 to 3.000	22		A95154		30-41	11					√	√										√			
	5154	H32	Al-3.5 Mg		.051 to 2.000			A95154		36-43	26					√	√													
	5154	H34	Al-3.5 Mg	Sh & Pl	.051 to 1.000			A95154		39-46	29					√	√													
	5154	H112	Al-3.5 Mg		.250 to .499			A95154		32	18					√	√													

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-209 (Con't)	5154	H112	Al-3.5 Mg		.500 to 3.000			A95154		30	11					√	√													
	5254	0	Al-3.5 Mg		.051 to 3.000	22		A95254		30-41	11					√	√										√			
	5254	H32	Al-3.5 Mg		.051 to 2.000			A95254		36-43	26					√	√													
	5254	H34	Al-3.5 Mg		.051 to 1.000			A95254		39-46	29					√	√													
	5254	H112	Al-3.5 Mg		.250 to .499			A95254		32	18					√	√													
	5254	H112	Al-3.5 Mg		.500 to 3.000			A95254		30	11					√	√													
	5454	0	Al-2.7 Mg-Mn		.051 to 3.000	22		A95454		31-41	12					√	√				√						√			
	5454	H32	Al-2.7 Mg-Mn		.051 to 2.000			A95454		36-44	26					√	√													
	5454	H34	Al-2.7 Mg-Mn		.051 to 1.000			A95454		39-47	29					√	√													
	5454	H112	Al-2.7 Mg-Mn		.250 to .499			A95454		32	18					√	√				√									
	5454	H112	Al-2.7 Mg-Mn		.500 to 3.000			A95454		31	12					√	√				√									
	5456	0	Al-5.1 Mg-Mn		.051 to 1.500	25		A95456		42-53	19-30					√	√										√			
	5456	0	Al-5.1 Mg-Mn		1.501 to 3.000	25		A95456		41-52	18-30					√	√										√			
	5456	0	Al-5.1 Mg-Mn		3.001 to 5.000 In.	25		A95456		40	17					√	√										√			
	5456	0	Al-5.1 Mg-Mn		5.001 to 7.000	25		A95456		39	16					√	√										√			
	5456	0	Al-5.1 Mg-Mn		7.000 to 8.000	25		A95456		38	15					√	√										√			
	5456	H321	Al-5.1 Mg-Mn		.188 to .499			A95456		46-59	33-46					√	√													
	5456	H321	Al-5.1 Mg-Mn		.500 to 1.500			A95456		44-56	31-44					√	√													
	5456	H321	Al-5.1 Mg-Mn		1.501 to 3.000			A95456		41-54	29-43					√	√													
	5456	H112	Al-5.1 Mg-Mn		.250 to 1.500			A95456		42	19					√	√													
	5456	H112	Al-5.1 Mg-Mn	Sh & Pl	1.501 to 3.000			A95456		41	18					√	√													

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-209 (Con't)	5652	0	Al-2.5 Mg		.051 to 3.000	22		A95652		25-31	9.5					√	√										√			
	5652	H32	Al-2.5 Mg		.051 to 2.000			A95652		31-38	23					√	√													
	5652	H34	Al-2.5 Mg		.051 to 1.000			A95652		34-41	26					√	√													
	5652	H112	Al-2.5 Mg		.250 to .499			A95652		28	16					√	√													
	5652	H112	Al-2.5 Mg		.500 to 3.000			A95652		25	9.5					√	√													
	6061	T4	Al-Mg-Si-Cu		.051 to .249	23		A96061		30	16					√	√				√						√			
	6061	T451	Al-Mg-Si-Cu		.250 to 3.000	23		A96061		30	16					√	√				√						√			
	6061	T6	Al-Mg-Si-Cu		.051 to .249	23		A96061		42	35					√	√				√						√		N519	
	6061	T651	Al-Mg-Si-Cu		.250 to 4.000	23		A96061		42	35					√	√				√						√		N519	
	6061	T651	Al-Mg-Si-Cu		4.001 to 6.000	23		A96061		40	35					√	√				√						√		N519	
	Alclad 6061	T4			.051 to .249	23		A86061		27	14					√	√										√			
	Alclad 6061	T451			.250 to .499	23		A86061		27	14					√	√										√			
	Alclad 6061	T451			.500 to 3.000	23		A86061		30	16					√	√										√			
	Alclad 6061	T6			.051 to .249	23		A86061		38	32					√	√										√			
	Alclad 6061	T651			.250 to .499	23		A86061		38	32					√	√										√			
	Alclad 6061	T651			.500 to 4.000	23		A86061		42	35					√	√										√			
	Alclad 6061	T651			4.001 to 5.000	23		A86061		40	35					√	√										√			
SB-210	1060	0	99.60 Al	ST	.018 to .500	21		A91060		8.5-13.5	2.5					√	√										√			
	1060	H14	99.60 Al		.018 to .500			A91060		12	10					√	√													
	1060	H113	99.60 Al		.018 to .500	21		A91060		8.5	2.5					√	√										√			
	3003	0	Al-Mn-Cu		.010 to .500	21		A93003		14-19	5					√	√				√						√			
	3003	H12	Al-Mn-Cu		.010 to .500			A93003		17	12					√	√													
	3003	H14	Al-Mn-Cu		.010 to .500			A93003		20	17					√	√													
	3003	H18	Al-Mn-Cu		.010 to .500			A93003		27	24					√	√													
	3003	H113	Al-Mn-Cu		.010 to .500			A93003		14	5					√	√				√									
	Alclad 3003	0	Al-Mg-1 Si	ST	.010 to .500	21		A83003		13-19	4.5					√	√				√						√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-210	Alclad 3003	H14	Al-Mg-1 Si		.010 to .500			A83003		19	16					√	√													
(Con't)	Alclad 3003	H18	Al-Mg-1 Si		.010 to .500			A83003		26	23					√	√													
	Alclad 3003	H113	Al-Mg-1 Si		.050 to .500	21		A83003		13	4.5					√	√				√						√			
	5052	0	Al-2.5 Mg		.018 to .450	22		A95052		25-35	10					√	√										√			
	5052	H32	Al-2.5 Mg		.018 to .450			A95052		31	23					√	√													
	5052	H34	Al-2.5 Mg		.018 to .450			A95052		34	26					√	√													
	5154	0	Al-3.5 Mg		.010 to .450	22		A95154		30-41	11					√	√										√			
	5154	H34	Al-3.5 Mg		.010 to .450			A95154		39	29					√	√													
	6061	T4	Al-Mg-Si-Cu		.025 to .500	23		A96061		30	16					√	√				√						√			
	6061	T6	Al-Mg-Si-Cu		.025 to .500	23		A96061		42	35					√	√				√						√		N519	
	6063	T6	Al-Mg-Si		.025 to .500	23		A96063		33	28					√	√				√						√			
SB-211	2014	T6	Al-4 Cu-Si-Mn	Ba, Ro & Wire	.125 to 8.000			A92014		65	55											√	√							
	2014	T651	Al-4 Cu-Si-Mn		.125 to 8.000			A92014		65	55												√							
	2024	T4	Al-4 Cu-Mg		.125 to .499			A92024		62	45					√	√					√	√							
	2024	T4	Al-4 Cu-Mg		.500 to 4.500			A92024		62	42					√	√					√	√							
	2024	T4	Al-4 Cu-Mg		4.501 to 6.500			A92024		62	40					√	√					√	√							
	2024	T4	Al-4 Cu-Mg		6.501 to 8.000			A92024		58	38					√	√					√	√							
	6061	T6	Al-Mg-Si-Cu		.125 to 8.000	23		A96061		42	35					√	√					√	√				√			
	6061	T651	Al-Mg-Si-Cu		.125 to 8.000	23		A96061		42	35					√	√						√				√			
SB-221	1060	0	99.60 Al	Ba, Ro & Sa		21		A91060		8.5-14	2.5					√	√										√			
	1060	H112	99.60 Al			21		A91060		8.5	2.5					√	√										√			
	1100	0	99.0 Al-Cu			21		A91100		11-15.5	3					√	√										√			
	1100	H112	99.0 Al-Cu			21		A91100		11	3					√	√										√			
	2024	T3	Al-4 Cu-Mg		≤ .249			A92024		57	42					√	√													
	2024	T3	Al-4 Cu-Mg		.250 to .749			A92024		60	44					√	√													
	2024	T3	Al-4 Cu-Mg		.750 to 1.499			A92024		65	46					√	√													

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-221 (Con't)	2024	T3	Al-4 Cu-Mg	Ba, Ro & Sa	> 1.5; ≤ 25 in.[2]			A92024		70	52																			
	2024	T3	Al-4 Cu-Mg		> 1.5; > 25 ≤ 32 in.[2]			A92024		68	48					√	√													
	3003	0	Al-Mn-Cu			21		A93003		14-19	5					√	√				√						√			
	3003	H112	Al-Mn-Cu			21		A93003		14	5					√	√				√						√			
	5154	0	Al-3.5 Mg			22		A95154		30-41	11					√	√										√			
	5154	H112	Al-3.5 Mg			22		A95154		30	11					√	√										√			
	5454	0	Al-2.7 Mg-Mn		≤ 5.000	22		A95454		31-41	12					√	√				√						√			
	5454	H111	Al-2.7 Mg-Mn		≤ 5.000			A95454		33	19					√	√													
	5454	H112	Al-2.7 Mg-Mn		≤ 5.000	22		A95454		31	12					√	√				√						√			
	5456	0	Al-5.1 Mg-Mn		≤ 5.000	25		A95456		41-53	19					√	√										√			
	5456	H111	Al-5.1 Mg-Mn		≤ 5.000			A95456		42	26					√	√													
	5456	H112	Al-5.1 Mg-Mn		≤ 5.000	25		A95456		41	19					√	√										√			
	5083	0	Al-4.4 Mg-Mn		≤ 5.000	25		A95083		39-51	16					√	√										√			
	5083	H111	Al-4.4 Mg-Mn		≤ 5.000			A95083		40	24					√	√				√									
	5083	H112	Al-4.4 Mg-Mn		≤ 5.000	25		A95083		39	16					√	√										√			
	5086	H112	Al-4.0 Mg-Mn		≤ 5.000			A95086		35	14					√	√													
	6061	T4	Al-Mg-Si-Cu			23		A96061		26	16					√	√				√						√			
	6061	T4510	Al-Mg-Si-Cu			23		A96061		26	16																√			
	6061	T4511	Al-Mg-Si-Cu			23		A96061		26	16																√			
	6061	T6	Al-Mg-Si-Cu			23		A96061		38	35					√	√				√						√		N519	
	6061	T6510	Al-Mg-Si-Cu			23		A96061		38	35																√			
	6061	T6511	Al-Mg-Si-Cu			23		A96061		38	35																√			
	6063	T1	Al-Mg-Si		≤ .500	23		A96063		17	9					√	√										√			
	6063	T1	Al-Mg-Si		.501 to 1.000	23		A96063		16	8					√	√										√			
	6063	T5	Al-Mg-Si		≤ .500	23		A96063		22	16					√	√					√					√			
	6063	T5	Al-Mg-Si		.501 to 1.000	23		A96063		21	15					√	√					√					√			
	6063	T6	Al-Mg-Si		≤ 1.000	23		A96063		30	25					√	√					√					√			
SB-234	1060	H14	99.60 Al	ST	WT: .010 to .200	21		A91060		12	10					√	√										√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-234 (Con't)	3003	H14	Al-Mg-Cu		WT: .010 to .200	21		A93003		20	17					√	√										√			
	3003	H25	Al-Mg-Cu	ST	WT: .010 to .200	21		A93003		22	19					√	√										√			
	Alclad 3003	H14	Al-Mg-Cu		WT: .010 to .200	21		A83003		19	16					√	√										√			
	Alclad 3003	H25	Al-Mg-Cu		WT: .010 to .200	21		A83003		21	18					√	√										√			
	5052	H32	Al-2.5 Mg		WT: .010 to .200	22		A95052		31	23					√	√										√			
	5052	H34	Al-2.5 Mg		WT: .010 to .200	22		A95052		34	26					√	√										√			
	5454	H32	Al-2.7 Mg-Mn		WT: .010 to .200	22		A95454		36	26					√	√										√			
	5454	H34	Al-2.7 Mg-Mn		WT: .010 to .200	22		A95454		39	29					√	√										√			
	6061	T4	Al-Mg-Si-Cu		WT: .025 to .200	23		A96061		30	16					√	√										√			
	6061	T6	Al-Mg-Si-Cu		WT: .025 to .200	23		A96061		42	35					√	√										√			
SB-241	3003	H18	Al-Mg-Cu	SP & ST	Pipe < 1			A93003		27	24					√	√													
	3003	H112	Al-Mg-Cu		Pipe ≥ 1	21		A93003		14	5					√	√										√			
	6061	T6	Al-Mg-Si-Cu		Pipe < 1	23		A96061		42	35					√	√				√						√		N519	
	6061	T6	Al-Mg-Si-Cu		Pipe ≥ 1	23		A96061		38	35					√	√				√						√		N519	
	6063	T6	Al-Mg-Si		Pipe, all sizes	23		A96063		30	25					√	√				√						√			
	1060	0	99.60 Al		Tube, all sizes	21		A91060		8.5-14	2.5					√	√										√			
	1060	H112	99.60 Al		Tube, all sizes	21		A91060		8.5	2.5					√	√										√			
	1100	0	99.0 Al		Tube, all sizes	21		A91100		11-15.5	3					√	√										√			
	1100	H112	99.0 Al		Tube, all sizes	21		A91100		11	3					√	√										√			
	3003	0	Al-Mg-Cu		Tube, all sizes	21		A93003		14-19	5					√	√				√						√			
	3003	H112	Al-Mg-Cu		Tube, all sizes	21		A93003		14	5					√	√				√						√			
	Alclad 3003	0			Tube, all sizes	21		A83003		13-18	4.5					√	√				√						√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-241 (Con't)	Alclad 3003	H112			Tube, all sizes	21		A83003		13	4.5					√	√				√						√			
	5052	0	Al-2.5 Mg	SP & ST	Tube, all sizes	22		A95052		25-35	10					√	√										√			
	5083	0	Al-4.4 Mg-Mn		Tube, all sizes	25		A95083		39-51	16					√	√										√			
	5083	H111	Al-4.4 Mg-Mn		Tube, all sizes			A95083		40	24					√	√				√									
	5083	H112	Al-4.4 Mg-Mn		Tube, all sizes	25		A95083		39	16					√	√										√			
	5086	0	Al-4.0 Mg-Mn		Tube, all sizes	25		A95086		35-46	14					√	√										√			
	5086	H111	Al-4.0 Mg-Mn		Tube, all sizes			A95086		36	21					√	√													
	5086	H112	Al-4.0 Mg-Mn		Tube, all sizes	25		A95086		35	14					√	√										√			
	5454	0	Al-2.7 Mg-Mn		Tube, all sizes	22		A95454		31-41	12					√	√				√						√			
	5454	H111	Al-2.7 Mg-Mn		Tube, all sizes			A95454		33	19					√	√													
	5454	H112	Al-2.7 Mg-Mn		Tube, all sizes	22		A95454		31	12					√	√				√						√			
	5456	0	Al-5.1 Mg-Mn		Tube, all sizes	25		A95456		41-53	19					√	√										√			
	5456	H111	Al-5.1 Mg-Mn		Tube, all sizes			A95456		42	26					√	√													
	5456	H112	Al-5.1 Mg-Mn		Tube, all sizes	25		A95456		41	19					√	√										√			
	6061	T4	Al-Mg-Si-Cu		Tube, all sizes	23		A96061		26	16					√	√				√						√			
	6061	T4510	Al-Mg-Si-Cu		Tube, all sizes	23		A96061		26	16																√			
	6061	T4511	Al-Mg-Si-Cu		Tube, all sizes	23		A96061		26	16																√			
	6061	T6	Al-Mg-Si-Cu		Tube, all sizes	23		A96061		38	35					√	√				√						√		N519	
	6061	T6510	Al-Mg-Si-Cu		Tube, all sizes	23		A96061		38	35																√			
	6061	T6511	Al-Mg-Si-Cu		Tube, all sizes	23		A96061		38	35																√			
	6063	T5	Al-Mg-Si		WT: ≤ .500	23		A96063		22	16					√	√				√						√			

												SECTION II, PART D COVERAGE																				
SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-241 (Con't)	6063	T5	Al-Mg-Si		WT: .500 to 1.000	23		A96063		21	15					√	√				√						√			
	6063	T6	Al-Mg-Si	SP & ST	Tube, all sizes	23		A96063		30	25					√	√				√						√			
	6063	T1	Al-Mg-Si		Tube ≤ .500	23		A96063		17	9					√											√			
	6063	T1	Al-Mg-Si		Tube .501 to 1.000	23		A96063		16	8					√											√			
SB-247	2014	T4	Al-4.4 Cu-Si-Mn	Fo	≤ 4.000			A92014	Die forgings	L55	L30					√	√													
	2014	T6	Al-4.4 Cu-Si-Mn		≤ 2.000			A92014	Die forgings	L65 T64	L56 T55					√	√													
	2014	T6	Al-4.4 Cu-Si-Mn		2.001 to 3.000			A92014	Die forgings	L65 T63	L55 T54					√	√													
	2014	T6	Al-4.4 Cu-Si-Mn		3.001 to 4.000			A92014	Die forgings	L63 T63	L55 T54					√	√													
	3003	H112	Al-Mg-Cu		≤ 4.000	21		A93003	Die forgings	L14	L5					√	√										√			
	5083	H111	Al-4.4 Mg-Mn		≤ 4.000	25		A95083	Die forgings	L42 T39	L22 T20					√	√										√			
	5083	H112	Al-4.4 Mg-Mn		≤ 4.000	25		A95083	Die forgings	L40 T39	L18 T16					√	√										√			
	6061	T6	Al-Mg-Si-Cu		≤ 4.000	23		A96061	Die forgings	38	35					√	√										√		N519	
	5083	H111	Al-4.4 Mg-Mn		≤ 4.000	25		A95083	Hand forgings	L42 T39	L22 T20					√	√										√			
	5083	H112	Al-4.4 Mg-Mn		≤ 4.000	25		A95083	Hand forgings	L40 T39	L18 T16					√	√										√			
	6061	T6	Al-Mg-Si-Cu		≤ 4.000	23		A96061	Hand forgings	L38 ST37	L35 ST33					√	√										√			
	6061	T6	Al-Mg-Si-Cu		4.001 to 8.000	23		A96061	Hand forgings	L37 ST35	L34 ST32					√	√										√			
SB-265	Gr 1		Ti, unalloyed	Str, Sh & Pl		51		R50250		35	25-45					√	√				√						√			
	Gr 2		Ti, unalloyed			51		R50400		50	40-65					√	√				√						√			
	Gr 3		Ti, unalloyed			52		R50550		65	55-80					√	√				√						√			
	Gr 4		Ti, unalloyed					R50700		80	70-95																			
	Gr 5		Ti-6 Al-4 V					R56400		130	120																			
	Gr 6		Ti-5 Al-2.5 Sn					R54520		120	115																			
	Gr 7		Ti, unalloyed			51		R52400	+ Pd	50	40-65					√	√				√						√			
	Gr 9		Ti-3 Al-2.5 V			53		R56320		90	70						√										√			
	Gr 11		Ti-0.2 Pd			51		R52250		35	25-45						√										√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-265	Gr 12		Ti-.3 Mo-.8 Ni			52		R53400		70	50						√										√			
(Con't)	Gr 13		Ti-0.5 Ni-Ru					R53413		40	25																			
	Gr 14		Ti-0.5 Ni-Ru	Str, Sh & Pl				R53414		60	40																			
	Gr 15		Ti-0.5 Ni-Ru					R53415		70	55																			
	Gr 16		Ti-0.06Pd			51		R52402		50	40-65						√										√			
	Gr 17		Ti-0.06Pd					R52252		35	25-45																			
	Gr 18		Ti-3 Al-2.5V-0.05 Pd					R56322		90	70																			
	Gr 19		Ti-8 V-6 Cr-Mo-Zr-Al							115	110																			
	Gr 20		Ti-8 V-6 Cr-Mo-Zr-Al-Pd					R58645	Beta C	115	110																			
	Gr 21		Ti-15 Mo-3 Al-Cb							115	110																			
	Gr 23		Ti-6 Al-4 V							120	110																			
SB-271	C95200		88 Cu-9 Al- 3 Fe	CC		35		C95200	Al bronze 9A	(65)	(25)					√	√										√			
	C95400		85 Cu-11 Al-4 Fe			35		C95400	Al bronze 9C	(75)	(30)					√											√		N249	
SB-283	C37700		60 Cu-37 Zn-2 Pb	Die Fo	≤ 1½			C37700	Forging brass	50	18						√													
	C37700		60 Cu-37 Zn-2 Pb		> 1½			C37700	Forging brass	46	15						√													
	C64200		91 Cu-7 Al-2 Si		≤ 1½			C64200	Al bronze No. 1	70	25						√													
	C64200		91 Cu-7 Al-2 Si		> 1½			C64200	Al bronze No. 1	68	23						√													
SB-308	6061	T6	Al-Mg-Si-Cu	St Sa		23		A96061		38	35					√	√				√						√			
SB-315	C65500		97 Cu-3 Si	SP & ST		33		C65500	High silicon bronze A	50	15-29					√	√										√			
SB-333	N10001		62 Ni-28 Mo-5 Fe	Pl, Sh & Str	Sh/St < 3/16	44		N10001	Alloy B	115	50					√	√				√						√			
	N10001		62 Ni-28 Mo-5 Fe		Pl 3/16 - 2½	44		N10001	Alloy B	100	45					√	√				√						√			
	N10665		65 Ni-28 Mo-2 Fe		Sh/St < 3/16	44		N10665	Alloy B-2	110	51					√	√				√						√			
	N10665		65 Ni-28 Mo-2 Fe		Pl 3/16 - 2½	44		N10665	Alloy B-2	110	51					√	√				√						√			
	(Case only)		64Ni-29.5Mo-2Cr-2Fe-Mn-W					N10675	Alloy B-3	110	51																	2140		
	(Case only)		62 Ni-28 Mo-4 Fe-1 Cu					N10629		110	51																	2187		
SB-335	N10001		62 Ni-28 Mo-5 Fe	Ro	5/16 - 1½	44		N10001	Alloy B	115	46					√	√				√	√					√			
	N10001		62 Ni-28 Mo-5 Fe		1½ -3½	44		N10001	Alloy B	100	46					√	√				√	√	√	√			√			
	N10665		65 Ni-28 Mo-2 Fe		5/16 - 3½	44		N10665	Alloy B-2	110	51					√	√				√		√	√			√			
	N10675		64Ni-29.5Mo-2Cr-2Fe-Mn-W					N10675	Alloy B-3	110	51																	2140		
	N10629		62 Ni-28 Mo-4 Fe-1 Cu		5/16 - 3½			N10629		110	51																	2187		
SB-337	Gr 1		Ti, unalloyed	SP & WP		51		R50250		35	25-45					√	√				√						√			
	Gr 2		Ti, unalloyed			51		R50400		50	40-65					√	√				√						√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-337	Gr 3		Ti, unalloyed			52		R50550		65	55-80					√	√				√						√			
(Con't)	Gr 7		Ti-0.2 Pd			51		R52400	+ Pd	50	40-65					√	√				√						√			
	Gr 12		Ti-.3 Mo-.8 Ni	SP & WP		52		R53400		70	50						√										√			
	Gr 9	CW & SR	Ti-3 Al-2.5 V					R56320		125	105																			
	Gr 9	Annealed	Ti-3 Al-2.5 V			53		R56320		90	70						√										√			
SB-338	Gr 1	Annealed	Ti, unalloyed	ST & WT		51		R50250		35	25-45					√	√				√						√	2149		
	Gr 2	Annealed	Ti, unalloyed			51		R50400		50	40-65					√	√				√						√	2149		
	Gr 3	Annealed	Ti, unalloyed			52		R50550		65	55-80					√	√				√						√	2149		
	Gr 7	Annealed	Ti-0.2 Pd			51		R52400	+ Pd	50	40-65					√	√				√						√	2149		
	Gr 9	Annealed	Ti-3 Al-2.5 V					R56320		90	70																			
	Gr 9	CW & SR	Ti-3 Al-2.5 V			53		R56320		125	105						√										√	2149	N492	
	Gr 11		Ti-0.2 Pd					R52250		35	25-45																			
	Gr 12	Annealed	Ti-.3 Mo-.8 Ni			52		R53400		70	50						√										√			
SB-348	Gr 1		Ti, unalloyed	Ba & Bi		51		R50250		35	25					√	√				√						√			
	Gr 2		Ti, unalloyed			51		R50400		50	40					√	√				√						√			
	Gr 3		Ti, unalloyed			52		R50550		65	55					√	√				√						√			
	Gr 4		Ti, unalloyed					R50700		80	70																			
	Gr 5		Ti-6 Al-4 V					R56400		130	120																			
	Gr 6		Ti-5 Al-2.5 Sn					R54520		120	115																			
	Gr 7		Ti-0.2 Pd			51		R52400		50	40					√	√				√						√			
	Gr 9		Ti-3 Al-2.5 V			53		R56320		90	70																√			
	Gr 11		Ti-0.2 Pd					R52250		35	25																			
	Gr 12		Ti-.3 Mo-.8 Ni			52		R53400		70	50						√										√			
	Gr 13		Ti-0.5 Ni-Ru					R53413		40	25																			
	Gr 14		Ti-0.5 Ni-Ru					R53414		60	40																			
	Gr 15		Ti-0.5 Ni-Ru					R53415		70	55																			
	Gr 16		Ti-0.06 Pd					R52402		50	40																			
	Gr 17		Ti-0.06 Pd					R52252		35	25																			
	Gr 18		Ti-3 Al-2.5 V-0.05Pd					R56322		90	70																			
SB-359	C10200	061	99.95 Cu	SFT		31		C10200	OF Cu	30	9																√			
	C10200	H55	99.95 Cu			31		C10200	OF Cu	36	30																√			
	C12000	061	99.90 Cu + P			31		C12000	DLP Cu	30	9																√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-359	C12000	H55	99.90 Cu + P			31		C12000	DLP Cu	36	30																√			
(Con't)	C12200	061	99.9 Cu + P			31		C12200	DHP Cu	30	9					√											√			
	C12200	H55	99.9 Cu + P	SFT		31		C12200	DHP Cu	36	30																√			
	C14200	061	99.40 Cu + As + P			31		C14200	DPA Cu	30	9																√			
	C14200	H55	99.40 Cu + As + P			31		C14200	DPA Cu	36	30																√			
	C19200	061	98.7 Cu + Fe + P			31		C19200	Phosphorized + 1% iron	38	12																√			
	C23000	Annealed	85 Cu + 15 Zn			32		C23000	Red brass	40	12																√			
	C44300	Annealed	71 Cu-28 Zn-Sn-As			32		C44300	Admiralty metal B (As)	45	15					√											√			
	C44400	Annealed	71 Cu-28 Zn-Sn-Sb			32		C44400	Admiralty metal C (Sb)	45	15					√											√			
	C44500	Annealed	71 Cu-28 Zn-Sn-P			32		C44500	Admiralty metal D (P)	45	15					√											√			
	C60800	Annealed	95 Cu - 5 Al			35		C60800	Al bronze	50	19																√			
	C68700	Annealed	78 Cu-20 Zn- 2 Al			32		C68700	Al bronze B	50	18																√			
	C70400	Annealed	95 Cu-5 Ni			34		C70400	95-5 Cu-Ni	38	12																√			
	C70600	Annealed	90 Cu-10 Ni			34		C70600	90-10 Cu-Ni	40	15					√											√			
	C71000	Annealed	80 Cu-20 Ni			34		C71000	80-20 Cu-Ni	45	16					√											√			
	C71500	Annealed	70 Cu-30 Ni			34		C71500	70-30 Cu-Ni	52	18					√											√			
SB-363	Gr WPT 1		Ti, unalloyed	W Fi		51		R50250								√											√			See B265, 337, 338, 348, 367, 381
	Gr WPT 2		Ti, unalloyed			51		R50400								√											√			See B265, 337, 338, 348, 367, 381
	Gr WPT 3		Ti, unalloyed			52		R50550								√											√			See B265, 337, 338, 348, 367, 381
	Gr WPT 7		Ti-0.2 Pd																											See B265, 337, 338, 348, 367, 381

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO.		UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi		SECTION II, PART D COVERAGE																IX	CODE CASE COVERAGE		NOTES
						P	Gr			UTS	YS	TABLE 1A			TABLE 1B			TABLE 2A		TABLE 2B		TABLE 3			TABLE 4		QW 422	NON-NUCL	NUCL	
												I	III 2/3	VIII 1	I	III 2/3	VIII 1	III 1	VIII 2	III 1	VIII 2	III 2/3	VIII 1	VIII 2	III 1	VIII 2				
SB-363 (Con't)	Gr WPT 9		Ti-3 Al-2.5 V			53																					√			See B265, 337, 338, 348, 381
	Gr WPT 11		Ti-0.2 Pd	W Fi				(R52250)																						See B265, 337, 338, 348, 367, 381
	Gr WPT 12		Ti-.3 Mo-.8 Ni					R53400																						See B265, 337, 338, 348, 381
	Gr WPT 13		Ti-0.5 Ni-Ru					R53413																						See B265, 337, 338, 348, 381
	Gr WPT 14		Ti-0.5 Ni-Ru					R53414																						See B265, 337, 338, 348, 381
	Gr WPT 15		Ti-0.5 Ni-Ru					R53415																						See B265, 337, 338, 348, 381
	Gr WPT 16		Ti-0.06 Pd					R52402																						See B265, 337, 338, 348, 381
	Gr WPT 17		Ti-0.06 Pd					R52252																						See B265, 337, 338, 348, 381
	Gr WPT 18		Ti- 3 Al-2.5 V-0.05 Pd					R56322																						See B265, 337, 338, 348, 381
	Gr WPT 19		Ti- 8 V- 6 Cr- Mo-Zr-Al					---																						See B265, 337, 348, 381

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-363 (Con't)	Gr WPT 20		Ti - 8 V - 6 Cr - Mo - Zr - Al - Pd					(R58645)																						See B265, 337, 348, 381
	Gr WPT 21																													See B265, 337, 348, 381
	Gr WPT 23		Ti - 6 Al - 4 V	W Fi				---																						See B265, 337, 348, 381
SB-366	CRN WPN		99.0 Ni	W Fi				N02200	Alloy 200, 99.0 Ni	(55)	(12)						√												See B160, 161, 162
	CRNL WPNL		99.0 Ni - Low C					N02201	Alloy 201, 99.0 Ni - Low C	(50)	(10)						√												See B-160, 161, 162
	CRNC WPNC		67 Ni - 30 Cu					N04400	Alloy 400, Ni - Cu	(70)	(28)						√												See B127, 165, 164, 564
	CRV602 WPV602		62 Ni - 25 Cr - 10 Fe - Al					N06025	Nicrofer 6025 HT, Ni - Cr - Fe	(96)	(51)																		See B163,166, 167, 168
	CRV45TM WPV45TM		46 Ni - 27 Cr - 23 Fe - 2.75 Si					N06045	Nicrofer 45, Ni - Cr - Fe	(90)	(35)																	2188		See B163,166, 167, 168
	CR5923 WP5923		59 Ni - 23 Cr - 16 Mo - Fe-Al					N06059	VDM-59, Low C Ni - Cr - Mo	(100)	(45)																		See B564, 574, 575, 619, 622, 626
	CRNC1 WPNC1		72 Ni - 15 Cr - 8 Fe					N06600	Alloy 600, Ni - Cr - Fe	(80)	(30)						√												See B166, 167, 168, 516, 517, 564
	CRNIC WPNIC		33 Ni - 42 Fe - 21Cr					N08800	Alloy 800, Ni - Fe - Cr	(75)	(30)						√												See B407, 408, 409, 514, 515, 564

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-366 (Con't)	CRNIC 10 WPNIC 10		33 Ni - 42 Fe - 21 Cr					N08810	Alloy 800H, Ni - Fe - Cr	(65)	(25)																			See B407, 408, 409, 514, 515, 564
	CRNIC 11 WPNIC 11		33 Ni - 42 Fe - 21 Cr - Al - Ti	W Fi				N08811	Alloy 800HT, Ni - Fe - Cr	(65)	(25)																			See B407, 408, 409, 564
	CR330 WP330		35 Ni - 19 Cr - 1¼ Si					N08330	RA-330, Ni - Fe - Cr - Si	(70)	(30)						√													See B511, 512, 535, 536, 710
	CRNICMC WPNICMC		42 Ni - 21 Cr - 5.5 Mo - 2.3 Cu					N08825	Alloy 825, Ni - Cr - Fe - Mo - Cu	(85)	(35)						√													See B423, 424, 425, 704, 705
	CR20CB WP20CB		35 Ni - 35 Fe - 20 Cr-Cb					N08020	Alloy 20 Cb-3, Cr - Ni - Fe - Mo - Cu - Cb Stab'd	(85)	(40)						√													See B463, 464, 468, 472, 473
	CR3127 WP3127		31 Ni - 31 Fe - 27 Cr - 7 Mo					N08031	Alloy 31, Ni - Fe - Cr - Mo - Cu - Low C	(94)	(40)																			See B564, 619, 622, 625, 626, 649
	CRHB WPHB		62 Ni - 28 Mo - 5 Fe					N10001	Alloy B, Ni - Mo	(100)	(45)						√													See B333, 335, 619, 622, 626
	CRHB2 WPHB2		65 Ni - 28 Mo - 2 Fe					N10665	Alloy B-2, Ni - Mo	(100)	(51)						√													See B333, 335, 619, 622, 626
	CRHC276 WPHC276		54 Ni - 16 Mo - 15 Cr					N10276	Alloy C-276, Low C Ni-Mo-Cr	(100)	(41)						√											1924		See B574, 575, 610, 622, 626
	CRHC4 WPHC4		61 Ni - 16 Mo - 16 Cr					N06455	Alloy C-4, Low C Ni-Mo-Cr	(100)	(40)						√													See B574, 575, 610, 622, 626

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-366 (Con't)	CRHG WPHG		47 Ni - 22 Cr - 19 Fe - 6 Mo					N06007	Alloy G, Ni-Cr-Fe-Mo-Cu	(90)	(35)						√												See B581, 582, 619, 622, 626
	CRHG3 WPHG3		47 Ni - 22 Cr - 20 Fe - 7 Mo	W Fi				N06985	Alloy G-3, Ni-Cr-Fe-Mo-Cu	(90)	(35)						√												See B581, 582, 619, 622, 626
	CRHN WPHN		70 Ni - 16 Mo - 7 Cr - 5 Fe					N10003	Alloy N, Ni-Mo-Cr-Fe	(100)	(40)						√												See B434, 573
	CRHX WPHX		47 Ni - 22 Cr - 9 Mo - 18 Fe					N06002	Alloy X, Ni-Cr-Mo-Fe	(100)	(40)						√												See B435, 572, 619, 622, 626
	CRNCMC WPNCMC		60 Ni - 22 Cr - 9 Mo - 3.5 Cb					N06625	Alloy 625, Ni-Cr-Mo-Cb	(110)	(50)						√												See B443, 444, 446, 704, 705
	CRHC22 WPHC22		55 Ni -21 Cr -13.5 Mo			44		N06022	Alloy C-22, Low C Ni-Mo-Cr	(100)	(45)						√										√	2212		See B574, 575, 619, 622, 626
	CRHG30 WPHG30		40 Ni - 29 Cr - 15 Fe - 5 Mo					N06030	Alloy G-30, Ni-Cr-Fe-Mo-Cu	(85)	(35)						√												See B581, 582, 619, 622, 626
	CR1925 WP1925		25 Ni - 20 Cr - 6 Mo - Cu - N			45		N08925	VDM1925, Low C Ni-Fe-Cr-Mo-Cu	(87)	(43)																√		N454	See B625, 649, 673, 674, 677
	CR6XN WP6XN		46 Fe - 24 Ni - 21 Cr - 6 Mo - Cu - N					N08367	AL6XN, Ni-Fe-Cr-Mo-N	(104)	(46)																	1997		See B472, 564, 675, 676, 688, 690, 691
	CRH230 WPH230		53 Ni - 22 Cr - 14 W - Co - Fe - Mo					N06230	Alloy 230, Ni-Cr-W-Mo	(110)	(45)																			See B435, 572, 619, 622, 626

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SB-366 (Con't)	CRVB4 WPVB4		62 Ni - 28 Mo - 4 Fe - 1 Cu					N10629	Ni-Mo	(110)	(51)																	2187		See B333, 335, 619, 622, 626
	CRH556 WPH556		21 Ni - 30 Fe - 22 Cr - 18 Co - 3 Mo - 3 W	W Fi				R30556	HS556, Ni-Fe-Cr-Co	(100)	(45)																			See B435, 572, 619, 622, 626
	CRHB3 WPHB3		64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W					N10675	Alloy B-3	(110)	(51)																	2140		See B335, 333, 564, 619, 622, 626
	(Case only)		29 Ni-30 Co-28 Cr-2.75 Si					N12160	HR160	(90)	(36)																	2162		
	CR1925N WP1925N		28Ni-39Fe-16Cr-4Cu					N08926	25-6 Mo	(94)	(43)																	2120		See B625, 649, 673, 674, 677
SB-367	C-2		Ti, unalloyed	Ca		51		R50400		50	40						√										√			
	C-3		Ti, unalloyed			52		R50550		65	55						√										√			
	C-5		Ti-6 Al-4 V							130	120																			
	C-6		Ti-5 Al-2.5 Sn							115	105																			
	Ti-Pd7B		Ti-0.2 Pd							50	40																			
	Ti-Pd8A		Ti-0. 2 Pd							65	55																			
	Ti-Pd16		Ti-0.06 Pd					(R52402)		50	40																			
	Ti-Pd17		Ti-0.06 Pd					(R52252)		35	25																			
	Ti-Pd18		Ti-3 Al- 2.5 V- 0.05 Pd					(R56322)		90	70																			
SB-369	C96200		87.5 Cu-10 Ni-Fe-Mn	Ca		34		C96200	Alloy A	45	25					√											√			
SB-381	Gr F1		Ti, unalloyed	Fo		51		R50250		35	25					√	√				√						√			
	Gr F2		Ti, unalloyed			51		R50400		50	40					√	√				√						√			
	Gr F3		Ti, unalloyed			52		R50550		65	55					√	√				√						√			
	Gr F4		Ti, unalloyed					R50700		80	70																			
	Gr F5		Ti-6 Al-4 V					R56400		130	120																			
	Gr F6		Ti-5 Al-2.5 Sn					R54520		120	115																			
	Gr F7		Ti-0.2 Pd			51		R52400		50	40						√				√						√			
	Gr F9	Annealed	Ti-3 Al-2.5 V			53		R56320		90	70																√			

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SB-381	Gr F11		Ti-0.2 Pd					R52250		35	25																			
(Con't)	Gr F12		Ti-.3 Mo-.8 Ni			52		R53400		70	50						√										√			
	Gr F13		Ti-0.5 Ni-Ru					R53413		40	25																			
	Gr F14		Ti-0.5 Ni-Ru	Fo				R53414		60	40																			
	Gr F15		Ti-0.5 Ni-Ru					R53415		70	55																			
	Gr F16		Ti-0.06 Pd					R52402		50	40																			
	Gr F17		Ti-0.06 Pd					R52252		35	25																			
	Gr F18		Ti-3 Al-2.5 V-0.05 Pd					R56322		90	70																			
SB-395	C10200	H55	99.5 Cu	Sm U-Tubes		31		C10200	OF Cu	36	30					√	√										√			
	C12000	H55	99.90 Cu + P			31		C12000	DLP Cu	36	30					√	√										√			
	C12200	H55	99.9 Cu + P			31		C12200	DHP Cu	36	30					√	√										√			
	C14200	H55	99.40 Cu + As + P			31		C14200	DPA Cu	36	30					√	√										√			
	C19200	061	98.7 Cu + Fe + P			31		C19200	Phosphorized + 1% iron	38	12						√										√			
	C23000	061	85 Cu-15 Zn			32		C23000	Red brass	40	12					√	√										√			
	C44300	061	71 Cu-28 Zn+Sn+As			32		C44300	Admiralty metal B (As)	45	15					√	√										√			
	C44400	061	71 Cu-28 Zn+Sn+Sb			32		C44400	Admiralty metal C (Sb)	45	15					√	√										√			
	C44500	061	71 Cu-28 Zn + Sn + P			32		C44500	Admiralty metal D (P)	45	15					√	√										√			
	C60800	061	95 Cu- 5 Al			35		C60800	Al bronze	50	19					√	√										√			
	C68700	061	78 Cu-20 Zn-2 Al			32		C68700	Al brass B	50	18					√	√										√			
	C70600	061	90 Cu-10 Ni			34		C70600	90-10 Cu-Ni	40	15					√	√				√						√			
	C71000	061	80 Cu-20 Ni			34		C71000	80-20 Cu-Ni	45	16					√	√										√			
	C71500	061	70 Cu-30 Ni			34		C71500	70-30 Cu-Ni	52	18					√	√				√						√			
	C71500	HR50	70 Cu-30 Ni			34		C71500	70-30 Cu-Ni	72	50					√	√										√			
SB-407	N08800	CD, Annealed	33 Ni-42 Fe-21 Cr	SP & ST		45		N08800	Alloy 800	75	30				√	√	√			√	√						√	1325	N253	
	N08800	HF, Annealed	33 Ni-42 Fe-21 Cr					N08800	Alloy 800	65	25																	1325		
	N08810	CD or HF, Annealed	33 Ni-42 Fe-21 Cr			45		N08810	Alloy 800H	65	25				√	√	√			√	√						√	1325, 1983	N201, 253, 290	
	N08811		33 Ni-42 Fe-21 Cr			45		N08811	Alloy 800HT	65	25																√	1987		0.06-0.10C
	N08801		33 Ni-42 Fe-21 Cr					N08801	Alloy 801	65	25																	1671		
SB-408	N08800	CW and HW, Annealed	33 Ni-42 Fe-21 Cr	Ro & Ba		45		N08800	Alloy 800	75	30				√	√	√			√	√		√	√			√	1325	N253	

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SB-408 (Con't)	N08810	CW and HW Annealed	33 Ni-42 Fe-21 Cr			45		N08810	Alloy 800H	65	25				√	√	√			√	√		√	√			√	1325	N201, 253	
	N08811	CW and HW Annealed	33 Ni-42 Fe-21 Cr	Ro & Ba		45		N08811	Alloy 800HT	65	25																√	1987		0.06-0.10C
SB-409	N08800	Annealed	33 Ni-42 Fe-21 Cr	Pl, Sh & Str		45		N08800	Alloy 800	75	30				√	√	√			√	√						√	1325	N253	
	N08810	Annealed	33 Ni-42 Fe-21 Cr	Pl, Sh & Str		45		N08810	Alloy 800H	65	25				√	√	√			√	√						√	1325	N201, 253, 290	
	N08800	As rolled	33 Ni-42 Fe-21 Cr					N08800	Alloy 800	80	35																	1325		
	N08811		33 Ni-42 Fe-21 Cr			45		N08811	Alloy 800HT	65	25																√	1987		
SB-423	N08825	HF, Annealed	42 Ni-21.5 Cr-3 Mo-2.3 Cu	SP & ST		45		N08825	Alloy 825	75	25																√	1936		
	N08825	CD, Annealed	42 Ni-21.5 Cr-3 Mo-2.3 Cu			45		N08825	Alloy 825	85	35				√	√	√				√						√	1936	N188	
	N08221	CD, Annealed	42 Ni-21 Cr-5.5 Mo-2.3 Cu					N08221		79	34																			
	(Case only)		42 Ni-22 Fe-21 Cr-Mo-Ti-Cu					N09925		140	105																	2218		
SB-424	N08825	Annealed	42 Ni-21.5 Cr-3 Mo-2.3 Cu	Pl, Sh & Str		45		N08825	Alloy 825	85	35				√	√	√				√						√	1936		
	N08221	Annealed	42 Ni-21 Cr-5.5 Mo-2.3 Cu					N08221		79	34																			
	(Case only)		42 Ni-22 Fe-21 Cr-Mo-Ti-Cu					N09925		140	105																	2218		
SB-425	N08825	HF/CD, Annealed	42 Ni-21.5 Cr-3 Mo-2.3 Cu	Ro & Ba		45		N08825	Alloy 825	85	35				√	√	√				√		√	√			√			
	N08221	Annealed	42 Ni-21 Cr-5.5 Mo-2.3 Cu					N08221		79	34																			
	(Case only)		42 Ni-22 Fe-21 Cr-Mo-Ti-Cu					N09925		140	105																	2218		
SB-434	N10003		70 Ni-16 Mo-7 Cr-5 Fe	Pl, Sh & Str		44		N10003	Alloy N	100	40						√				√						√			
SB-435	N06002		47Ni-22Cr-9Mo-18Fe	Pl, Sh & Str		43		N06002	Alloy X	95	35					√	√			√	√						√		N253	
	R30556		21 Ni-30 Fe-22 Cr-18 Co-3 Mo-3 W			45		R30556	HS-556	100	45						√										√	2010		
	N06230		53 Ni-22 Cr-14 W-Co-Fe-Mo			47		N06230	230	110	45																√	2063		

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SB-435 (Con't)	(Case only)		Co-26 Cr-9 Ni-5 Mo-3 Fe-2 W					R31233	Udimet	120	55																2121		
	(Case only)		29 Ni-30 Co-28 Cr-2.75 Si					N12160	HR160	90	35																2162		
SB-443	N06625 Gr 1	CR	60Ni-22Cr-9Mo-3.5Cb	Pl, Sh & Str	Sh, Str	43		N06625	Alloy 625	120	60						√										√	1935	N290	
	N06625 Gr 1	HR	60Ni-22Cr-9Mo-3.5Cb		Sh, Pl			N06625	Alloy 625	110	55					√	√			√									N290	
	N06625 Gr 2	CR & HR	60Ni-22Cr-9Mo-3.5Cb			43		N06625	Alloy 625	100	40																√	1409	N290	
	(Case only)		45Ni-22Cr-12Co-9Mo					N06617	Alloy 617	95	35																	1956		
	(Case only)		57 Ni-21 Cr-8 Mo -3 Cb					N07725	Alloy 725	150	120																	2217		
SB-444	N06625 Gr 1		60Ni-22Cr-9Mo-3.5Cb	SP & ST		43		N06625	Alloy 625	120	60					√	√			√							√	1935	N188, N290	
	N06625 Gr 2		60Ni-22Cr-9Mo-3.5Cb					N06625	Alloy 625	100	40																	1409	N290	
	(Case only)		45Ni-22Cr-12Co-9Mo	SP & ST				N06617	Alloy 617	95	35																	1956, 1982		
	(Case only)		57 Ni-21 Cr-8 Mo -3 Cb					N07725	Alloy 725	150	120																	2217		
SB-446	N06625 Gr 1		60Ni-22Cr-9Mo-3.5Cb	Ro & Ba	≤ 4	43		N06625	Alloy 625	120	60					√	√			√			√				√			
	N06625 Gr 1		60Ni-22Cr-9Mo-3.5Cb		> 4			N06625	Alloy 625	110	50					√	√			√								1935		
	N06625 Gr 2		60Ni-22Cr-9Mo-3.5Cb		All sizes			N06625	Alloy 625	100	40																	1409		
	(Case only)		57 Ni-21 Cr-8 Mo -3 Cb					N07725	Alloy 725	150	120																	2217		
SB-462	N08020		35 Ni-35 Fe-20 Cr-Cb	Fo		45		N08020	Alloy 20 Cb-3	80	35					√	√										√			
	N08024		37 Ni-33 Fe-23 Cr-4 Mo-1 Cu					N08024	20Mo-4	80	35																			
	N08026		35 Ni-30 Fe-24 Cr-6 Mo-3 Cu					N08026	20Mo-6	80	35																			
	N08367		46 Fe-24 Ni-21 Cr-6 Mo-Cu-N					N08367	AL6XN	95	45																	1997		
	(Case only)		28Ni-39Fe-16Cr-4Cu					N08926	25-6 Mo	94	43																	2120		
SB-463	N08020		35 Ni-35 Fe-20 Cr-Cb	Pl, Sh & Str		45		N08020	Alloy 20 Cb-3	80	35					√	√										√			
	N08026		35 Ni-30 Fe-24 Cr-6 Mo-3 Cu			45		N08026	20 Mo-6	80	35						√										√			
	N08024		37 Ni-33 Fe-23 Cr-4 Mo-1 Cu			45		N08024	20 Mo-4	80	35						√										√			
SB-464	N08020		35 Ni-35 Fe-20 Cr-Cb	Sm & WP		45		N08020	Alloy 20 Cb-3	80	35					√	√										√			
	N08026		35 Ni-30 Fe-24 Cr-6 Mo-3 Cu			45		N08026	20 Mo-6	80	35						√										√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-464 (Con't)	N08024		37 Ni-33 Fe-23 Cr-4 Mo-1 Cu			45		N08024	20 Mo-4	80	35						√										√			
SB-466	C70600		90 Cu-10 Ni	SP & ST		34		C70600	90-10 Cu-Ni	38	13					√	√										√			
	C71000		80 Cu-20 Ni			34		C71000	80-20 Cu-Ni	45	16					√	√										√			
	C71500		70 Cu-30 Ni			34		C71500	70-30 Cu-Ni	50	18					√	√										√			
SB-467	C70600	W061	90 Cu-10 Ni	WP	≤ 4½ dia.	34		C70600	90-10 Cu-Ni	40	15					√	√										√			
	C70600	W061	90 Cu-10 Ni		> 4½ dia.	34		C70600	90-10 Cu-Ni	38	13					√	√										√			
	C70600	As welded	90 Cu-10 Ni		≤ 4½ dia.	34		C70600	90-10 Cu-Ni	45	30						√										√			
	C70600	As welded	90 Cu-10 Ni		> 4½ dia.	34		C70600	90-10 Cu-Ni	54	45						√										√			
	C71500	W061	70 Cu-30 Ni		≤ 4½ dia.	34		C71500	70-30 Cu-Ni	50	20					√											√			
	C71500	W061	70 Cu-30 Ni		> 4½ dia.	34		C71500	70-30 Cu-Ni	45	15					√											√			
	C71500	Welded, CD	70 Cu-30 Ni	WP				C71500	70-30 Cu-Ni	72	50																			
SB-468	N08020		35 Ni-35 Fe-20 Cr-Cb	Sm & WT		45		N08020	Alloy 20 Cb-3	80	35					√	√										√			
	N08026		35 Ni-30 Fe-24 Cr-6 Mo-3 Cu			45		N08026	20 Mo-6	80	35						√										√			
	N08024		37 Ni-33 Fe-23 Cr-4 Mo-1 Cu			45		N08024	20 Mo-4	80	35						√										√			
SB-473	N08020		35 Ni-35 Fe-20 Cr-Cb	Ba		45		N08020	Alloy 20 Cb-3	80	35					√	√										√			
	N08024		37 Ni-33 Fe-23 Cr-4 Mo-1 Cu					N08024	20 Mo-4	80	35																			
	N08026		35 Ni-30 Fe-24 Cr-6 Mo-3 Cu					N08026	20 Mo-6	80	35																			
SB-493	Gr R60702		99.2 Zr	Fo		61		R60702	Gr 702	55	30						√										√	2221		
	Gr R60704		97.5 Zr + Sn					R60704	Gr 704	60	35																			
	Gr R60705		95.5 Zr + Cb			62		R60705	Gr 705	70	55						√										√			
SA-494	Gr N-12MV		62 Ni-28 Mo-5 Fe	Ca				N30012	Alloy B	76	40						√													
	Gr CW-12MW		53 Ni-17 Mo-16 Cr-6 Fe-5 W					N30002	Alloy C	72	40						√													
	(Case only)		57 Ni-21 Cr-13 Mo-4 Fe-3 W						GrCX2MW	80	40																	2104		
	GR CZ100		95 Ni					N02100		50	18																			
	Gr M-35-1		65 Ni-29 Cu							65	25																			
	Gr M-35-2		65 Ni-29 Cu					N04020		65	30																			
	Gr M-30H		62 Ni-30 Cu-3 Si							100	60																			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SA-494 (Con't)	Gr M-25S		61 Ni-30 Cu-4 Si																											HB 300 min
	Gr M-30C		63 Ni-29 Cu-2 Cb-Si							65	32.5																			
	Gr N-7M		63 Ni-31 Mo-1 Cr-Si							76	40																			
	Gr CY-40		68 Ni-16 Cr-11 Fe					N06040		70	28																			
	Gr CW-6M		59 Ni-18 Cr-18 Mo							72	40																			
	Gr CW-2M		63 Ni-16 Cr-16 Mo							72	40																			
	Gr CW-6MC		58 Ni-21 Cr-9 Mo-4 Cb							70	40																			
	Gr CY5SnBiM		69 Ni-12 Cr-4 Bi-4 Sn																											
	Gr CX2MW		57 Ni-21 Cr-13 Mo-4 Fe-3 W							80	45																			
	Gr CU5MCuC		41 Ni-29 Fe-21 Cr-3 Mo-Cb							75	35																			
SB-505	Cu No. 952		88 Cu-9 Al-3 Fe	Ca		35		C95200	Al bronze A	68	26					√											√			
SB-511	N08330		35 Ni-19 Cr-1¼ Si	Ba		46		N08330	RA-330	70	30				√		√				√						√			
	N08332		35 Ni-19 Cr-1¼ Si					N08332	RA-330TX	67	27																			
SB-514	N08800		33 Ni-42 Fe-21 Cr	WP		45		N08800	Alloy 800	75	30						√				√						√			
	N08810		33 Ni-42 Fe-21 Cr			45		N08810	Alloy 800H	65	25						√				√						√			
SB-515	N08800		33 Ni-42 Fe-21 Cr	WT		45		N08800	Alloy 800	75	30				√		√				√						√	1325		
	N08810		33 Ni-42 Fe-21 Cr			45		N08810	Alloy 800H	65	25				√		√				√						√	1325		
	N06045		33 Ni-42 Fe-21 Cr					N08811	Alloy 800HT	65	25																	1987		
SB-516	N06600		72 Ni-15 Cr-8 Fe	WT		43		N06600	Alloy 600	80	35						√				√						√			
	N06025		62 Ni-25 Cr-10 Fe-Al					N06025	Nicrofer 6025 HT	94	43																			
	N06045		46 Ni-27 Cr-23 Fe-2.75 Si					N06045	Nicrofer 45	90	35																	2188		
SB-517	N06600		72 Ni-15 Cr-8 Fe	WP		43		N06600	Alloy 600	80	35						√				√						√			
	N06025		62 Ni-25 Cr-10 Fe-Al					N06025	Nicrofer 6025 HT	94	43																			
	N06045		46 Ni-27 Cr-23 Fe-2.75 Si					N06045	Nicrofer 45	90	35																	2188		
SB-523	Gr R60702		99.2 Zr	Sm & WT		61		R60702	Gr 702	55	30						√										√	2221		
	Gr R60704		97.5 Zr + Sn					R60704	Gr 704	60	35																			
	Gr R60705		95.5 Zr + Cb			62		R60705	Gr 705	80	55						√										√			
SB-535	N08330		35 Ni-19 Cr-1¼ Si	Sm & WP		46		N08330	RA-330	70	30				√		√				√						√			.08C max.
	N08332		35 Ni-19 Cr-1¼ Si					N08332	RA-330TX	67	27																			.05-.10C

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-536	N08330		35 Ni-19 Cr- 1¼ Si	Pl, Sh & Str		46		N08330	RA-330	70	30				√		√				√						√			
	N08332		35 Ni-19 Cr-1¼ Si					N08332	RA-330TX	67	27																			
SB-543	C12200	Light CW	99.9 Cu + P	WT		31		C12200	DPH Cu	32	15					√	√										√			
	C19400	Annealed	97.4 Cu + Fe			31		C19400	Cu-Fe alloy	45	15						√										√			
	C19400	Light CW	97.4 Cu + Fe			31		C19400	Cu-Fe alloy	45	22					√	√										√			
	C23000	Annealed	85 Cu-15 Zn			32		C23000	Red brass	40	12					√	√										√			
	C23000	Light CW	85 Cu-15 Zn			32		C23000	Red brass	42	20					√	√										√			
	C44300	Annealed	71 Cu-28 Zn-Sn-As			32		C44300	Admiralty metal B (As)	45	15						√										√			
	C44400	Annealed	71 Cu-28 Zn-Sn-Sb			32		C44400	Admiralty metal C (Sb)	45	15						√										√			
	C44500	Annealed	71 Cu-28 Zn-Sn-P			32		C44500	Admiralty metal D (P)	45	15						√										√			
	C68700	Annealed	78 Cu-20 Zn-2 Al			32		C68700	Arsenical red brass	50	18						√										√			
	C70400	Annealed	95 Cu-5 Ni			34		C70400	95-5 Cu-Ni	38	12						√										√			
	C70600	Annealed	90 Cu-10 Ni			34		C70600	90-10 Cu-Ni	40	15					√	√										√			
	C70600	Light CW	90 Cu-10 Ni			34		C70600	90-10 Cu-Ni	45	35					√	√										√			
	C71500	Annealed	70 Cu-30 Ni			34		C71500	70-30 Cu-Ni	52	18					√	√										√			
	C71640	Annealed	66 Cu-30 Ni-2 Fe-2Mn	WT		34		C71640		63	25																√	1868		
	C71640	Light CW	66 Cu-30 Ni-2 Fe-2Mn			34		C71640		75	40																√	1868		
SB-550	R60702		99.2 Zr	Bar & Wire		61		R60702	Gr 702	55	30						√										√	2221		
	R60704		97.5 Zr + Sn					R60704	Gr 704	60	35																			
	R60705		95.5 Zr + Cb			62		R60705	Gr 705	80	55						√										√			
SB-551	R60702		99.2 Zr	Str, Sh & Pl		61		R60702	Gr 702	55	30						√										√	2221		
	R60704		97.5 Zr + Sn					R60704	Gr 704	60	35																			
	R60705		95.5 Zr + Cb			62		R60705	Gr 705	80	55						√										√			
	R60706		95.5 Zr + Cb					R60706	Gr 706	74	50																			
SB-564	N02200	Annealed	99.0 Ni	Fo				N02200	Alloy 200	55	15																			
	N04400	Annealed	67 Ni-30 Cu			42		N04400	Alloy 400	70	25					√	√			√	√						√			
	N06022		55 Ni-21 Cr-13.5 Mo			44		N06022	Alloy C-22	100	45					√	√										√	2212		
	N06059		59 Ni-23 Cr-16 Mo-Fe-Al					N06059	VDM59	100	43																	2134		
	N06110	Annealed	51 Ni-31 Cr-10 Mo-W		≤ 4			N06110	Allcorr	95	45																			
	N06110	Annealed	51 Ni-31 Cr-10 Mo-W		> 4			N06110	Allcorr	90	40																			
	N06230	Annealed	53 Ni-22 Cr-14 W-Co-Fe-Mo					N06230	Alloy 230	110	45																	2063		

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SB-564	N06600	Annealed	72 Ni-15 Cr-8 Fe			43		N06600	Alloy 600	80	35					√	√			√	√						√		N253	
(Con't)	N06617		45Ni-22Cr-12Co-9Mo					N06617	Alloy 617	95	35																	1956		
	N06625	Annealed	60Ni-22Cr-9Mo-3.5Cb		≤ 4	43		N06625	Alloy 625	120	60					√	√										√			
	N06625	Annealed	60Ni-22Cr-9Mo-3.5Cb		> 4	43		N06625	Alloy 625	110	50					√	√										√	1935		
	N06686		50Ni-25Cr-15Fe-6Mo-Ti					N06686	Alloy 686	100	45																	2198		
	N06690	Annealed	58 Ni-29 Cr-9 Fe					N06690	Alloy 690	85	35																		N474	
	N08031		31Ni-31Fe-27Cr-7Mo					N08031	Aloy 31	94	40																	2139		
	N08367		46 Fe-24 Ni-21 Cr-6 Mo-Cu-N					N08367	AL6XN	95	45																	1997	N539	
	N08800	Annealed	33 Ni-42 Fe-21 Cr			45		N08800	Alloy 800	75	30					√	√			√	√						√	1949	N253	
	N08810	Annealed	33 Ni-42 Fe-21 Cr			45		N08810	Alloy 800H	65	25					√	√			√	√						√	1949	N201, 253	
	N08811	Annealed	33 Ni-42 Fe-21 Cr					N08811	Alloy 800HT	65	25																	1987		
	N08825		42 Ni-21.5 Cr-3 Mo-2.3 Cu					N08825	Alloy 825	85	35																			
	N10276		54 Ni-16 Mo-15 Cr			44		N10276	Alloy C-276	100	41						√										√			
	N10675		64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W	Fo				N10675	Alloy B-3																					
	N12160	Annealed	29 Ni-30 Co-28 Cr-2.75 Si					N12160	HR160	90	35																	2162		
	(Case only)		62 Ni-28 Mo-4 Fe-1 Cu					N10629		110	51																	2187		
	(Case only)		46 Ni- 27 Cr- 23 Fe-2.75 Si					N06045	Nicrofer 45	90	35																	2188		
	(Case only)		42 Ni-22 Fe-21 Cr-Mo-Ti-Cu					N09925		140	105																	2218		
	(Case only)		57 Ni-21 Cr-8 Mo -3 Cb					N07725	Alloy 725	150	120																	2217		
SB-572	N06002		47 Ni-22 Cr-9 Mo-18 Fe	Ro		43		N06002	Alloy X	95	35					√	√			√	√		√	√			√		N253	
	R30556		21 Ni-30 Fe-22 Cr-18 Co-3 Mo-3 W			45		R30556	HS556	100	45						√						√				√	2010		
	N06230		53 Ni-22 Cr-14 W-Co-Fe-Mo			47		N06230	Alloy 230	110	45																√	2063		
	N12160		29 Ni-30 Co-28 Cr-2.75 Si					N12160	HR160	90	35																			
	(Case only)		Co-26 Cr-9 Ni-5 Mo-3 Fe-2 W					R31233	Udimet	120	55																	2121		

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SB-573	N10003		70 Ni-16 Mo-7 Cr-5 Fe	Ro		44		N10003	Alloy N	100	40						√				√		√	√			√			
SB-574	N10276		54 Ni-16 Mo-15 Cr	Ro		44		N10276	Alloy C-276	100	41					√	√				√		√	√			√	1924		
	N06022		55 Ni-21 Cr-13.5 Mo			44		N06022	Alloy C-22	100	45					√	√						√				√	2212		
	N06455		61 Ni-16 Mo-16 Cr			44		N06455	Alloy C-4	100	40						√				√		√	√			√			
	N06059		59 Ni-23 Cr-16 Mo-Fe-Al					N06059	VDM59	100	45																	2134		
	N06686		50Ni-25Cr-15Fe-6Mo-Ti					N06686	Alloy 686	100	45																	2198		
SB-575	N10276		54 Ni-16 Mo-15 Cr	Pl, Sh & Str		44		N10276	Alloy C-276	100	41					√	√				√						√	1924		
	N06022		55 Ni-21 Cr-13.5 Mo			44		N06022	Alloy C-22	100	45					√	√										√	2212		
	N06455		61 Ni-16 Mo-16 Cr			44		N06455	Alloy C-4	100	40						√				√						√			
	N06059		59 Ni-23 Cr-16 Mo-Fe-Al					N06059	VDM59	100	45																	2134		
	N06686		50Ni-25Cr-15Fe-6Mo-Ti					N06686	Alloy 686	100	45																	2198		
SB-581	N06007		47Ni-22Cr-19Fe-6Mo	Ro	5/16 -3/4 incl.	45		N06007	Alloy G	90	35						√				√		√	√			√			
	N06007		47Ni-22Cr-19Fe-6Mo		> 3/4 -3½ incl.	45		N06007	Alloy G	85	30						√				√		√	√			√			
	N06975		49Ni-25Cr-18Fe-6Mo		5/16 -3½ incl.	45		N06975	Alloy G-2	85	32												√				√			
	N06985		47Ni-22Cr-20Fe-7Mo		5/16 -3/4 incl.	45		N06985	Alloy G-3	90	35						√										√			
	N06985		47Ni-22Cr-20Fe-7Mo		> 3/4 -3½ incl.	45		N06985	Alloy G-3	85	30						√										√			
	N06030		40Ni-29Cr-13Fe-5Mo	Ro		45		N06030	Alloy G-30	85	35					√	√						√				√			
	(Case only)		31Ni-31Fe-27Cr-7Mo					N08031	Alloy 31	94	40																	2139		
SB-582	N06007		47Ni-22Cr-19Fe-6Mo	Pl, Sh & Str	Plate 3/16 -3/4	45		N06007	Alloy G	90	35						√				√						√			
	N06007		47Ni-22Cr-19Fe-6Mo		Plate > 3/4 - 2½, incl.	45		N06007	Alloy G	85	30						√				√						√			
	N06007	Annealed	47Ni-22Cr-19Fe-6Mo		Sheet/Strip > .020	45		N06007	Alloy G	90	35																√			
	N06030	Annealed	40Ni-29Cr-15Fe-5Mo			45		N06030	Alloy G-30	85	35					√	√										√			
	N06975		49Ni-25Cr-18Fe-6Mo		Plate 3/16 -2½	45		N06975	Alloy G-2	85	32						√										√			
	N06975	Annealed	49Ni-25Cr-18Fe-6Mo		Sheet/Strip > .020	45		N06975	Alloy G-2	85	32						√										√			
	N06985		47Ni-22Cr-20Fe-7Mo		Plate 5/16 -3/4	45		N06985	Alloy G-3	90	35						√										√			

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SB-582 (Con't)	N06985		47Ni-22Cr-20Fe-7Mo		Plate > ¾ - 2½, incl.	45		N06985	Alloy G-3	85	30						√										√			
	N06985	Annealed	47Ni-22Cr-20Fe-7Mo		Sheet > .020	45		N06985	Alloy G-3	90	35																√			
SB-584	C84400		81 Cu-9 Zn-7 Pb-3 Sn	Ca				C84400	Leaded semi-red brass	29	13																			
	C92200		88 Cu-6 Sn-4.5 Zn-Pb					C92200	Leaded tin bronze	34	16					√	√													
	C93700		80 Cu-10 Sn-10 Pb					C93700	High lead tin bronze	30	12					√	√			√									N249	
	C97600		65 Cu-20 Ni-8 Zn					C97600	Leaded nickel bronze	40	17						√													
	(Case only)		87 Cu-8 Sn-4 Zn					C90300	Tin bronze	40	18																	2184		
SB-599	N08700		25Ni-47Fe-21Cr-5Mo	Pl, Sh & Str		45		N08700	JS700	80	35						√										√			
SB-619	N10001		62 Ni-28 Mo-5 Fe	WP		44		N10001	Alloy B	100	45						√				√						√			
	N10276		54 Ni-16 Mo-15 Cr			44		N10276	Alloy C-276	100	41					√	√				√						√	1924		
	N10665		65 Ni-28 Mo-2 Fe			44		N10665	Alloy B-2	110	51					√	√				√						√			
	N06002		47Ni-22Cr-9Mo-18Fe			43		N06002	Alloy X	100	40					√	√			√	√						√			
	N06007		47Ni-22Cr-19Fe-6Mo			45		N06007	Alloy G	90	35						√				√						√			
	N06022		55 Ni-21 Cr-13.5 Mo			44		N06022	Alloy C-22	100	45					√	√										√	2212		
	N06030		40Ni-29Cr-15Fe-5Mo			45		N06030	Alloy G-30	85	35					√	√										√			
	N06059		59 Ni-23 Cr-16 Mo-Fe-Al					N06059	VDM59	100	45																	2134		
	N06230		53 Ni-22 Cr-14 W-Co-Fe-Mo			47		N06230	Alloy 230	110	45																√	2063		
	N06455		61 Ni-16 Mo-16 Cr			44		N06455	Alloy C-4	100	40						√				√						√			
	N06686		50 Ni-25 Cr-15 Fe-6 Mo-Ti	WP				N06686	Alloy 686	100	45																	2198		
	N06975		49Ni-25Cr-18Fe-6Mo			45		N06975	Alloy G-2	85	32						√										√			
	N06985		47Ni-22Cr-20Fe-7Mo			45		N06985	Alloy G-3	90	35						√										√			
	N08320		26Ni-43Fe-22Cr-5Mo			45		N08320	Alloy 20 Mod.	75	28						√										√			
	N08031		31Ni-31Fe-27Cr-7Mo					N08031	Alloy 31	94	40																	2139		
	R30556		21 Ni-30 Fe-22 Cr-18 Co-3 Mo-3 W			45		R30556	HS556	100	45						√										√	2010		
	N12160		29 Ni-30 Co-28 Cr-2.75 Si					N12160	HR160	90	35																	2162		
	N10675		64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W					N10675	Alloy B-3	110	51																	2140		
	N10629		62 Ni-28 Mo-4 Fe-1 Cu					N10629		110	51																	2187		
SB-620	N08320		26Ni-43Fe-22Cr- 5Mo	Pl, Sh & Str		45		N08320	Alloy 20 Mod	75	28						√										√			

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SB-621	N08320		26Ni-43Fe-22Cr-5Mo	Ro		45		N08320	Alloy 20 Mod	75	28						√						√				√			
SB-622	N10001		62 Ni-28 Mo-5 Fe	SP & ST		44		N10001	Alloy B	100	45						√				√						√			
	N10276		54 Ni-16 Mo-15 Cr			44		N10276	Alloy C-276	100	41					√	√				√						√	1924		
	N06002		47Ni-22Cr-9Mo-18Fe			43		N06002	Alloy X	100	40					√	√			√	√						√			
	N06007		47Ni-22Cr-19Fe-6Mo			45		N06007	Alloy G	90	35						√				√						√			
	N06022		55 Ni-21 Cr-13.5 Mo			44		N06022	Alloy C-22	100	45					√	√										√	2212		
	N06030		40Ni-29Cr-15Fe-5Mo			45		N06030	Alloy G-30	85	35					√	√										√			
	N06059		59 Ni-23 Cr-16 Mo-Fe-Al					N06059	VDM59	100	45																	2134		
	N06230		53 Ni-22 Cr-14 W-Co-Fe-Mo			47		N06230	Alloy 230	110	45																√	2063		
	N06250		52 Ni-21 Cr-13 Fe-11 Mo					N06250	SM 2050	90	35																			
	N06255		49Ni-24Cr-14Fe-7Mo					N06255	SM 2550	85	32																			
	N06455		61 Ni-16 Mo-16 Cr			44		N06455	Alloy C-4	100	40						√				√						√			
	N06975		49Ni-25Cr-18Fe-6Mo			45		N06975	Alloy G-2	85	32						√										√			
	N06985		47Ni-22Cr-20Fe-7Mo			45		N06985	Alloy G-3	90	35						√										√			
	N08031		31Ni-31Fe-27Cr- 7Mo					N08031	Alloy 31	94	40																	2139		
	N08320		26Ni-43Fe-22Cr-5Mo			45		N08320	Alloy 20 Mod.	75	28						√										√			
	N08535		33Ni-36Fe-25Cr-3Mo					N08535		73	31																			
	N10665		65 Ni-28 Mo-2 Fe			44		N10665	Alloy B-2	110	51					√	√				√						√			
	R30556		21 Ni-30 Fe-22 Cr-18 Co-3 Mo- 3 W	SP & ST		45		R30556	HS556	100	45						√										√	2010		
	N12160		29 Ni-30 Co-28 Cr-2.75 Si					N12160	HR160	90	35																	2162		
	N10675		64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W					N10675	Alloy B-3	110	51																	2140		
	N06686		50 Ni-25 Cr-15 Fe-6 Mo-Ti					N06686	Alloy 686	100	45																	2198		
	N06060		57 Ni-20 Cr-13 Mo-6 Fe-Ti-Cu					N06060	SM 2060	90	35																			
	N08135		36 Ni-35 Fe-22 Cr-4 Mo					N08135	SM 2035	73	31																			
	N10629		62 Ni-28 Mo-4 Fe-1 Cu					N10629		110	51																	2187		
SB-625	N08031		31Ni-31Fe-27Cr- 7Mo	Pl, Sh & Str				N08031	Alloy 31	94	40																	2139		
	N08904		44 Fe-25 Ni-21 Cr-Mo			45		N08904	904L, AL4X	71	31						√										√			

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-625	N08925		25Ni-20Cr-6Mo-Cu-N			45		N08925	VDM1925	87	43						√										√		N454	
(Con't)	N08926		28Ni-39Fe-16Cr-4Cu					N08926	25-6 Mo	94	43																	2120	N454	
	N08932		25 Cr-25 Ni-5 Mo-N					N08932	UR-SB8	87	44																	2097		
SB-626	N10001		62 Ni-28 Mo-5 Fe	WT		44		N10001	Alloy B	100	45						√				√						√			
	N10665		65 Ni-28 Mo-2 Fe			44		N10665	Alloy B-2	110	51					√	√				√						√			
	N10276		54 Ni-16 Mo-15 Cr			44		N10276	Alloy C-276	100	41					√	√				√						√	1924		
	N06002		47Ni-22Cr-9Mo-18Fe			43		N06002	Alloy X	100	40					√	√			√	√						√			
	N06007		47Ni-22Cr-19Fe-6Mo			45		N06007	Alloy G	90	35						√				√						√			
	N06022		55 Ni-21 Cr-13.5 Mo			44		N06022	Alloy C-22	100	45					√	√										√	2212		
	N06030		40Ni-29Cr-15Fe-5Mo			45		N06030	Alloy G-30	85	35					√	√										√			
	N06230		53 Ni-22 Cr-14 W-Co-Fe-Mo			47		N06230	230	110	45																√	2063		
	N06059		59 Ni-23 Cr-16 Mo-Fe-Al					N06059	VDM59	100	45																	2134		
	N06455		61 Ni-16 Mo-16 Cr			44		N06455	Alloy C-4	100	40						√				√						√			
	N06975		49Ni-25Cr-18Fe-6Mo			45		N06975	Alloy G-2	85	32						√										√			
	N06985		47Ni-22Cr-20Fe-7Mo			45		N06985	Alloy G-3	90	35						√										√			
	N08031		31Ni-31Fe-27Cr-7Mo					N08031	Alloy 31	94	40																	2139		
	N08320		26Ni-43Fe-22Cr-5Mo			45		N08320	Alloy 20 Mod.	75	28						√										√			
	N12160		29 Ni-30 Co-28 Cr-2.75 Si					N12160	HR160	90	35																	2162		
	N10675		64 Ni-29.5 Mo-2 Cr-2 Fe-Mn-W	WT				N10675	Alloy B-3	110	51																	2140		
	N10629		62 Ni-28 Mo-4 Fe-1 Cu					N10629		110	51																	2187		
	N06686		50 Ni-25 Cr-15 Fe-6 Mo-Ti					N06686	Alloy 686	100	45																	2198		
	R30556		21 Ni-30 Fe-22 Cr-18 Co-3 Mo-3 W			45		R30556	HS556	100	45						√										√	2010		
SB-637	N07001	SHT, Stab. + PH	53 Ni-20 Cr-14 Co-4 Mo	Ba & Fo				N07001	Old Gr 685	160	110																			
	N07080	SHT, Stab. + PH	70 Ni-19 Cr-Fe-Ti-Al					N07080	Old Gr 804	135	90																			
	N07252	SHT + PH	51 Ni-19 Cr-10 Mo-10 Co					N07252	Old Gr 689	160	90																			

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SB-637 (Con't)	N07500	SHT, Stab. + PH	50 Ni-17 Cr-17 Co-Mo-Fe		Ro & Ba			N07500	Old Gr 684	175	105																			
	N07500	SHT, Stab. + PH	50 Ni-17 Cr-17 Co-Mo-Fe		Fo			N07500	Old Gr 684	170	100																			
	N07718		53 Ni-19 Cr-19 Fe-Cb-Mo					N07718	718	185	150											√	√		√			1993, 2206, 2222	N208, 253	
	N07750 Ty 1	SHT 2100°F	70 Ni-16 Cr-7 Fe-Ti-Al					N07750	X-750	140	90																		N60	
	N07750 Ty 2	SHT 1800°F	70 Ni-16 Cr-7 Fe-Ti-Al					N07750	X-750	170	115											√			√				N60	
	N07750 Ty 3	Annealed 2000°F + PH	70 Ni-16 Cr-7 Fe-Ti-Al					N07750	X-750	160-185	100-130																		N60	
	N07752 Ty 1	SHT + PH	70Ni-16 Cr-7 Fe-Ti-Cb					N07752		160-185	100-130																			
	N07752 Ty 2	SHT + PH	70Ni-16 Cr-7 Fe-Ti-Cb					N07752		140	85																			
SB-649	N08926		28Ni-39Fe-16Cr-4Cu	Bar & Wire				N08926	25-6 Mo	94	43																	2120	N454, 455	
	N08031		31Ni-31Fe-27Cr-7Mo					N08031	Alloy 31	94	40																	2139		
	N08904		44 Fe-25 Ni-21 Cr-Mo			45		N08904	904L, AL4X	71	31						√										√			
	N08925		25Ni-20Cr-6Mo-Cu-N			45		N08925	VDM1925	87	43						√										√		N454, 455	
SB-658	R60702		99.2 Zr	Sm & WP		61		R60702	Gr 702	55	30						√										√	2221		
	R60704		97.5 Zr + Sn					R60704	Gr 704	60	35																			
	R60705		95.5 Zr + Cb			62		R60705	Gr 705	80	55						√										√			
SB-668	N08028		31 Ni-31 Fe-29 Cr-Mo	ST		45		N08028	Sanicro 28	73	31					√	√										√	1325, 2189		
SB-672	N08700		46 Fe-25 Ni-21 Cr-Mo	Bar & Wire		45		N08700	JS700	80	35						√										√			
SB-673	N08904		44 Fe-25 Ni-21 Cr-Mo	WP		45		N08904	904L, AL4X	71	31						√										√			
	N08925		25Ni-20Cr-6Mo-Cu-N			45		N08925	VDM1925	87	43						√										√		N453	
	N08926		28Ni-39Fe-16Cr-4Cu					N08926	25-6 Mo	94	43																	2120	N453	
SB-674	N08904		44 Fe-25 Ni-21 Cr-Mo	WT		45		N08904	904L, AL4X	71	31						√										√			
	N08925		25Ni-20Cr-6Mo-Cu-N			45		N08925	VDM1925	87	43						√										√			
	N08926		28Ni-39Fe-16Cr-4Cu					N08926	25-6 Mo	94	43																	2120		

SPEC. NO.	GRADE - Gr CLASS - Cl TYPE - Ty	HT CONDI-TION	NOMINAL COMPOSITION DESIGNATION	PRODUCT FORM	SIZE LIMITS, IN.	WELD NO. P	WELD NO. Gr	UNS NO.	COMMON NAME OR TRADE NAME OR REF. SPEC.	STRENGTH LEVEL, ksi UTS	STRENGTH LEVEL, ksi YS	SECTION II, PART D COVERAGE TABLE 1A I	TABLE 1A III 2/3	TABLE 1A VIII 1	TABLE 1B I	TABLE 1B III 2/3	TABLE 1B VIII 1	TABLE 2A III 1	TABLE 2A VIII 2	TABLE 2B III 1	TABLE 2B VIII 2	TABLE 3 III 2/3	TABLE 3 VIII 1	TABLE 3 VIII 2	TABLE 4 III 1	TABLE 4 VIII 2	IX QW 422	CODE CASE COVERAGE NON-NUCL	CODE CASE COVERAGE NUCL	NOTES
SB-675	N08366		46Fe-24Ni-21Cr-6Mo	WP		45		N08366	AL6X	75	30						√										√			
	N08367		46 Fe-24 Ni-21 Cr-6 Mo-Cu-N			45		N08367	AL6XN	104	46						√										√	1997		
SB-676	N08366 Cl's. 1 & 2	SHT	46Fe-24Ni-21Cr-6Mo	WT		45		N08366	AL6X	75	30					√	√										√			
	N08366 Cl's. 3 & 4	CW	46Fe-24Ni-21Cr-6Mo			45		N08366	AL6X	75	30																√			
	N08367 Cl's. 1 & 2	SHT	46 Fe-24 Ni-21 Cr-6 Mo-Cu-N			45		N08367	AL6XN	104	46						√										√	1997		
	N08367 Cl's. 3 & 4	CW	46 Fe-24 Ni-21 Cr-6 Mo-Cu-N					N08367	AL6XN	75	30																	1997		
SB-677	N08904		44 Fe-25 Ni-21 Cr-Mo	SP & ST		45		N08904	904L, AL4X	71	31					√	√										√			
	N08925		25Ni-20Cr-6Mo-Cu-N			45		N08925	VDM1925	87	43						√										√		N453	
	N08926		28Ni-39Fe-16Cr-4Cu					N08926	25-6 Mo	94	43																	2120	N453	
SB-688	N08366		46Fe-24Ni-21Cr-6Mo	Pl, Sh & Str		45		N08366	AL6X	75	35						√										√		N304	
	N08367		46 Fe-24 Ni-21 Cr-6 Mo-Cu-N		< 3⁄16	45		N08367	AL6XN	104	46						√										√	1997	N539	
	N08367		46 Fe-24 Ni-21 Cr-6 Mo-Cu-N		3⁄16 to 3⁄4, incl.			N08367	AL6XN	100	45																			
	N08367		46 Fe-24 Ni-21 Cr-6 Mo-Cu-N		> 3⁄4			N08367	AL6XN	95	45																			
SB-690	N08366	CD or HF, Annealed	46Fe-24Ni-21Cr-6Mo	SP & ST		45		N08366	AL6X	75	30						√										√			
	N08367	CD or HF, Annealed	46 Fe-24 Ni-21 Cr-6 Mo-Cu-N	SP & ST		45		N08367	AL6XN	104	46						√										√	1997		
SB-691	N08366		46Fe-24Ni-21Cr-6Mo	Ro, Ba & Wire		45		N08366	AL6X	75	30						√										√			
	N08367		46 Fe-24 Ni-21 Cr-6 Mo-Cu-N			45		N08367	AL6XN	95	45																√	1997		
SB-704	N06625		60Ni-22Cr-9Mo-3.5Cb	WT		43		N06625	Alloy 625	120	60					√	√										√			
	N08825		42 Ni-21.5 Cr-3 Mo-2.3 Cu			45		N08825	Alloy 825	85	35					√	√										√			
SB-705	N06625		60Ni-22Cr-9Mo-3.5Cb	WP		43		N06625	Alloy 625	120	60						√										√			
	N08825		42 Ni-21.5 Cr-3 Mo-2.3 Cu			45		N08825	Alloy 825	85	35						√										√			
SB-709	N08028		31 Ni-31 Fe-29 Cr-Mo	Pl, Sh & Str		45		N08028	Sanicro 28	73	31						√										√	2189, 1325		

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SB-710	N08330		35 Ni-19 Cr-1¼ Si	WP		46		N08330	RA-330	70	30						√										√			
SB-729	N08020		35 Ni-35 Fe-20 Cr-Cb	SP & ST				N08020	Alloy 20 Cb-3	80	35						√													
	N08024		37 Ni-33 Fe-23 Cr-4 Mo-1 Cu					N08024	20-Mo 4	80	35																			
	N08026		35 Ni-30 Fe-24 Cr-6 Mo-Cu					N08026	20-Mo 6	80	35																			
SB-804	N08367		46 Fe-24 Ni-21 Cr-6 Mo-Cu-N	WP				N08367	AL6XN	95	45																			
	N08926		28 Ni-39 Fe-16 Cr-4 Cu					N08926	25-6 Mo	94	43																			

Chapter 9

ASME SPECIFICATION DESIGNATIONS AND TITLES

ASME FERROUS SPECIFICATION DESIGNATIONS AND TITLES LISTED BY PRODUCT FORM

Steel Pipe	
SA-53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
SA-106	Seamless Carbon Steel Pipe for High-Temperature Service
SA-134	Pipe, Steel, Electric-Fusion (Arc)-Welded (Sizes NPS 16 and Over)
SA-135	Electric-Resistance-Welded Steel Pipe
SA-312/SA-312M	Seamless and Welded Austenitic Stainless Steel Pipe
SA-333/SA-333M	Seamless and Welded Steel Pipe for Low-Temperature Service
SA-335/SA-335M	Seamless Ferritic Alloy Steel Pipe for High-Temperature Service
SA-358/SA-358M	Electric-Fusion-Welded Austenitic Chromium-Nickel Alloy Steel Pipe for High Temperature Service
SA-369/SA-369M	Carbon and Ferritic Alloy Steel Forged and Bored Pipe for High-Temperature Service
SA-376/SA-376M	Seamless Austenitic Steel Pipe for High-Temperature Central-Station Service
SA-409/SA-409M	Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service
SA-426	Centrifugally Cast Ferritic Alloy Steel Pipe for High-Temperature Service
SA-430/SA-430M	Austenitic Steel Forged and Bored Pipe for High-Temperature Service
SA-451	Centrifugally Cast Austenitic Steel Pipe for High-Temperature Service
SA-452	Centrifugally Cast Austenitic Steel Cold-Wrought Pipe for High-Temperature Service
SA-524	Seamless Carbon Steel Pipe for Atmospheric and Lower Temperatures
SA-530/SA-530M	General Requirements for Specialized Carbon and Alloy Steel Pipe
SA-587	Electric-Welded Low-Carbon Steel Pipe for the Chemical Industry
SA-660	Centrifugally Cast Carbon Steel Pipe for High-Temperature Service
SA-671	Electric-Fusion-Welded Steel Pipe for Atmospheric and Lower Temperatures
SA-672	Electric-Fusion-Welded Steel Pipe for High-Pressure Service at Moderate Temperatures
SA-691	Carbon and Alloy Steel Pipe, Electric-Fusion-Welded for High-Pressure Service at High Temperatures
SA-727/SA-727M	Forgings, Carbon Steel, for Piping Components with Inherent Notch Toughness
SA-731/SA-731M	Seamless and Welded Ferritic, Martensitic Stainless Steel Pipe
SA-790/SA-790M	Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe
SA-813/SA-813M	Single- or Double-Welded Austenitic Stainless Steel Pipe
SA-814/SA-814M	Cold-Worked Welded Austenitic Stainless Steel Pipe
Steel Tubes	
SA-178/SA-178M	Electric-Resistance-Welded Carbon Steel and Carbon-Manganese Steel Boiler Tubes
SA-179/SA-179M	Seamless Cold-Drawn Low-Carbon Steel Heat Exchanger and Condenser Tubes
SA-192/SA-192M	Seamless Carbon Steel Boiler Tubes for High-Pressure Service
SA-199/SA-199M	Seamless Cold-Drawn Intermediate Alloy Steel Heat Exchanger and Condenser Tubes
SA-209/SA-209M	Seamless Carbon-Molybdenum Alloy-Steel Boiler and Superheater Tubes

Steel Tubes (Continued)	
SA-210/SA-210M	Seamless Medium-Carbon Steel Boiler and Superheater Tubes
SA-213/SA-213M	Seamless Ferritic and Austenitic Alloy Steel Boiler, Superheater, and Heat Exchanger Tubes
SA-214/SA-214M	Electric-Resistance-Welded Carbon Steel Heat-Exchanger and Condenser Tubes
SA-226/SA-226M	Electric-Resistance-Welded Carbon Steel Boiler and Superheater Tubes for High Pressure Service
SA-249/SA-249M	Welded Austenitic Steel Boiler, Superheater, Heat Exchanger, and Condenser Tubes
SA-250/SA-250M	Electric-Resistance-Welded Ferritic Alloy Steel Boiler and Superheater Tubes
SA-268/SA-268M	Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service
SA-334/SA-334M	Seamless and Welded Carbon and Alloy Steel Tubes for Low-Temperature Service
SA-423/SA-423M	Seamless and Electric Welded Low-Alloy Steel Tubes
SA-450/SA-450M	General Requirements for Carbon, Ferritic Alloy, and Austenitic Alloy Steel Tubes
SA-556/SA-556M	Seamless Cold-Drawn Carbon Steel Feedwater Heater Tubes
SA-557/SA-557M	Electric-Resistance-Welded Carbon Steel Feedwater Heater Tubes
SA-688/SA-688M	Welded Austenitic Stainless Steel Feedwater Heater Tubes
SA-789/SA-789M	Seamless and Welded Ferritic/Austenitic Stainless Steel Tubing for General Service
SA-803/SA803M	Welded Ferritic Stainless Steel Feedwater Heater Tubes
Steel Flanges, Fittings, Valves, and Parts	
SA-105/SA-105M	Forgings, Carbon Steel, for Piping Components
SA-181/SA-181M	Forgings, Carbon Steel, for General-Purpose Piping
SA-182/SA-182M	Forged or Rolled Alloy Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service
SA-216/SA-216M	Steel Castings, Carbon, Suitable for Fusion Welding for High-Temperature Service
SA-217/SA-217M	Steel Castings, Martensitic Stainless and Alloy, for Pressure Containing Parts Suitable for High-Temperature Service
SA-232	Chromium-Vanadium Alloy Steel Valve Spring Quality Wire
SA-234/SA-234M	Piping Fittings of Wrought Carbon Steel and Alloy for Moderate and Elevated Temperatures
SA-350/SA-350M	Forgings, Carbon and Low-Alloy Steel, Requiring Notch Toughness Testing for Piping Components
SA-351/SA-351M	Steel Castings, Austenitic, for High-Temperature Service
SA-352/SA-352M	Steel Castings, Ferritic and Martensitic, for Pressure Containing Parts Suitable for Low-Temperature Service
SA-403/SA-403M	Wrought Austenitic Stainless Steel Piping Fittings
SA-420/SA-420M	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service
SA-522/SA-522M	Forged or Rolled 8 and 9% Nickel Alloy Steel Flanges, Fittings, Valves, and Parts for Low-Temperature Service
SA-592/SA-592M	High-Strength Quenched and Tempered Low-Alloy Steel Forged Fittings and Parts for Pressure Vessels
SA-815/SA-815M	Wrought Ferritic, Ferritic/Austenitic, and Martensitic Stainless Steel Piping Fittings
SA-905	Steel Wire, Pressure Vessel Winding
Steel Plates, Sheets, and Strip for Pressure Vessels	
SA-20/SA-20M	General Requirements for Steel Plates for Pressure Vessels
SA-202/SA-202M	Pressure Vessel Plates, Alloy Steel, Chromium-Manganese-Silicon
SA-203/SA-203M	Pressure Vessel Plates, Alloy Steel, Nickel
SA-204/SA-204M	Pressure Vessel Plates, Alloy Steel, Molybdenum
SA-225/SA-225M	Pressure Vessel Plates, Alloy Steel, Manganese-Vanadium-Nickel
SA-240	Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels
SA-263	Corrosion-Resisting Chromium Steel Clad Plate, Sheet, and Strip
SA-264	Stainless Chromium-Nickel Steel Clad Plate, Sheet, and Strip

Steel Plates, Sheets, and Strip for Pressure Vessels (Continued)	
SA-265	Nickel and Nickel-Base Alloy Clad Steel Plate
SA-285/SA-285M	Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength
SA-299/SA-299M	Pressure Vessel Plates, Carbon Steel, Manganese-Silicon
SA-302/SA-302M	Pressure Vessel Plates, Alloy Steel, Manganese-Molybdenum and Manganese-Molybdenum-Nickel
SA-353/SA-353M	Pressure Vessel Plates, Alloy Steel, 9% Nickel, Double-Normalized and Tempered
SA-387/SA-387M	Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum
SA-414/SA-414M	Steel Sheet Carbon for Pressure Vessels
SA-455/SA-455M	Pressure Vessel Plates, Carbon Steel, High-Strength Manganese
SA-480/SA-480M	General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
SA-515/SA-515M	Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service
SA-516/SA-516M	Pressure Vessel Plates, Carbon Steel, for Moderate-and Lower-Temperature Service
SA-517/SA-517M	Pressure Vessel Plates, Alloy Steel, High Strength, Quenched and Tempered
SA-533/SA-533M	Pressure Vessel Plates, Alloy Steel, Quenched and Tempered, Manganese-Molybdenum and Manganese-Molybdenum-Nickel
SA-537/SA-537M	Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel
SA-542/SA-542M	Pressure Vessel Plates, Alloy Steel, Quenched and Tempered, Chromium-Molybdenum and Chromium-Molybdenum-Vanadium-Titanium-Boron
SA-543/SA-543M	Pressure Vessel Plates, Alloy Steel, Quenched and Tempered Nickel-Chromium-Molybdenum
SA-553/SA-553M	Pressure Vessel Plates, Alloy Steel, Quenched and Tempered, 8 and 9% Nickel
SA-562/SA-562M	Pressure Vessel Plates, Carbon Steel, Manganese-Titanium for Glass or Diffused Metallic Coatings
SA-612/SA-612M	Pressure Vessel Plates, Carbon Steel, High Strength, for Moderate- and Lower-Tempered Service
SA-620/SA-620M	Steel Sheet, Carbon, Drawing Quality, Special Killed, Cold-Rolled
SA-645/SA-645M	Pressure Vessel Plates, 5% Nickel Alloy Steel, Specially Heat Treated
SA-662/SA-662M	Pressure Vessel Plates, Carbon-Manganese, for Moderate- and Lower-Temperature Service
SA-666	Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar
SA-693	Precipitation Hardening Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
SA-724/SA-724M	Pressure Vessel Plates, Carbon Steel, Quenched and Tempered, for Welded Layered Pressure Vessels
SA-736/SA-736M	Pressure Vessel Plates, Low-Carbon Age-Hardening Nickel-Copper-Chromium-Molybdenum-Columbium and Nickel-Copper-Manganese-Molybdenum-Columbium Alloy Steel
SA-737/SA-737M	Pressure Vessel Plates, High-Strength, Low-Alloy Steel
SA-738/SA-738M	Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel, for Moderate- and Lower-Temperature Service
SA-770/SA-770M	Through-Thickness Tension Testing of Steel Plates for Special Application
SA-812/SA-812M	Steel Sheet, High-Strength, Low-Alloy Hot-Rolled, for Welded Layered Pressure Vessels
SA-832/SA-832M	Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum-Vanadium-Titanium-Boron
SA-841/SA-841M	Steel Plated for Pressure Vessels, Produced by the Thermo-Mechanical Control Process (TMCP)
Structural Steel	
SA-6/SA-6M	General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use
SA-36/SA-36M	Structural Steel
SA-283/SA-283M	Low- and Intermediate-Tensile Strength Carbon Steel Plates

Steel Bars and Wire	
SA-6/SA-6M	General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use
SA-29/SA-29M	General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought and Cold-Finished
SA-311/SA-311M	Steel Bars, Carbon, Stress-Relieved Cold Drawn, Subject to Mechanical Property Requirements
SA-479/SA-479M	Stainless and Heat-Resisting Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels
SA-484/SA-484M	General Requirements for Stainless and Heat-Resisting Bars, Billets, and Forgings
SA-564/SA-564M	Hot-Rolled and Cold-Finished Age-Hardening Stainless and Heat-Resisting Steel Bars and Shapes
SA-638/SA-638M	Precipitation Hardening Iron Base Superalloy Bars, Forgings, and Forging Stock for High-Temperature Service
SA-675/SA-675M	Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
SA-695	Steel Bars, Carbon, Hot-Wrought, Special Quality, for Fluid Power Applications
SA-696	Steel Bars, Carbon, Hot-Wrought or Cold-Finished, Special Quality, for Pressure Piping Components
SA-739	Steel Bars, Alloy, Hot-Wrought, for Elevated Temperature or Pressure Containing Parts, or Both
Steel Bolting Materials	
SA-193/SA-193M	Alloy Steel and Stainless Steel Bolting Materials for High-Temperature Service
SA-194/SA-194M	Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service
SA-307	Carbon Steel Externally Threaded Standard Fasteners
SA-320/SA-320M	Alloy Steel Bolting Materials for Low-Temperature Service
SA-325	High-Strength Bolts for Structural Steel Joints
SA-354	Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners
SA-437/SA-437M	Alloy Steel Turbine-Type Bolting Material Specially Heat Treated for High-Temperature Service
SA-449	Quenched and Tempered Steel Bolts and Studs
SA-453/SA-453M	Bolting Materials, High Temperature, 50 to 120 ksi (345 to 827 MPa) Yield Strength, with Expansion Coefficients Comparable to Austenitic Steel
SA-540/SA-540M	Alloy Steel Bolting Materials for Special Applications
SA-563	Carbon and Alloy Steel Nuts
SA-574	Alloy Steel Socket-Head Screws
SF-568	Carbon and Alloy Steel Externally Threaded Metric Fasteners
Steel Billets and Forgings	
SA-105/SA-105M	Forgings, Carbon Steel, for Piping Components
SA-181/SA-181M	Forgings, Carbon Steel, for General-Purpose Piping
SA-266/SA-266M	Forgings, Carbon Steel, for Pressure Vessel Components
SA-336/SA-336M	Steel Forgings, Alloy, for Pressure and High-Temperature Parts
SA-350/SA-350M	Forgings, Carbon and Low-Alloy Steel, Requiring Notch Toughness Testing for Piping Components
SA-372/SA-372M	Carbon Alloy Steel Forgings for Thin-Walled Pressure Vessels
SA-484/SA-484M	General Requirements for Stainless and Heat-Resisting Bars, Billets, and Forgings
SA-508/SA-508M	Quenched and Tempered Vacuum-Treated Carbon and Alloy Steel Forgings for Pressure Vessels
SA-541/SA-541M	Steel Forgings, Carbon and Alloy, Quenched and Tempered, for Pressure Vessel Components
SA-638/SA-638M	Precipitation Hardening Iron Base Superalloy Bars, Forgings, and Forging Stock for High-Temperature Service
SA-649/SA-649M	Forged Steel Rolls used for Corrugating Paper Machinery
SA-705/SA-705M	Age-Hardening Stainless and Heat-Resisting Steel Forgings

Steel Billets and Forgings (Continued)	
SA-723/SA-723M	Alloy Steel Forgings for High-Strength Pressure Component Application
SA-745/SA-745M	Ultrasonic Examination of Austenitic Steel Forging
SA-765/SA-765M	Carbon Steel and Low-Alloy Steel Pressure Vessel Component Forgings with Mandatory Toughness Requirements
SA-788	Steel Forgings, General Requirements
SA-836/SA-836M	Forgings, Titanium Stabilized Carbon Steel for Glass-Lined Piping and Pressure Vessel Service
Steel Castings	
SA-216/SA-216M	Steel Castings, Carbon, Suitable for Fusion Welding for High-Temperature Service
SA-217/SA-217M	Steel Castings, Martensitic Stainless and Alloy, for Pressure Containing Parts Suitable for High-Temperature Service
SA-351/SA-351M	Steel Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure Containing Parts
SA-352/SA-352M	Steel Castings, Ferritic and Martensitic, for Pressure Containing Parts Suitable for Low-Temperature Service
SA-487/SA-487M	Steel Castings Suitable for Pressure Service
SA-494/SA-494M	Castings, Nickel and Nickel Alloy
SA-609	Castings, Carbon, Low Alloy, and Martensitic Stainless Steel, Ultrasonic Examination Thereof
SA-667/SA-667M	Centrifugally Cast Dual Metal (Gray and White Cast Iron) Cylinders
SA-703/SA-703M	Steel Castings, General Requirements, for Pressure Containing Parts
SA-747/SA-747M	Precipitation Hardening Stainless Castings
SA-781/SA-781M	Castings, Steel and Alloy, Common Requirements for General Industrial Use
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
SA-193/SA-193M	Alloy Steel and Stainless Steel Bolting Materials for High-Temperature Service
SA-194/SA-194M	Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service
SA-213/SA-213M	Seamless Ferritic and Austenitic Alloy Steel Boiler, Superheater, and Heat Exchanger Tubes
SA-216/SA-216M	Steel Castings, Carbon, Suitable for Fusion Welding for High-Temperature Service
SA-217/SA-217M	Steel Castings, Martensitic Stainless and Alloy, for Pressure Containing Parts Suitable for High-Temperature Service
SA-240	Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels
SA-249/SA-249M	Welded Austenitic Steel Boiler, Superheater, Heat Exchanger, and Condenser Tubes
SA-263	Corrosion-Resisting Chromium Steel Clad Plate, Sheet, and Strip
SA-264	Stainless Chromium-Nickel Steel Clad Plate, Sheet, and Strip
SA-265	Nickel and Nickel-Base Alloy Clad Steel Plate
SA-268/SA-268M	Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service
SA-312/SA-312M	Seamless and Welded Austenitic Stainless Steel Pipe
SA-320/SA-320M	Alloy Steel Bolting Materials for Low-Temperature Service
SA-336/SA-336M	Steel Forgings, Alloy, for Pressure and High-Temperature Parts
SA-351/SA-351M	Steel Castings, Austenitic, for High-Temperature Service
SA-358/SA-358M	Electric-Fusion-Welded Austenitic Chromium-Nickel Alloy Steel Pipe for High-Temperature Service
SA-369/SA-369M	Carbon and Ferritic Alloy Steel Forged and Bored Pipe for High-Temperature Service
SA-376/SA-376M	Seamless Austenitic Steel Pipe for High-Temperature Central-Station Service
SA-403/SA-403M	Wrought Austenitic Stainless Steel Piping Fittings
SA-409/SA-409M	Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service
SA-426	Centrifugally Cast Ferritic Alloy Steel Pipe for High-Temperature Service
SA-430/SA-430M	Austenitic Steel Forged and Bored Pipe for High-Temperature Service

Corrosion-Resisting and Heat-Resisting Steels (Continued)	
SA-437/SA-437M	Alloy Steel Turbine-Type Bolting Material Specially Heat Treated for High-Temperature Service
SA-451	Centrifugally Cast Austenitic Steel Pipe for High-Temperature Service
SA-452	Centrifugally Cast Austenitic Steel Cold-Wrought Pipe for High-Temperature Service
SA-479/SA-479M	Stainless and Heat-Resisting Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels
SA-484/SA-484M	General Requirements for Stainless and Heat-Resisting Bars, Billets, and Forgings
SA-515/SA-515M	Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service
SA-564/SA-564M	Hot-Rolled and Cold-Finished Age-Hardening Stainless and Heat-Resisting Steel Bars and Shapes
SA-638/SA-638M	Precipitation Hardening Iron Base Superalloy Bars, Forgings, and Forging Stock for High-Temperature Service
SA-660	Centrifugally Cast Carbon Steel Pipe for High-Temperature Service
SA-666	Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar
SA-691	Carbon and Alloy Steel Pipe, Electric-Fusion-Welded for High-Pressure Service at High Temperatures
SA-705/SA-705M	Age-Hardening Stainless and Heat-Resisting Steel Forgings
SA-789/SA-789M	Seamless and Welded Ferritic/Austenitic Stainless Steel Tubing for General Service
SA-790/SA-790M	Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe
SA-814/SA-814M	Cold-Worked Welded Austenitic Stainless Steel Pipe
SA-815/SA-815M	Wrought Ferritic, Ferritic/Austenitic, and Martensitic Stainless Steel Piping Fittings
Wrought Iron, Cast Iron, and Malleable Iron	
SA-47	Ferritic Malleable Iron Castings
SA-278	Gray Iron Castings for Pressure Containing Parts for Temperatures up to 650°F
SA-395	Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures
SA-476	Ductile Iron Castings for Paper Mill Dryer Rolls
SA-748/SA-748M	Statically Cast Chilled White Iron-Gray Iron Dual Metal Rolls for Pressure Vessel Use
SA-834	Common Requirements for Iron Castings for General Industrial Use
Methods	
SA-275/SA-275M	Magnetic Particle Examination of Steel Forgings
SA-370	Test Methods and Definition for Mechanical Testing of Steel Products
SA-388/SA-388M	Ultrasonic Examination of Heavy Steel Forgings
SA-435/SA-435M	Straight-Beam Ultrasonic Examination of Steel Plates
SA-577/SA-577M	Ultrasonic Angle-Beam Examination of Steel Plates
SA-578/SA-578M	Straight-Beam Ultrasonic of Plain and Clad Steel Plates for Special Applications
SA-745/SA-745M	Ultrasonic Examination of Austenitic Steel Forgings
SA-751	Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products

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SA-6/SA-6M	General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use
SA-20/SA-20M	General Requirements for Steel Plates for Pressure Vessels
SA-29/SA-29M	General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought and Cold-Finished
SA-36/SA-36M	Structural Steel
SA-47	Ferritic Malleable Iron Castings
SA-53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
SA-105/SA-105M	Forgings, Carbon Steel, for Piping Components
SA-106	Seamless Carbon Steel Pipe for High-Temperature Service
SA-134	Pipe, Steel, Electric-Fusion (Arc)-Welded (Sizes NPS 16 and Over)
SA-135	Electric-Resistance-Welded Steel Pipe
SA-178/SA-178M	Electric-Resistance-Welded Carbon Steel and Carbon-Manganese Steel Boiler Tubes
SA-179/SA-179M	Seamless Cold-Drawn Low-Carbon Steel Heat Exchanger and Condenser Tubes
SA-181/SA-181M	Forgings, Carbon Steel, for General-Purpose Piping
SA-182/SA-182M	Forged or Rolled Alloy Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service
SA-192/SA-192M	Seamless Carbon Steel Boiler Tubes for High-Pressure Service
SA-193/SA-193M	Alloy Steel and Stainless Steel Bolting Materials for High-Temperature Service
SA-194/SA-194M	Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service
SA-199/SA-199M	Seamless Cold-Drawn Intermediate Alloy Steel Heat Exchanger and Condenser Tubes
SA-202/SA-202M	Pressure Vessel Plates, Alloy Steel, Chromium-Manganese-Silicon
SA-203/SA-203M	Pressure Vessel Plates, Alloy Steel, Nickel
SA-204/SA-204M	Pressure Vessel Plates, Alloy Steel, Molybdenum
SA-209/SA-209M	Seamless Carbon-Molybdenum Alloy-Steel Boiler and Superheater Tubes
SA-210/SA-210M	Seamless Medium-Carbon Steel Boiler and Superheater Tubes
SA-213/SA-213M	Seamless Ferritic and Austenitic Alloy Steel Boiler, Superheater, and Heat Exchanger Tubes
SA-214/SA-214M	Electric-Resistance-Welded Carbon Steel Heat-Exchanger and Condenser Tubes
SA-216/SA-216M	Steel Castings, Carbon, Suitable for Fusion Welding for High-Temperature Service
SA-217/SA-217M	Steel Castings, Martensitic Stainless and Alloy, for Pressure Containing Parts Suitable for High-Temperature Service
SA-225/SA-225M	Pressure Vessel Plates, Alloy Steel, Manganese-Vanadium-Nickel
SA-226/SA-226M	Electric-Resistance-Welded Carbon Steel Boiler and Superheater Tubes for High Pressure Service
SA-232	Chromium-Vanadium Alloy Steel Valve Spring Quality Wire
SA-234/SA-234M	Piping Fittings of Wrought Carbon Steel and Alloy for Moderate and Elevated Temperatures
SA-240	Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels
SA-249/SA-249M	Welded Austenitic Steel Boiler, Superheater, Heat Exchanger, and Condenser Tubes
SA-250/SA-250M	Electric-Resistance-Welded Ferritic Alloy Steel Boiler and Superheater Tubes
SA-263	Corrosion-Resisting Chromium Steel Clad Plate, Sheet, and Strip
SA-264	Stainless Chromium-Nickel Steel Clad Plate, Sheet, and Strip
SA-265	Nickel and Nickel-Base Alloy Clad Steel Plate
SA-266/SA-266M	Forgings, Carbon Steel, for Pressure Vessel Components
SA-268/SA-268M	Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service
SA-275/SA-275M	Magnetic Particle Examination of Steel Forgings
SA-278	Gray Iron Castings for Pressure Containing Parts for Temperatures up to 650°F
SA-283/SA-283M	Low- and Intermediate-Tensile Strength Carbon Steel Plates
SA-285/SA-285M	Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength
SA-299/SA-299M	Pressure Vessel Plates, Carbon Steel, Manganese-Silicon

SA-302/SA-302M	Pressure Vessel Plates, Alloy Steel, Manganese-Molybdenum and Manganese-Molybdenum-Nickel
SA-307	Carbon Steel Externally Threaded Standard Fasteners
SA-311/SA-311M	Steel Bars, Carbon, Stress-Relieved Cold Drawn, Subject to Mechanical Property Requirements
SA-312/SA-312M	Seamless and Welded Austenitic Stainless Steel Pipe
SA-320/SA-320M	Alloy Steel Bolting Materials for Low-Temperature Service
SA-325	High-Strength Bolts for Structural Steel Joints
SA-333/SA-333M	Seamless and Welded Steel Pipe for Low-Temperature Service
SA-334/SA-334M	Seamless and Welded Carbon and Alloy Steel Tubes for Low-Temperature Service
SA-335/SA-335M	Seamless Ferritic Alloy Steel Pipe for High-Temperature Service
SA-336/SA-336M	Steel Forgings, Alloy, for Pressure and High-Temperature Parts
SA-350/SA-350M	Forgings, Carbon and Low-Alloy Steel, Requiring Notch Toughness Testing for Piping Components
SA-351/SA-351M	Steel Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure Containing Parts
SA-352/SA-352M	Steel Castings, Ferritic and Martensitic, for Pressure Containing Parts Suitable for Low-Temperature Service
SA-353/SA-353M	Pressure Vessel Plates, Alloy Steel, 9% Nickel, Double-Normalized and Tempered
SA-354	Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners
SA-358/SA-358M	Electric-Fusion-Welded Austenitic Chromium-Nickel Alloy Steel Pipe for High-Temperature Service
SA-369/SA-369M	Carbon and Ferritic Alloy Steel Forged and Bored Pipe for High-Temperature Service
SA-370	Test Methods and Definition for Mechanical Testing of Steel Products
SA-372/SA-372M	Carbon Alloy Steel Forgings for Thin-Walled Pressure Vessels
SA-376/SA-376M	Seamless Austenitic Steel Pipe for High-Temperature Central-Station Service
SA-387/SA-387M	Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum
SA-388/SA-388M	Ultrasonic Examination of Heavy Steel Forgings
SA-395	Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures
SA-403/SA-403M	Wrought Austenitic Stainless Steel Piping Fittings
SA-409/SA-409M	Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service
SA-414/SA-414M	Steel Sheet Carbon for Pressure Vessels
SA-420/SA-420M	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service
SA-423/SA-423M	Seamless and Electric Welded Low-Alloy Steel Tubes
SA-426	Centrifugally Cast Ferritic Alloy Steel Pipe for High-Temperature Service
SA-430/SA-430M	Austenitic Steel Forged and Bored Pipe for High-Temperature Service
SA-435/SA-435M	Straight-Beam Ultrasonic Examination of Steel Plates
SA-437/SA-437M	Alloy Steel Turbine-Type Bolting Material Specially Heat Treated for High-Temperature Service
SA-449	Quenched and Tempered Steel Bolts and Studs
SA-450/SA-450M	General Requirements for Carbon, Ferritic Alloy, and Austenitic Alloy Steel Tubes
SA-451	Centrifugally Cast Austenitic Steel Pipe for High-Temperature Service
SA-452	Centrifugally Cast Austenitic Steel Cold-Wrought Pipe for High-Temperature Service
SA-453/SA-453M	Bolting Materials, High Temperature, 50 to 120 ksi (345 to 827 MPa) Yield Strength, with Expansion Coefficients Comparable to Austenitic Steel
SA-455/SA-455M	Pressure Vessel Plates, Carbon Steel, High-Strength Manganese
SA-476	Ductile Iron Castings for Paper Mill Dryer Rolls
SA-479/SA-479M	Stainless and Heat-Resisting Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels
SA-480/SA-480M	General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
SA-484/SA-484M	General Requirements for Stainless and Heat-Resisting Bars, Billets, and Forgings
SA-487/SA-487M	Steel Castings Suitable for Pressure Service
SA-494/SA-494M	Castings, Nickel and Nickel Alloy
SA-508/SA-508M	Quenched and Tempered Vacuum-Treated Carbon and Alloy Steel Forgings for Pressure Vessels
SA-515/SA-515M	Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service

SA-516/SA-516M	Pressure Vessel Plates, Carbon Steel, for Moderate-and Lower-Temperature Service
SA-517/SA-517M	Pressure Vessel Plates, Alloy Steel, High Strength, Quenched and Tempered
SA-522/SA-522M	Forged or Rolled 8 and 9% Nickel Alloy Steel Flanges, Fittings, Valves, and Parts for Low-Temperature Service
SA-524	Seamless Carbon Steel Pipe for Atmospheric and Lower Temperatures
SA-530/SA-530M	General Requirements for Specialized Carbon and Alloy Steel Pipe
SA-533/SA-533M	Pressure Vessel Plates, Alloy Steel, Quenched and Tempered, Manganese-Molybdenum and Manganese-Molybdenum-Nickel
SA-537/SA-537M	Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel
SA-540/SA-540M	Alloy Steel Bolting Materials for Special Applications
SA-541/SA-541M	Steel Forgings, Carbon and Alloy, Quenched and Tempered, for Pressure Vessel Components
SA-542/SA-542M	Pressure Vessel Plates, Alloy Steel, Quenched and Tempered, Chromium-Molybdenum and Chromium-Molybdenum-Vanadium-Titanium-Boron
SA-543/SA-543M	Pressure Vessel Plates, Alloy Steel, Quenched and Tempered Nickel-Chromium-Molybdenum
SA-553/SA-553M	Pressure Vessel Plates, Alloy Steel, Quenched and Tempered, 8 and 9% Nickel
SA-556/SA-556M	Seamless Cold-Drawn Carbon Steel Feedwater Heater Tubes
SA-557/SA-557M	Electric-Resistance-Welded Carbon Steel Feedwater Heater Tubes
SA-562/SA-562M	Pressure Vessel Plates, Carbon Steel, Manganese-Titanium for Glass or Diffused Metallic Coatings
SA-563	Carbon and Alloy Steel Nuts
SA-564/SA-564M	Hot-Rolled and Cold-Finished Age-Hardening Stainless and Heat-Resisting Steel Bars and Shapes
SA-574	Alloy Steel Socket-Head Screws
SA-577/SA-577M	Ultrasonic Angle-Beam Examination of Steel Plates
SA-578/SA-578M	Straight-Beam Ultrasonic of Plain and Clad Steel Plates for Special Applications
SA-587	Electric-Welded Low-Carbon Steel Pipe for the Chemical Industry
SA-592/SA-592M	High-Strength Quenched and Tempered Low-Alloy Steel Forged Fittings and Parts for Pressure Vessels
SA-609	Castings, Carbon, Low Alloy, and Martensitic Stainless Steel, Ultrasonic Examination Thereof
SA-612/SA-612M	Pressure Vessel Plates, Carbon Steel, High Strength, for Moderate- and Lower-Tempered Service
SA-620/SA-620M	Steel Sheet, Carbon, Drawing Quality, Special Killed, Cold-Rolled
SA-638/SA-638M	Precipitation Hardening Iron Base Superalloy Bars, Forgings, and Forging Stock for High-Temperature Service
SA-645/SA-645M	Pressure Vessel Plates, 5% Nickel Alloy Steel, Specially Heat Treated
SA-649/SA-649M	Forged Steel Rolls used for Corrugating Paper Machinery
SA-660	Centrifugally Cast Carbon Steel Pipe for High-Temperature Service
SA-662/SA-662M	Pressure Vessel Plates, Carbon-Manganese, for Moderate- and Lower-Temperature Service
SA-666	Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar
SA-667/SA-667M	Centrifugally Cast Dual Metal (Gray and White Cast Iron) Cylinders
SA-671	Electric-Fusion-Welded Steel Pipe for Atmospheric and Lower Temperatures
SA-672	Electric-Fusion-Welded Steel Pipe for High-Pressure Service at Moderate Temperatures
SA-675/SA-675M	Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
SA-688/SA-688M	Welded Austenitic Stainless Steel Feedwater Heater Tubes
SA-691	Carbon and Alloy Steel Pipe, Electric-Fusion-Welded for High-Pressure Service at High Temperatures
SA-693	Precipitation Hardening Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
SA-695	Steel Bars, Carbon, Hot-Wrought, Special Quality, for Fluid Power Applications
SA-696	Steel Bars, Carbon, Hot-Wrought or Cold-Finished, Special Quality, for Pressure Piping Components
SA-703/SA-703M	Steel Castings, General Requirements, for Pressure Containing Parts

SA-705/SA-705M	Age-Hardening Stainless and Heat-Resisting Steel Forgings
SA-723/SA-723M	Alloy Steel Forgings for High-Strength Pressure Component Application
SA-724/SA-724M	Pressure Vessel Plates, Carbon Steel, Quenched and Tempered, for Welded Layered Pressure Vessels
SA-727/SA-727M	Forgings, Carbon Steel, for Piping Components with Inherent Notch Toughness
SA-731/SA-731M	Seamless and Welded Ferritic, Martensitic Stainless Steel Pipe
SA-736/SA-736M	Pressure Vessel Plates, Low-Carbon Age-Hardening Nickel-Copper-Chromium-Molybdenum-Columbium and Nickel-Copper-Manganese-Molybdenum-Columbium Alloy Steel
SA-737/SA-737M	Pressure Vessel Plates, High-Strength, Low-Alloy Steel
SA-738/SA-738M	Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel, for Moderate- and Lower-Temperature Service
SA-739	Steel Bars, Alloy, Hot-Wrought, for Elevated Temperature or Pressure Containing Parts, or Both
SA-745/SA-745M	Ultrasonic Examination of Austenitic Steel Forgings
SA-747/SA-747M	Precipitation Hardening Stainless Castings
SA-748/SA-748M	Statically Cast Chilled White Iron-Gray Iron Dual Metal Rolls for Pressure Vessel Use
SA-751	Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products
SA-765/SA-765M	Carbon Steel and Low-Alloy Steel Pressure Vessel Component Forgings with Mandatory Toughness Requirements
SA-770/SA-770M	Through-Thickness Tension Testing of Steel Plates for Special Application
SA-781/SA-781M	Castings, Steel and Alloy, Common Requirements for General Industrial Use
SA-788	Steel Forgings, General Requirements
SA-789/SA-789M	Seamless and Welded Ferritic/Austenitic Stainless Steel Tubing for General Service
SA-790/SA-790M	Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe
SA-803/SA-803M	Welded Ferritic Stainless Steel Feedwater Heater Tubes
SA-812/SA-812M	Steel Sheet, High-Strength, Low-Alloy Hot-Rolled, for Welded Layered Pressure Vessels
SA-813/SA-813M	Single- or Double-Welded Austenitic Stainless Steel Pipe
SA-814/SA-814M	Cold-Worked Welded Austenitic Stainless Steel Pipe
SA-815/SA-815M	Wrought Ferritic, Ferritic/Austenitic, and Martensitic Stainless Steel Piping Fittings
SA-832/SA-832M	Pressure Vessel Plates, Alloy Steel, Chromium-Molybdenum-Vanadium-Titanium-Boron
SA-834	Common Requirements for Iron Castings for General Industrial Use
SA-836/SA-836M	Forgings, Titanium Stabilized Carbon Steel for Glass-Lined Piping and Pressure Vessel Service
SA-841/SA-841M	Steel Plated for Pressure Vessels, Produced by the Thermo-Mechanical Control Process (TMCP)
SA-905	Steel Wire, Pressure Vessel Winding
SF-568	Carbon and Alloy Steel Externally Threaded Metric Fasteners

ASME NONFERROUS SPECIFICATION DESIGNATIONS AND TITLES LISTED BY ALLOY GROUP AND PRODUCT FORM

Aluminum and Aluminum Alloys	
SB-26/ SB-26M	Aluminum-Alloy Sand Castings
SB-108	Aluminum-Alloy Permanent Mold Castings
SB-209	Aluminum and Aluminum-Alloy Sheet and Plate
SB-210	Aluminum and Aluminum-Alloy Drawn Seamless Tubes
SB-211	Aluminum-Alloy Bar, Rod, and Wire
SB-221	Aluminum and Aluminum-Alloy Extruded Bars, Rods, and Shapes
SB-234	Aluminum and Aluminum-Alloy Drawn Seamless Tubes for Condensers and Heat Exchangers
SB-241/ SB-241M	Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube
SB-247	Aluminum-Alloy Die and Hand Forgings
SB-308/ SB-308M	Aluminum-Alloy 6061-T6 Standard Structural Shapes
SB-548	Ultrasonic Inspection of Aluminum-Alloy Plate for Pressure Vessels
Copper and Copper Alloy Plate, Sheet, Strip, and Rolled Bar	
SB-96	Copper-Silicon Alloy Plate, Sheet, Strip, and Rolled Bar for General Purposes and Pressure Vessels
SB-152	Copper Sheet, Strip, Plate, and Rolled Bar
SB-169	Aluminum Bronze Plate, Sheet, Strip, and Rolled Bar
SB-171	Copper-Alloy Plate and Sheet for Pressure Vessels Condensers and Heat Exchangers
SB-248	General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar
SB-283	Copper and Copper-Alloy Die Forgings (Hot Pressed)
Copper and Copper Alloy Rod, Bar, and Shapes	
SB-98	Copper-Silicon Alloy Rod, Bar, and Shapes
SB-150	Aluminum Bronze Rod and Bar
SB-151	Copper-Nickel Rod and Bar
SB-187	Copper Bar, Bus Bar, Rod and Shapes
SB-249	General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, and Shapes
Copper and Copper Alloy Pipe and Tubes	
SB-42	Seamless Copper Pipe, Standard Sizes
SB-43	Seamless Red Brass Pipe, Standard Sizes
SB-75	Seamless Copper Tube
SB-111	Copper and Copper-Alloy Seamless Condenser Tubes and Ferrule Stock
SB-135	Seamless Brass Tube
SB-251	General Requirements for Wrought Seamless Copper and Copper-Alloy Tube
SB-315	Seamless Copper Alloy Pipe and Tube
SB-359	Copper and Copper-Alloy Seamless Condenser and Heat Exchanger Tubes with Integral Fins
SB-395	U-Bend Seamless Copper and Copper-Alloy Heat Exchanger and Condenser Tubes
SB-466	Seamless Copper-Nickel Pipe and Tube
SB-467	Welded Copper-Nickel Pipe
SB-543	Welded Copper and Copper-Alloy Heat Exchanger Tube
Copper Alloy Castings	
SB-61	Steam or Valve Bronze Castings
SB-62	Composition Bronze or Ounce Metal Castings
SB-148	Aluminum Bronze Sand Castings
SB-271	Copper-Base Centrifugal Castings

Copper Alloy Castings (Continued)	
SB-369	Copper-Nickel Alloy Castings
SB-505	Copper-Base Alloy Continuous Castings
SB-584	Copper Alloy Sand Castings for General Application
SB-824	General Requirements for Copper Alloy Castings
Nickel and Nickel Alloy Plate, Sheet, and Strip	
SB-127	Nickel-Copper Alloy (UNS N04400) Plate, Sheet, and Strip
SB-162	Nickel Plate, Sheet, and Strip
SB-168	Nickel-Chromium-Iron Alloys (UNS N06600 and N06690) Plate, Sheet, and Strip
SB-333	Nickel-Molybdenum Alloy Plate, Sheet, and Strip
SB-409	Nickel-Iron-Chromium Alloy Plate, Sheet, and Strip
SB-424	Ni-Fe-Cr-Mo-Cu Alloy (UNS N08825 and UNS N08221) Plate, Sheet, and Strip
SB-434	Nickel-Molybdenum-Chromium-Iron (UNS N10003) Plate, Sheet, and Strip
SB-435	UNS N06002, UNS N06230 and UNS R30556 Plate, Sheet, and Strip
SB-443	Nickel-Chromium-Molybdenum-Columbium Alloy (UNS N06625) Plate, Sheet, and Strip
SB-463	UNS N08020, UNS N08026, and UNS N08024 Alloy Plate, Sheet, and Strip
SB-536	Nickel-Iron-Chromium-Silicon Alloy (UNS N08330) Plate, Sheet, and Strip
SB-575	Low-Carbon Nickel-Molybdenum-Chromium Alloy Plate, Sheet, and Strip
SB-582	Nickel-Chromium-Iron-Molybdenum-Copper Alloy Plate, Sheet, and Strip
SB-599	Nickel-Iron-Chromium-Molybdenum-Columbium Stabilized Alloy (UNS N08700) Plate, Sheet, and Strip
SB-620	Nickel-Iron-Chromium-Molybdenum Alloy (UNS N08320) Plate, Sheet, and Strip
SB-625	Ni-Fe-Cr-Mo-Cu Low-Carbon Alloy (UNS N08904 and N08925) Plate, Sheet, and Strip
SB-688	Chromium-Nickel-Molybdenum-Iron (UNS N08366 and UNS N08367) Plate, Sheet, and Strip
SB-709	Iron-Nickel-Chromium-Molybdenum Alloy (UNS N08028) Plate, Sheet, and Strip
Nickel and Nickel Alloy Rod, Bar, and Wire	
SB-160	Nickel Rod and Bar
SB-164	Nickel-Copper Alloy Rod, Bar, and Wire
SB-166	Nickel-Chromium-Iron Alloy (UNS N06600 and N06690) Rod, Bar, and Wire
SB-335	Nickel-Molybdenum Alloy Rod
SB-408	Nickel-Iron-Chromium Alloy Rod and Bar
SB-425	Nickel-Iron-Chromium-Molybdenum-Copper Alloy (UNS N08825 and UNS N08221) Rod and Bar
SB-446	Nickel-Chromium-Molybdenum-Columbium Alloy (UNS N06625) Rod and Bar
SB-473	Chromium-Nickel-Iron-Molybdenum-Copper-Columbium Stabilized Alloy (UNS N08020) Bar
SB-511	Nickel-Iron-Chromium-Silicon Alloy Bars and Shapes
SB-564	Nickel Alloy Forgings
SB-572	UNS N06002, UNS N06230 and UNS R30556 Rod
SB-573	Nickel-Molybdenum-Chromium-Iron Alloy (UNS000N13) Rod
SB-574	Low-Carbon Nickel-Molybdenum-Chromium Alloy Rod
SB-581	Nickel-Chromium-Iron-Molybdenum-Copper Alloy Rod
SB-621	Nickel-Iron-Chromium-Molybdenum Alloy (UNS N08320) Rod
SB-637	Precipitation-Hardening Nickel Alloy Bars, Forgings, and Forging Stock for High-Temperature Service
SB-649	Ni-Fe-Cr-Mo-Cu Low-Carbon Alloy (UNS N08904 and N08925) Bar and Wire
SB-672	Nickel-Iron-Chromium-Molybdenum-Columbium Stabilized Alloy (UNS N08700) Bar and Wire
SB-691	Iron-Nickel-Chromium-Molybdenum Alloys (UNS N08366 and UNS 08367) Rod, Bar, and Wire
Nickel and Nickel Alloy Pipe and Tubes	
SB-161	Nickel Seamless Pipe and Tube
SB-163	Seamless Nickel and Nickel Alloy Condenser and Heat Exchanger Tubes

Nickel and Nickel Alloy Pipe and Tubes (Continued)	
SB-165	Nickel-Copper Alloy (UNS N04400) Seamless Pipe and Tube
SB-167	Nickel-Chromium-Iron Alloys (UNS N06600 and N06690) Seamless Pipe and Tube
SB-407	Nickel-Iron-Chromium Alloy Seamless Pipe and Tube
SB-423	Nickel-Iron-Chromium-Molybdenum-Copper Alloy (UNS N08825 and UNS N08221) Seamless Pipe and Tube
SB-444	Nickel-Chromium-Molybdenum-Columbium Alloy (UNS N06625) Pipe and Tube
SB-462	Forged or Rolled Chromium-Nickel-Iron-Molybdenum-Copper-Columbium Stabilized Alloy (UNS N08020) Pipe Flanges, Forged Fittings, and Valves and Parts for Corrosive High-Temperature Service
SB-464	Welded UNS N08020, UNS N08026, and UNS N08024 Alloy Pipe
SB-468	Welded UNS N08020, UNS N08026, and UNS N08024 Alloy Tubes
SB-514	Welded Nickel-Iron-Chromium Alloy Pipe
SB-515	Welded Nickel-Iron-Chromium Alloy (UNS N08800 and UNS N08810) Tubes
SB-516	Welded Nickel-Chromium-Iron Alloy (UNS N06600) Tubes
SB-517	Welded Nickel-Chromium-Iron Alloy (UNS N06600) Pipe
SB-535	Nickel-Iron-Chromium-Silicon Alloy (UNS N08330) Seamless Pipe
SB-619	Welded Nickel and Nickel-Cobalt Alloy Pipe
SB-622	Seamless Nickel and Nickel-Cobalt Alloy Pipe and Tube
SB-626	Welded Nickel and Nickel-Cobalt Alloy Tube
SB-668	UNS N08028 Seamless Tubes
SB-673	UNS N08904 and N08925 Welded Pipe
SB-674	UNS N08904 and N08925 Welded Tube
SB-675	UNS N08366 and N08367 Welded Pipe
SB-676	UNS N08366 and N08367 Welded Tube
SB-677	UNS N08904 and UNS N08925 Seamless Pipe and Tube
SB-690	Iron-Nickel-Chromium-Molybdenum Alloys (UNS N08366 and UNS N08367) Seamless Pipe and Tube
SB-704	Nickel-Alloy (UNS N06625 and N08825) Welded Tube
SB-705	Nickel-Alloy (UNS N06625 and N08825) Welded Pipe
SB-710	Nickel-Iron-Chromium-Silicon Alloy Welded Pipe
SB-729	Seamless UNS N08020, UNS N08026, and UNS N08024 Nickel-Alloy Pipe and Tube
SB-751	Nickel and Nickel-Alloy Seamless and Welded Tube
SB-775	Nickel and Nickel-Alloy Seamless and Welded Pipe
SB-804	UNS N08367 Welded Pipe
SB-829	Nickel and Nickel Alloy Seamless Pipe and Tube
Nickel Alloy Castings	
SB-494/ SA-494M	Castings, Nickel and Nickel Alloy
Nickel and Nickel Alloy Fittings	
SB-366	Factory-Made Wrought Nickel and Nickel Alloy Welding Fittings
Titanium and Titanium Alloys	
SB-265	Titanium and Titanium Alloy Strip, Sheet, and Plate
SB-337	Seamless and Welded Titanium and Titanium Alloy Pipe
SB-338	Seamless and Welded Titanium and Titanium Alloy Tubes for Condensers and Heat Exchangers
SB-348	Titanium and Titanium Alloy Bars and Billets
SB-363	Seamless and Welded Unalloyed Titanium and Titanium Alloy Welding Fittings
SB-367	Titanium and Titanium Alloy Castings
SB-381	Titanium and Titanium Alloy Forgings

Zirconium and Zirconium Alloys	
SB-493	Zirconium and Zirconium Alloy Forgings
SB-523	Seamless and Welded Zirconium and Zirconium Alloy Tubes for Condensers and Heat Exchangers
SB-550	Zirconium and Zirconium Alloy Bar and Wire
SB-551	Zirconium and Zirconium Alloy Strip, Sheet, and Plate
SB-658	Seamless and Welded Zirconium and Zirconium Alloy Pipe

ASME NONFERROUS SPECIFICATION DESIGNATIONS AND TITLES LISTED BY NUMERIC SEQUENCE

SB-26/ SB-26M	Aluminum-Alloy Sand Castings
SB-42	Seamless Copper Pipe, Standard Sizes
SB-43	Seamless Red Brass Pipe, Standard Sizes
SB-61	Steam or Valve Bronze Castings
SB-62	Composition Bronze or Ounce Metal Castings
SB-75	Seamless Copper Tube
SB-96	Copper-Silicon Alloy Plate, Sheet, Strip, and Rolled Bar for General Purposes and Pressure Vessels
SB-98	Copper-Silicon Alloy Rod, Bar, and Shapes
SB-108	Aluminum-Alloy Permanent Mold Castings
SB-111	Copper and Copper-Alloy Seamless Condenser Tubes and Ferrule Stock
SB-127	Nickel-Copper Alloy (UNS N04400) Plate, Sheet, and Strip
SB-135	Seamless Brass Tube
SB-148	Aluminum Bronze Sand Castings
SB-150	Aluminum Bronze Rod and Bar
SB-151	Copper-Nickel Rod and Bar
SB-152	Copper Sheet, Strip, Plate, and Rolled Bar
SB-160	Nickel Rod and Bar
SB-161	Nickel Seamless Pipe and Tube
SB-162	Nickel Plate, Sheet, and Strip
SB-163	Seamless Nickel and Nickel Alloy Condenser and Heat Exchanger Tubes
SB-164	Nickel-Copper Alloy Rod, Bar, and Wire
SB-165	Nickel-Copper Alloy (UNS N04400) Seamless Pipe and Tube
SB-166	Nickel-Chromium-Iron Alloy (UNS N06600 and N06690) Rod, Bar, and Wire
SB-167	Nickel-Chromium-Iron Alloys (UNS N06600 and N06690) Seamless Pipe and Tube
SB-168	Nickel-Chromium-Iron Alloys (UNS N06600 and N06690) Plate, Sheet, and Strip
SB-169	Aluminum Bronze Plate, Sheet, Strip, and Rolled Bar
SB-171	Copper-Alloy Plate and Sheet for Pressure Vessels Condensers and Heat Exchangers
SB-187	Copper Bar, Bus Bar, Rod and Shapes
SB-209	Aluminum and Aluminum-Alloy Sheet and Plate
SB-210	Aluminum and Aluminum-Alloy Drawn Seamless Tubes
SB-211	Aluminum-Alloy Bar, Rod, and Wire
SB-221	Aluminum and Aluminum-Alloy Extruded Bars, Rods, and Shapes
SB-234	Aluminum and Aluminum-Alloy Drawn Seamless Tubes for Condensers and Heat Exchangers
SB-241/ SB-241M	Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube
SB-247	Aluminum-Alloy Die and Hand Forgings
SB-248	General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar
SB-249	General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, and Shapes
SB-251	General Requirements for Wrought Seamless Copper and Copper-Alloy Tube
SB-265	Titanium and Titanium Alloy Strip, Sheet, and Plate
SB-271	Copper-Base Centrifugal Castings
SB-283	Copper and Copper-Alloy Die Forgings (Hot Pressed)
SB-308/ SB-308M	Aluminum-Alloy 6061-T6 Standard Structural Shapes
SB-315	Seamless Copper Alloy Pipe and Tube
SB-333	Nickel-Molybdenum Alloy Plate, Sheet, and Strip
SB-335	Nickel-Molybdenum Alloy Rod
SB-337	Seamless and Welded Titanium and Titanium Alloy Pipe

SB-338	Seamless and Welded Titanium and Titanium Alloy Tubes for Condensers and Heat Exchangers
SB-348	Titanium and Titanium Alloy Bars and Billets
SB-359	Copper and Copper-Alloy Seamless Condenser and Heat Exchanger Tubes with Integral Fins
SB-363	Seamless and Welded Unalloyed Titanium and Titanium Alloy Welding Fittings
SB-366	Factory-Made Wrought Nickel and Nickel Alloy Welding Fittings
SB-367	Titanium and Titanium Alloy Castings
SB-369	Copper-Nickel Alloy Castings
SB-381	Titanium and Titanium Alloy Forgings
SB-395	U-Bend Seamless Copper and Copper-Alloy Heat Exchanger and Condenser Tubes
SB-407	Nickel-Iron-Chromium Alloy Seamless Pipe and Tube
SB-408	Nickel-Iron-Chromium Alloy Rod and Bar
SB-409	Nickel-Iron-Chromium Alloy Plate, Sheet, and Strip
SB-423	Nickel-Iron-Chromium-Molybdenum-Copper Alloy (UNS N08825 and UNS N08221) Seamless Pipe and Tube
SB-424	Ni-Fe-Cr-Mo-Cu Alloy (UNS N08825 and UNS N08221) Plate, Sheet, and Strip
SB-425	Nickel-Iron-Chromium-Molybdenum-Copper Alloy (UNS N08825 and UNS N08221) Rod and Bar
SB-434	Nickel-Molybdenum-Chromium-Iron (UNS N10003) Plate, Sheet, and Strip
SB-435	UNS N06002, UNS N06230 and UNS R30556 Plate, Sheet, and Strip
SB-443	Nickel-Chromium-Molybdenum-Columbium Alloy (UNS N06625) Plate, Sheet, and Strip
SB-444	Nickel-Chromium-Molybdenum-Columbium Alloy (UNS N06625) Pipe and Tube
SB-446	Nickel-Chromium-Molybdenum-Columbium Alloy (UNS N06625) Rod and Bar
SB-462	Forged or Rolled Chromium-Nickel-Iron-Molybdenum-Copper-Columbium Stabilized Alloy (UNS N08020) Pipe Flanges, Forged Fittings, and Valves and Parts for Corrosive High-Temperature Service
SB-463	UNS N08020, UNS N08026, and UNS N08024 Alloy Plate, Sheet, and Strip
SB-464	Welded UNS N08020, UNS N08026, and UNS N08024 Alloy Pipe
SB-466	Seamless Copper-Nickel Pipe and Tube
SB-467	Welded Copper-Nickel Pipe
SB-468	Welded UNS N08020, UNS N08026, and UNS N08024 Alloy Tubes
SB-473	Chromium-Nickel-Iron-Molybdenum-Copper-Columbium Stabilized Alloy (UNS N08020) Bar
SB-493	Zirconium and Zirconium Alloy Forgings
SA-494/ SA-494M	Castings, Nickel and Nickel Alloy
SB-505	Copper-Base Alloy Continuous Castings
SB-511	Nickel-Iron-Chromium-Silicon Alloy Bars and Shapes
SB-514	Welded Nickel-Iron-Chromium Alloy Pipe
SB-515	Welded Nickel-Iron-Chromium Alloy (UNS N08800 and UNS N08810) Tubes
SB-516	Welded Nickel-Chromium-Iron Alloy (UNS N06600) Tubes
SB-517	Welded Nickel-Chromium-Iron Alloy (UNS N06600) Pipe
SB-523	Seamless and Welded Zirconium and Zirconium Alloy Tubes for Condensers and Heat Exchangers
SB-535	Nickel-Iron-Chromium-Silicon Alloy (UNS N08330) Seamless Pipe
SB-536	Nickel-Iron-Chromium-Silicon Alloy (UNS N08330) Plate, Sheet, and Strip
SB-543	Welded Copper and Copper-Alloy Heat Exchanger Tube
SB-548	Ultrasonic Inspection of Aluminum-Alloy Plate for Pressure Vessels
SB-550	Zirconium and Zirconium Alloy Bar and Wire
SB-551	Zirconium and Zirconium Alloy Strip, Sheet, and Plate
SB-564	Nickel Alloy Forgings
SB-572	UNS N06002, UNS N06230 and UNS R30556 Rod
SB-573	Nickel-Molybdenum-Chromium-Iron Alloy (UNS000N13) Rod
SB-574	Low-Carbon Nickel-Molybdenum-Chromium Alloy Rod
SB-575	Low-Carbon Nickel-Molybdenum-Chromium Alloy Plate, Sheet, and Strip
SB-581	Nickel-Chromium-Iron-Molybdenum-Copper Alloy Rod

SB-582	Nickel-Chromium-Iron-Molybdenum-Copper Alloy Plate, Sheet, and Strip
SB-584	Copper Alloy Sand Castings for General Application
SB-599	Nickel-Iron-Chromium-Molybdenum-Columbium Stabilized Alloy (UNS N08700) Plate, Sheet, and Strip
SB-619	Welded Nickel and Nickel-Cobalt Alloy Pipe
SB-620	Nickel-Iron-Chromium-Molybdenum Alloy (UNS N08320) Plate, Sheet, and Strip
SB-621	Nickel-Iron-Chromium-Molybdenum Alloy (UNS N08320) Rod
SB-622	Seamless Nickel and Nickel-Cobalt Alloy Pipe and Tube
SB-625	Ni-Fe-Cr-Mo-Cu Low-Carbon Alloy (UNS N08904 and N08925) Plate, Sheet, and Strip
SB-626	Welded Nickel and Nickel-Cobalt Alloy Tube
SB-637	Precipitation-Hardening Nickel Alloy Bars, Forgings, and Forging Stock for High-Temperature Service
SB-649	Ni-Fe-Cr-Mo-Cu Low-Carbon Alloy (UNS N08904 and N08925) Bar and Wire
SB-658	Seamless and Welded Zirconium and Zirconium Alloy Pipe
SB-668	UNS N08028 Seamless Tubes
SB-672	Nickel-Iron-Chromium-Molybdenum-Columbium Stabilized Alloy (UNS N08700) Bar and Wire
SB-673	UNS N08904 and N08925 Welded Pipe
SB-674	UNS N08904 and N08925 Welded Tube
SB-675	UNS N08366 and N08367 Welded Pipe
SB-676	UNS N08366 and N08367 Welded Tube
SB-677	UNS N08904 and UNS N08925 Seamless Pipe and Tube
SB-688	Chromium-Nickel-Molybdenum-Iron (UNS N08366 and UNS N08367) Plate, Sheet, and Strip
SB-690	Iron-Nickel-Chromium-Molybdenum Alloys (UNS N08366 and UNS N08367) Seamless Pipe and Tube
SB-691	Iron-Nickel-Chromium-Molybdenum Alloys (UNS N08366 and UNS 08367) Rod, Bar, and Wire
SB-704	Nickel-Alloy (UNS N06625 and N08825) Welded Tube
SB-705	Nickel-Alloy (UNS N06625 and N08825) Welded Pipe
SB-709	Iron-Nickel-Chromium-Molybdenum Alloy (UNS N08028) Plate, Sheet, and Strip
SB-710	Nickel-Iron-Chromium-Silicon Alloy Welded Pipe
SB-729	Seamless UNS N08020, UNS N08026, and UNS N08024 Nickel-Alloy Pipe and Tube
SB-751	General Requirements for Nickel and Nickel-Alloy Seamless and Welded Tube
SB-775	General Requirements for Nickel and Nickel-Alloy Seamless and Welded Pipe
SB-804	UNS N08367 Welded Pipe
SB-824	General Requirements for Copper Alloy Castings
SB-829	Nickel and Nickel Alloy Seamless Pipe and Tube
SB-858	Test Method for Determination of Susceptibility to Stress Corrosion Cracking in Copper Alloys Using an Ammonia Vapor Test

Appendix

UNIT CONVERSIONS

HARDNESS CONVERSIONS

To Convert From	To	Multiply By	To Convert From	To	Multiply By
Angle			**Mass per unit length**		
degree	rad	1.745 329 E -02	lb/ft	kg/m	1.488 164 E + 00
Area			lb/in.	kg/m	1.785 797 E + 01
$in.^2$	mm^2	6.451 600 E + 02	**Mass per unit time**		
$in.^2$	cm^2	6.451 600 E + 00	lb/h	kg/s	1.259 979 E - 04
$in.^2$	m^2	6.451 600 E - 04	lb/min	kg/s	7.559 873 E - 03
ft^2	m^2	9.290 304 E - 02	lb/s	kg/s	4.535 924 E - 01
Bending moment or torque			**Mass per unit volume (includes density)**		
lbf - in.	N - m	1.129 848 E - 01	g/cm^3	kg/m^3	1.000 000 E + 03
lbf - ft	N - m	1.355 818 E + 00	lb/ft^3	g/cm^3	1.601 846 E - 02
kgf - m	N - m	9.806 650 E + 00	lb/ft^3	kg/m^3	1.601 846 E + 01
ozf - in.	N-m	7.061 552 E - 03	$lb/in.^3$	g/cm^3	2.767 990 E + 01
Bending moment or torque per unit length			$lb/in.^3$	kg/m^3	2.767 990 E + 04
lbf - in./in.	N - m/m	4.448 222 E + 00	**Power**		
lbf - ft/in.	N - m/m	5.337 866 E + 01	Btu/s	kW	1.055 056 E + 00
Corrosion rate			Btu/min	kW	1.758 426 E - 02
mils/yr	mm/yr	2.540 000 E - 02	Btu/h	W	2.928 751 E - 01
mils/yr	μ/yr	2.540 000 E + 01	erg/s	W	1.000 000 E - 07
Current density			ft - lbf/s	W	1.355 818 E + 00
$A/in.^2$	A/cm^2	1.550 003 E - 01	ft - lbf/min	W	2.259 697 E - 02
$A/in.^2$	A/mm^2	1.550 003 E - 03	ft - lbf/h	W	3.766 161 E - 04
A/ft^2	A/m^2	1.076 400 E + 01	hp (550 ft - lbf/s)	kW	7.456 999 E - 01
Electricity and magnetism			hp (electric)	kW	7.460 000 E - 01
gauss	T	1.000 000 E - 04	$W/in.^2$	W/m^2	1.550 003 E + 03
maxwell	μWb	1.000 000 E - 02	**Pressure (fluid)**		
mho	S	1.000 000 E + 00	atm (standard)	Pa	1.013 250 E + 05
Oersted	A/m	7.957 700 E + 01	bar	Pa	1.000 000 E + 05
Ω - cm	Ω - m	1.000 000 E - 02	in. Hg (32 F)	Pa	3.386 380 E + 03
Ω circular - mil/ft	μΩ - m	1.662 426 E - 03	in. Hg (60 F)	Pa	3.376 850 E + 03
Energy (impact other)			$lbf/in.^2$ (psi)	Pa	6.894 757 E + 03
ft - lbf	J	1.355 818 E + 00	torr (mm Hg, 0 C)	Pa	1.333 220 E + 02
Btu (thermochemical)	J	1.054 350 E + 03	**Specific heat**		
cal (thermochemical)	J	4.184 000 E + 00	Btu/lb - F	J/kg - K	4.186 800 E + 03
kW - h	J	3.600 000 E + 06	cal/g - C	J/kg - K	4.186 800 E + 03
W - h	J	3.600 000 E + 03	**Stress (force per unit area)**		
Flow rate			$tonf/in.^2$ (tsi)	MPa	1.378 951 E + 01
ft^3/h	L/min	4.719 475 E - 01	kgf/mm^2	MPa	9.806 650 E + 00
ft^3/min	L/min	2.831 000 E + 01	ksi	MPa	6.894 757 E + 00
gal/h	L/min	6.309 020 E - 02	$lbf/in.^2$ (psi)	MPa	6.894 757 E - 03
gal/min	L/min	3.785 412 E + 00	MN/m^2	MPa	1.000 000 E + 00
Force			**Temperature**		
lbf	N	4.448 222 E + 00	F	C	5/9 (F - 32)
kip (1000 lbf)	N	4.448 222 E + 03	R	K	5/9
tonf	kN	8.896 443 E + 00	**Thermal conductivity**		
kgf	N	9.806 650 E + 00	Btu - in./s - ft^2 - F	W/m - K	5.192 204 E + 02
Force per unit length			Btu/ft - h - F	W/m - K	1.730 735 E + 00
lbf/ft	N/m	1.459 390 E + 01	Btu - in./h . ft^2 - F	W/m - K	1.442 279 E - 01
lbf/in.	N/m	1.751 268 E + 02	cal/cm - s - C	W/m - K	4.184 000 E + 02

To Convert From	To	Multiply By	To Convert From	To	Multiply By
Fracture toughness			**Thermal expansion**		
ksi √in.	MPa √m	1.098 800 E + 00	in./in. - C	m/m - K	1.000 000 E + 00
Heat content			in./in. - F	m/m - K	1.800 000 E + 00
Btu/lb	kJ/kg	2.326 000 E + 00	**Velocity**		
cal/g	kJ/kg	4.186 800 E + 00	ft/h	m/s	8.466 667 E - 05
Heat input			ft/min	m/s	5.080 000 E - 03
J/in.	J/m	3.937 008 E + 01	ft/s	m/s	3.048 000 E - 01
kJ/in.	kJ/m	3.937 008 E + 01	in./s	m/s	2.540 000 E - 02
Length			km/h	m/s	2.777 778 E - 01
A	nm	1.000 000 E - 01	mph	km/h	1.609 344 E + 00
μin.	μm	2.540 000 E - 02	**Velocity of rotation**		
mil	μm	2.540 000 E + 01	rev/min (rpm)	rad/s	1.047 164 E - 01
in.	mm	2.540 000 E + 01	rev/s	rad/s	6.283 185 E + 00
in.	cm	2.540 000 E + 00	**Viscosity**		
ft	m	3.048 000 E - 01	poise	Pa - s	1.000 000 E - 01
yd	m	9.144 000 E -01	stokes	m^2/s	1.000 000 E - 04
mile	km	1.609 300 E + 00	ft^2/s	m^2/s	9.290 304 E - 02
Mass			$in.^2/s$	mm^2/s	6.451 600 E + 02
oz	kg	2.834 952 E - 02	**Volume**		
lb	kg	4.535 924 E - 01	$in.^3$	m^3	1.638 706 E - 05
ton (short 2000 lb)	kg	9.071 847 E + 02	ft^3	m^3	2.831 685 E - 02
ton (short 2000 lb)	kg x 10^3	9.071 847 E - 01	fluid oz	m^3	2.957 353 E - 05
ton (long 2240 lb)	kg	1.016 047 E + 03	gal (U.S. liquid)	m^3	3.785 412 E - 03
kg x 10^3 = 1 metric ton			**Volume per unit time**		
Mass per unit area			ft^3/min	m^3/s	4.719 474 E - 04
$oz/in.^2$	kg/m^2	4.395 000 E + 01	ft^3/S	m^3/s	2.831 685 E - 02
oz/ft^2	kg/m^2	3.051 517 E - 01	$in.^3$/min	m^3/s	2.731 177 E - 07
oz/yd^2	kg/m^2	3.390 575 E - 02	**Wavelength**		
lb/ft^2	kg/m^2	4.882 428 E + 00	A	nm	1.000 000 E - 01

SI PREFIXES

Prefix	Symbol	Exponential Expression	Multiplication Factor
peta	P	10^{15}	1 000 000 000 000 000
tera	T	10^{12}	1 000 000 000 000
giga	G	10^9	1 000 000 000
mega	M	10^6	1 000 000
kilo	k	10^3	1 000
hecto	h	10^2	100
deka	da	10^1	10
Base Unit	---	10^0	1
deci	d	10^{-1}	0.1
centi	c	10^{-2}	0.01
milli	m	10^{-3}	0.001
micro	μ	10^{-6}	0.000 001
nano	n	10^{-9}	0.000 000 001
pico	p	10^{-12}	0.000 000 000 001
femto	f	10^{-15}	0.000 000 000 000 001

APPROXIMATE HARDNESS CONVERSION NUMBERS FOR NONAUSTENITIC STEELS[a, b]								
Rockwell C 150 kgf Diamond HRC	Vickers HV	Brinell 3000 kgf 10mm ball[c] HB	Knoop 500 gf HK	Rockwell A 60 kgf Diamond HRA	Rockwell Superficial Hardness			Approx. Tensile Strength ksi (MPa)
					15 kgf Diamond HR15N	30 kgf Diamond HR30N	45 kgf Diamond HR45N	
68	940	---	920	85.6	93.2	84.4	75.4	---
67	900	---	895	85.0	92.9	83.6	74.2	---
66	865	---	870	84.5	92.5	82.8	73.3	---
65	832	739[d]	846	83.9	92.2	81.9	72.0	---
64	800	722[d]	822	83.4	91.8	81.1	71.0	---
63	772	706[d]	799	82.8	91.4	80.1	69.9	---
62	746	688[d]	776	82.3	91.1	79.3	68.8	---
61	720	670[d]	754	81.8	90.7	78.4	67.7	---
60	697	654[d]	732	81.2	90.2	77.5	66.6	---
59	674	634[d]	710	80.7	89.8	76.6	65.5	351 (2420)
58	653	615	690	80.1	89.3	75.7	64.3	338 (2330)
57	633	595	670	79.6	88.9	74.8	63.2	325 (2240)
56	613	577	650	79.0	88.3	73.9	62.0	313 (2160)
55	595	560	630	78.5	87.9	73.0	60.9	301 (2070)
54	577	543	612	78.0	87.4	72.0	59.8	292 (2010)
53	560	525	594	77.4	86.9	71.2	58.6	283 (1950)
52	544	512	576	76.8	86.4	70.2	57.4	273 (1880)
51	528	496	558	76.3	85.9	69.4	56.1	264 (1820)
50	513	482	542	75.9	85.5	68.5	55.0	255 (1760)
49	498	468	526	75.2	85.0	67.6	53.8	246 (1700)
48	484	455	510	74.7	84.5	66.7	52.5	238 (1640)
47	471	442	495	74.1	83.9	65.8	51.4	229 (1580)
46	458	432	480	73.6	83.5	64.8	50.3	221 (1520)
45	446	421	466	73.1	83.0	64.0	49.0	215 (1480)
44	434	409	452	72.5	82.5	63.1	47.8	208 (1430)
43	423	400	438	72.0	82.0	62.2	46.7	201 (1390)
42	412	390	426	71.5	81.5	61.3	45.5	194 (1340)
41	402	381	414	70.9	80.9	60.4	44.3	188 (1300)
40	392	371	402	70.4	80.4	59.5	43.1	182 (1250)
39	382	362	391	69.9	79.9	58.6	41.9	177 (1220)
38	372	353	380	69.4	79.4	57.7	40.8	171 (1180)
37	363	344	370	68.9	78.8	56.8	39.6	166 (1140)
36	354	336	360	68.4	78.3	55.9	38.4	161 (1110)
35	345	327	351	67.9	77.7	55.0	37.2	156 (1080)
34	336	319	342	67.4	77.2	54.2	36.1	152 (1050)
33	327	311	334	66.8	76.6	53.3	34.9	149 (1030)
32	318	301	326	66.3	76.1	52.1	33.7	146 (1010)
31	310	294	318	65.8	75.6	51.3	32.5	141 (970)
30	302	286	311	65.3	75.0	50.4	31.3	138 (950)
29	294	279	304	64.6	74.5	49.5	30.1	135 (930)
28	286	271	297	64.3	73.9	48.6	28.9	131 (900)
27	279	264	290	63.8	73.3	47.7	27.8	128 (880)
26	272	258	284	63.3	72.8	46.8	26.7	125 (860)
25	266	253	278	62.8	72.2	45.9	25.5	123 (850)
24	260	247	272	62.4	71.6	45.0	24.3	119 (820)
23	254	243	266	62.0	71.0	44.0	23.1	117 (810)

APPROXIMATE HARDNESS CONVERSION NUMBERS FOR NONAUSTENITIC STEELS[a, b] (Continued)								
Rockwell C 150 kgf Diamond HRC	Vickers HV	Brinell 3000 kgf 10mm ball[c] HB	Knoop 500 gf HK	Rockwell A 60 kgf Diamond HRA	Rockwell Superficial Hardness			Approx. Tensile Strength ksi (MPa)
					15 kgf Diamond HR15N	30 kgf Diamond HR30N	45 kgf Diamond HR45N	
22	248	237	261	61.5	70.5	43.2	22.0	115 (790)
21	243	231	256	61.0	69.9	42.3	20.7	112 (770)
20	238	226	251	60.5	69.4	41.5	19.6	110 (760)

a. This table gives the approximate interrelationships of hardness values and approximate tensile strength of steels. It is possible that steels of various compositions and processing histories will deviate in hardness-tensile strength relationship from the data presented in this table. The data in this table should not be used for austenitic stainless steels, but have been shown to be applicable for ferritic and martensitic stainless steels. Where more precise conversions are required, they should be developed specially for each steel composition, heat treatment, and part.

b. All relative hardness values in this table are averages of tests on various metals whose different properties prevent establishment of exact mathematical conversions. These values are consistent with ASTM A 370-91 for nonaustenitic steels. It is recommended that ASTM standards A 370, E 140, E 10, E 18, E 92, E 110 and E 384, involving hardness tests on metals, be reviewed prior to interpreting hardness conversion values.

c. Carbide ball, 10mm.

d. This Brinell hardness value is outside the recommended range for hardness testing in accordance with ASTM E 10.

APPROXIMATE HARDNESS CONVERSION NUMBERS FOR NONAUSTENITIC STEELS[a, b]								
Rockwell B 100 kgf 1/16" ball HRB	Vickers HV	Brinell 3000 kgf 10 mm HB	Knoop 500 gf HK	Rockwell A 60 kgf Diamond HRA	Rockwell Superficial Hardness			Approx. Tensile Strength ksi (MPa)
					15 kgf 1/16" ball HR15T	30 kgf 1/16" ball HR30T	45 kgf 1/16" ball HR45T	
100	240	240	251	61.5	93.1	83.1	72.9	116 (800)
99	234	234	246	60.9	92.8	82.5	71.9	114 (785)
98	228	228	241	60.2	92.5	81.8	70.9	109 (750)
97	222	222	236	59.5	92.1	81.1	69.9	104 (715)
96	216	216	231	58.9	91.8	80.4	68.9	102 (705)
95	210	210	226	58.3	91.5	79.8	67.9	100 (690)
94	205	205	221	57.6	91.2	79.1	66.9	98 (675)
93	200	200	216	57.0	90.8	78.4	65.9	94 (650)
92	195	195	211	56.4	90.5	77.8	64.8	92 (635)
91	190	190	206	55.8	90.2	77.1	63.8	90 (620)
90	185	185	201	55.2	89.9	76.4	62.8	89 (615)
89	180	180	196	54.6	89.5	75.8	61.8	88 (605)
88	176	176	192	54.0	89.2	75.1	60.8	86 (590)
87	172	172	188	53.4	88.9	74.4	59.8	84 (580)
86	169	169	184	52.8	88.6	73.8	58.8	83 (570)
85	165	165	180	52.3	88.2	73.1	57.8	82 (565)
84	162	162	176	51.7	87.9	72.4	56.8	81 (560)
83	159	159	173	51.1	87.6	71.8	55.8	80 (550)
82	156	156	170	50.6	87.3	71.1	54.8	77 (530)
81	153	153	167	50.0	86.9	70.4	53.8	73 (505)
80	150	150	164	49.5	86.6	69.7	52.8	72 (495)
79	147	147	161	48.9	86.3	69.1	51.8	70 (485)
78	144	144	158	48.4	86.0	68.4	50.8	69 (475)
77	141	141	155	47.9	85.6	67.7	49.8	68 (470)
76	139	139	152	47.3	85.3	67.1	48.8	67 (460)
75	137	137	150	46.8	85.0	66.4	47.8	66 (455)
74	135	135	147	46.3	84.7	65.7	46.8	65 (450)
73	132	132	145	45.8	84.3	65.1	45.8	64 (440)
72	130	130	143	45.3	84.0	64.4	44.8	63 (435)
71	127	127	141	44.8	83.7	63.7	43.8	62 (425)
70	125	125	139	44.3	83.4	63.1	42.8	61 (420)

APPROXIMATE HARDNESS CONVERSION NUMBERS FOR NONAUSTENITIC STEELS [a, b] (Continued)								
Rockwell B		Brinell		Rockwell A	Rockwell Superficial Hardness			Approx.
100 kgf 1/16" ball HRB	Vickers HV	3000 kgf 10 mm HB	Knoop 500 gf HK	60 kgf Diamond HRA	15 kgf 1/16" ball HR15T	30 kgf 1/16" ball HR30T	45 kgf 1/16" ball HR45T	Tensile Strength ksi (MPa)
69	123	123	137	43.8	83.0	62.4	41.8	60 (415)
68	121	121	135	43.3	82.7	61.7	40.8	59 (405)
67	119	119	133	42.8	82.4	61.0	39.8	58 (400)
66	117	117	131	42.3	82.1	60.4	38.7	57 (395)
65	116	116	129	41.8	81.8	59.7	37.7	56 (385)
64	114	114	127	41.4	81.4	59.0	36.7	---
63	112	112	125	40.9	81.1	58.4	35.7	---
62	110	110	124	40.4	80.8	57.7	34.7	---
61	108	108	122	40.0	80.5	57.0	33.7	---
60	107	107	120	39.5	80.1	56.4	32.7	---
59	106	106	118	39.0	79.8	55.7	31.7	---
58	104	104	117	38.6	79.5	55.0	30.7	---
57	103	103	115	38.1	79.2	54.4	29.7	---
56	101	101	114	37.7	78.8	53.7	28.7	---
55	100	100	112	37.2	78.5	53.0	27.7	---
54	---	---	111	36.8	78.2	52.4	26.7	---
53	---	---	110	36.3	77.9	51.7	25.7	---
52	---	---	109	35.9	77.5	51.0	24.7	---
51	---	---	108	35.5	77.2	50.3	23.7	---
50	---	---	107	35.0	76.9	49.7	22.7	---
49	---	---	106	34.6	76.6	49.0	21.7	---
48	---	---	105	34.1	76.2	48.3	20.7	---
47	---	---	104	33.7	75.9	47.7	19.7	---
46	---	---	103	33.3	75.6	47.0	18.7	---
45	---	---	102	32.9	75.3	46.3	17.7	---
44	---	---	101	32.4	74.9	45.7	16.7	---
43	---	---	100	32.0	74.6	45.0	15.7	---
42	---	---	99	31.6	74.3	44.3	14.7	---
41	---	---	98	31.2	74.0	43.7	13.6	---
40	---	---	97	30.7	73.6	43.0	12.6	---
39	---	---	96	30.3	73.3	42.3	11.6	---
38	---	---	95	29.9	73.0	41.6	10.6	---
37	---	94	29.5	78.0	41.0	9.6		---
36	---	---	93	29.1	72.3	40.3	8.6	---
35	---	---	92	28.7	72.0	39.6	7.6	---
34	---	---	91	28.2	71.7	39.0	6.6	---
33	---	---	90	27.8	71.4	38.3	5.6	---
32	---	---	89	27.4	71.0	37.6	4.6	---
31	---	---	88	27.0	70.7	37.0	3.6	---
30	---	---	87	26.6	70.4	36.3	2.6	---

a. This table gives the approximate interrelationships of hardness values and approximate tensile strength of steels. It is possible that steels of various compositions and processing histories will deviate in hardness-tensile strength relationship from the data presented in this table. The data in this table should not be used for austenitic stainless steels, but have been shown to be applicable for ferritic and martensitic stainless steels. Where more precise conversions are required, they should be developed specially for each steel composition, heat treatment, and part. b. All relative hardness values in this table are averages of tests on various metals whose different properties prevent establishment of exact mathematical conversions. These values are consistent with ASTM A 370-91 for nonaustenitic steels. It is recommended that ASTM standards A 370, E 140, E 10, E 18, E 92, E 110 and E 384, involving hardness tests on metals, be reviewed prior to interpreting hardness conversion values.

APPROXIMATE HARDNESS NUMBERS FOR AUSTENITIC STEELS[a]				
Rockwell C	**Rockwell A**	**Rockwell Superficial Hardness**		
150 kgf, Diamond HRC	**60 kgf, Diamond HRA**	**15 kgf, Diamond HR15N**	**30 kgf, Diamond HR30N**	**45 kgf, Diamond HR45N**
48	74.4	84.1	66.2	52.1
47	73.9	83.6	65.3	50.9
46	73.4	83.1	64.5	49.8
45	72.9	82.6	63.6	48.7
44	72.4	82.1	62.7	47.5
43	71.9	81.6	61.8	46.4
42	71.4	81.0	61.0	45.2
41	70.9	80.5	60.1	44.1
40	70.4	80.0	59.2	43.0
39	69.9	79.5	58.4	41.8
38	69.3	79.0	57.5	40.7
37	68.8	78.5	56.6	39.6
36	68.3	78.0	55.7	38.4
35	67.8	77.5	54.9	37.3
34	67.3	77.0	54.0	36.1
33	66.8	76.5	53.1	35.0
32	66.3	75.9	52.3	33.9
31	65.8	75.4	51.4	32.7
30	65.3	74.9	50.5	31.6
29	64.8	74.4	49.6	30.4
28	64.3	73.9	48.8	29.3
27	63.8	73.4	47.9	28.2
26	63.3	72.9	47.0	27.0
25	62.8	72.4	46.2	25.9
24	62.3	71.9	45.3	24.8
23	61.8	71.3	44.4	23.6
22	61.3	70.8	43.5	22.5
21	60.8	70.3	42.7	21.3
20	60.3	69.8	41.8	20.2

a. All relative hardness values in this table are averages of tests on various metals whose different properties prevent establishment of exact mathematical conversions. These values are consistent with ASTM A 370-91 for austenitic steels. It is recommended that ASTM standards A 370, E 140, E 10, E 18, E 92, E 110 and E 384, involving hardness tests on metals, be reviewed prior to interpreting hardness conversion values.

APPROXIMATE HARDNESS CONVERSION VALUES FOR AUSTENITIC STEELS[a]						
Rockwell B 100 kgf 1/16" ball HRB	Brinell Indentation Diameter, mm	Brinell 3000 kgf 10 mm Ball HB	Rockwell A 60 kgf Diamond HRA	Rockwell Superficial Hardness		
				15 kgf 1/16" ball HR15T	30 kgf 1/16" ball HR30T	45 kgf 1/16" ball HR45T
100	3.79	256	61.5	91.5	80.4	70.2
99	3.85	248	60.9	91.2	79.7	69.2
98	3.91	240	60.3	90.8	79.0	68.2
97	3.96	233	59.7	90.4	78.3	67.2
96	4.02	226	59.1	90.1	77.7	66.1
95	4.08	219	58.5	89.7	77.0	65.1
94	4.14	213	58.0	89.3	76.3	64.1
93	4.20	207	57.4	88.9	75.6	63.1
92	4.24	202	56.8	88.6	74.9	62.1
91	4.30	197	56.2	88.2	74.2	61.1
90	4.35	192	55.6	87.8	73.5	60.1
89	4.40	187	55.0	87.5	72.8	59.0
88	4.45	183	54.5	87.1	72.1	58.0
87	4.51	178	53.9	86.7	71.4	57.0
86	4.55	174	53.3	86.4	70.7	56.0
85	4.60	170	52.7	86.0	70.0	55.0
84	4.65	167	52.1	85.6	69.3	54.0
83	4.70	163	51.5	85.2	68.6	52.9
82	4.74	160	50.9	84.9	67.9	51.9
81	4.79	156	50.4	84.5	67.2	50.9
80	4.84	153	49.8	84.1	66.5	49.9

a. All relative hardness values in this table are averages of tests on various metals whose different properties prevent establishment of exact mathematical conversions. These values are consistent with ASTM A 370-91 for austenitic steels. It is recommended that ASTM standards A 370, E 140, E 10, E 18, E 92, E 110 and E 384, involving hardness tests on metals, be reviewed prior to interpreting hardness conversion values.

APPROXIMATE HARDNESS CONVERSION NUMBERS FOR NICKEL & HIGH-NICKEL ALLOYS									
Vickers[a]	Brinell[b]	Rockwell Hardness Number[c]							
HV	HB	HRA	HRB	HRC	HRD	HRE	HRF	HRG	HRK
513	479	75.5	---	50.0	63.0	---	---	---	---
481	450	74.5	---	48.0	61.5	---	---	---	---
452	425	73.5	---	46.0	60.0	---	---	---	---
427	403	72.5	---	44.0	58.5	---	---	---	---
404	382	71.5	---	42.0	57.0	---	---	---	---
382	363	70.5	---	40.0	55.5	---	---	---	---
362	346	69.5	---	38.0	54.0	---	---	---	---
344	329	68.5	---	36.0	52.5	---	---	---	---
326	313	67.5	---	34.0	50.5	---	---	---	---
309	298	66.5	106	32.0	49.5	---	116.5	94.0	---
285	275	64.5	104	28.5	46.5	---	115.5	91.0	---
266	258	63.0	102	25.5	44.5	---	114.5	87.5	---
248	241	61.5	100	22.5	42.0	---	113.0	84.5	---
234	228	60.5	98	20.0	40.0	---	112.0	81.5	---
220	215	59.0	96	17.0	38.0	---	111.0	78.5	100.0
209	204	57.5	94	14.5	36.0	---	110.0	75.5	98.0
198	194	56.5	92	12.0	34.0	---	108.5	72.0	96.5
188	184	55.0	90	9.0	32.0	108.5	107.5	69.0	94.5

APPROXIMATE HARDNESS CONVERSION NUMBERS FOR NICKEL & HIGH-NICKEL ALLOYS (Continued)									
Vickers[a]	Brinell[b]	Rockwell Hardness Number[c]							
HV	HB	HRA	HRB	HRC	HRD	HRE	HRF	HRG	HRK
179	176	53.5	88	6.5	30.0	107.0	106.5	65.5	93.0
171	168	52.5	86	4.0	28.0	106.0	105.0	62.5	91.0
164	161	51.5	84	2.0	26.5	104.5	104.0	59.5	89.0
157	155	50.0	82	---	24.5	103.0	103.0	56.5	87.5
151	149	49.0	80	---	22.5	102.0	101.5	53.0	85.5
145	144	47.5	78	---	21.0	100.5	100.5	50.0	83.5
140	139	46.5	76	---	19.0	99.5	99.5	47.0	82.0
135	134	45.5	74	---	17.5	98.0	98.5	43.5	80.0
130	129	44.0	72	---	16.0	97.0	97.0	40.5	78.0
126	125	43.0	70	---	14.5	95.5	96.0	37.5	76.5
122	121	42.0	68	---	13.0	94.5	95.0	34.5	74.5
119	118	41.0	66	---	11.5	93.0	93.5	31.0	72.5
115	114	40.0	64	---	10.0	91.5	92.5	---	71.0
112	111	39.0	62	---	8.0	90.5	91.5	---	69.0
108	108	---	60	---	---	89.0	90.0	---	67.5
106	106	---	58	---	---	88.0	89.0	---	65.5
103	103	---	56	---	---	86.5	88.0	---	63.5
100	100	---	54	---	---	85.5	87.0	---	62.0
98	98	---	52	---	---	84.0	85.5	---	60.0
95	95	---	50	---	---	83.0	84.5	---	58.0
93	93	---	48	---	---	81.5	83.5	---	56.5
91	91	---	46	---	---	80.5	82.0	---	54.5
89	89	---	44	---	---	79.0	81.0	---	52.5
87	87	---	42	---	---	78.0	80.0	---	51.0
85	85	---	40	---	---	76.5	79.0	---	49.0
83	83	---	38	---	---	75.0	77.5	---	47.0
81	81	---	36	---	---	74.0	76.5	---	45.5
79	79	---	34	---	---	72.5	75.5	---	43.5
78	78	---	32	---	---	71.5	74.0	---	42.0
77	77	---	30	---	---	70.0	73.0	---	40.0

a. Vickers Hardness Number, Vickers indenter, 1.5, 10, 30-kgf load.

b. Brinell Hardness Number, 10 mm ball, 3000 kgf load. Note that in Table 5 of ASTM Test Method E 10, the use of a 3000-kgf load is recommended (but not mandatory) for material in the hardness range 96 to 600 HV, and a 1500-kgf load is recommended (but not mandatory) for material in the hardness range 48 to 300 HV. These recommendations are designed to limit impression diameters to the range 2.50 to 6.0 mm. The Brinell hardness numbers in this conversion table are based on tests using a 3000-kgf load. When the 1500-kgf load is used for the softer nickel and high-nickel alloys, these conversion relationships do not apply.

c. A Scale - 60-kgf load, diamond penetrator; B Scale - 100-kgf load, 1/16 in. (1.588 mm) ball; C Scale - 150-kgf load, diamond penetrator; D Scale - 100-kgf, diamond penetrator; E Scale - 100-kgf load, 1/8 in. (3.175 mm) ball; F Scale - 60-kgf load, 1/16 in. (1.588 mm) ball; G Scale - 150-kgf load, 1/16 in. (1.588 mm) ball; K Scale - 150-kgf load, 1/8 in. (3.175 mm) ball.

APPROXIMATE HARDNESS CONVERSION NUMBERS FOR NICKEL & HIGH-NICKEL ALLOYS							
Vickers[a]	Brinell[b]	Rockwell Superficial Hardness[c]					
HV	HB	HR15-N	HR30-N	HR45-N	HR15-T	HR30-T	HR45-T
513	479	85.5	68.0	54.5	---	---	---
481	450	84.5	66.5	52.5	---	---	---
452	425	83.5	64.5	50.0	---	---	---
427	403	82.5	63.0	47.5	---	---	---
404	382	81.5	61.0	45.5	---	---	---
382	363	80.5	59.5	43.0	---	---	---
362	346	79.5	58.0	41.0	---	---	---

APPROXIMATE HARDNESS CONVERSION NUMBERS FOR NICKEL & HIGH-NICKEL ALLOYS (Continued)							
Vickers[a]	Brinell[b]	Rockwell Superficial Hardness[c]					
HV	HB	HR15-N	HR30-N	HR45-N	HR15-T	HR30-T	HR45-T
344	329	78.5	56.0	38.5	---	---	---
326	313	77.5	54.5	36.0	---	---	---
309	298	76.5	52.5	34.0	94.5	85.5	77.0
285	275	75.0	49.5	30.0	94.0	84.5	75.0
266	258	73.5	47.0	26.5	93.0	83.0	73.0
248	241	72.0	44.5	23.0	92.5	81.5	71.0
234	228	70.5	42.0	20.0	92.0	80.5	69.0
220	215	69.0	39.5	17.0	91.0	79.0	67.0
209	204	68.0	37.5	14.0	90.5	77.5	65.0
198	194	66.5	35.5	11.0	89.5	76.0	63.0
188	184	65.0	32.5	7.5	89.0	75.0	61.0
179	176	64.0	30.5	5.0	88.0	73.5	59.5
171	168	62.5	28.5	2.0	87.5	72.0	57.5
164	161	61.5	26.5	-0.5	87.0	70.5	55.5
157	155	---	---	---	86.0	69.5	53.5
151	149	---	---	---	85.5	68.0	51.5
145	144	---	---	---	84.5	66.5	49.5
140	139	---	---	---	84.0	65.5	47.5
135	134	---	---	---	83.0	64.0	45.5
130	129	---	---	---	82.5	62.5	43.5
126	125	---	---	---	82.0	61.0	41.5
122	121	---	---	---	81.0	60.0	39.5
119	118	---	---	---	80.5	58.5	37.5
115	114	---	---	---	79.5	57.0	35.5
112	111	---	---	---	79.0	56.0	33.5
108	108	---	---	---	78.5	54.5	31.5
106	106	---	---	---	77.5	53.0	29.5
103	103	---	---	---	77.0	51.5	27.5
100	100	---	---	---	76.0	50.5	25.5
98	98	---	---	---	75.5	49.0	23.5
95	95	---	---	---	74.5	47.5	21.5
93	93	---	---	---	74.0	46.5	19.5
91	91	---	---	---	73.5	45.0	17.0
89	89	---	---	---	72.5	43.5	14.5
87	87	---	---	---	72.0	42.0	12.5
85	85	---	---	---	71.0	41.0	10.0
83	83	---	---	---	70.5	39.5	7.5
81	81	---	---	---	70.0	38.0	5.5
79	79	---	---	---	69.0	36.5	3.0
78	78	---	---	---	68.5	35.5	1.0
77	77	---	---	---	67.5	34.0	-1.5

a. Vickers Hardness Number, Vickers indenter, 1.5, 10, 30-kgf load.

b. Brinell Hardness Number, 10 mm ball, 3000 kgf load. Note that in Table 5 of ASTM Test Method E 10, the use of a 3000-kgf load is recommended (but not mandatory) for material in the hardness range 96 to 600 HV, and a 1500-kgf load is recommended (but not mandatory) for material in the hardness range 48 to 300 HV. These recommendations are designed to limit impression diameters to the range 2.50 to 6.0 mm. The Brinell hardness numbers in this conversion table are based on tests using a 3000-kgf load. When the 1500-kgf load is used for the softer nickel and high-nickel alloys, these conversion relationships do not apply.

c. 15-N Scale - 15-kgf load, superficial diamond penetrator; 30-N Scale - 30-kgf load, superficial diamond penetrator; 45-N Scale - 45-kgf load, superficial diamond penetrator; 15-T Scale - 15-kgf load, 1/16 in. (1.588 mm) ball; 30-T Scale - 30-kgf load, 1/16 in. (1.588 mm) ball; 45-T Scale - 45-kgf load, 1/16 in. (1.588 mm) ball.

ABOUT THE AUTHOR

Richard A. Moen earned his Bachelor of Science degree in Metallurgical Engineering in 1962 from South Dakota School of Mines and Technology. He has over 33 years of experience in the development, selection, specification, and characterization of structural materials . These work experiences have spanned the entire spectrum from research and development to plant design, construction, operation, and maintenance. Most of the work was in support of nuclear energy, including light water, gas, and liquid cooled systems. Many of the materials applications required extensions of the bases of knowledge and engineering extrapolations. Some of these applications even required extension of ASME Code rules, which is what led the author to Code committee work.

Beginning in late 1969, Mr. Moen became involved with the ASME Boiler and Pressure Vessel Code in committees associated with design limits for materials used in elevated temperature nuclear construction. Over the years, his ASME Code involvement increased to the extent that he is now a member of the Main Committee, the Subcommittee on Materials, and the Subcommittee on Nuclear Power, Subgroup on Materials, Fabrication and Examination (SCIII), and the Subgroup on Strength of Ferrous Alloys, and the Special Working Group on Environmental Effects.

After 33 years of continuous employment in industry, Mr. Moen is now self-employed as President of Moen Technical Services, providing consultation, support, and training services on a wide range of materials issues. Prior training in business administration and experience in supervision and management, coupled with his organizational skills, provide additional dimensions to the services offered.

USING ACROBAT® READER WITH SEARCH

Navigating

Searching

Navigating

Tool Bar Icons

Select a tool by clicking the icon.

 Click the **Page Only** icon to close the overview area of the window.

 Click the **Bookmarks and Page** icon to open the overview area and display bookmarks created for the document. Click a bookmark's name to go to the location marked by that bookmark.

 Click the **Thumbnails and Page** icon to open the overview area and display thumbnail images of each document page. Click a thumbnail to go to the page marked by that thumbnail.

 Use the **Hand** tool to move a document page on-screen when it does not fit within the window. Drag the hand tool in the direction you want to move the page.

Tool Bar Icons (Continued)

 Use the **Zoom** tools to magnify and reduce the page display by a factor of 2.

 This function is not available with this CD-ROM.

 The **Browse** icons (arrows) with the vertical line, advances the document to the first or last page of a document, whereas the browse icons without vertical lines move the document forward or back one page at a time.

 Use the **Go Back** and **Go Forward** icons to retrace your steps in a document, moving to each view in the order visited. Go Back also returns you to the original document after you click a link to another document.

 Click the **Actual Size** icon to display the page at 100 percent.

Tool Bar Icons (Continued)

 Click the **Fit Page** icon to scale the page to fit within the window.

 Click the **Fit Width** icon to scale the page width to fill the width of the window.

 The **Find** tool searches for part of a word, a complete word, or multiple words in a document.

 The **Search** tool searches indexed PDF documents for single words, phrases, parts of words, or combinations of words.

 The **Search/Results** tool displays the results of your cross document search.

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Paging Through a Document

Acrobat Reader provides a number of ways to page through a document.

Go to the Next Page

Choose one of the following:

- Click the **Next Page** button ▸ in the tool bar.
- Press the **Right Arrow** or **Down Arrow**.
- Choose *View*, *Next Page*.

Return to the Previous Page

Choose one of the following:

- Click the **Previous Page** button ◂ in the tool bar.
- Press the **Left Arrow** or **Up Arrow**.
- Choose *View*, *Previous Page*.

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Move One Screenful at a Time

- Press the **PageDown** key, **Enter**, or **Return** to move forward.
- Press the **PageUp** key, **Shift+ Enter**, or **Shift+ Return** to go back. Use the horizontal scroll bar in the status bar to scroll the page right or left.

Browsing with Thumbnails

A thumbnail is a miniature view of each document page which you can display in the overview area. You can use a thumbnail to jump quickly to a page and to adjust the view of the current page.

Jump to a Page Using its Thumbnail

Click the **Thumbnails and Page** button  or choose *View*, *Thumbnails and Page* to display thumbnail images. Click a thumbnail to move to the page it represents. The point you click determines the center of the page display.

Following Links

Links can connect parts of a document, jump to other PDF documents, open another application file, play a movie or sound, enter an article, hide or show an annotation, import form data, and reset or submit a form.

1. Move the pointer over a linked area. The pointer changes to a pointing finger  when positioned over a link.
2. Click to follow the link. Clicking a link can also change the page view, play a movie, reset a form, or perform other actions.

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Retracing Your Steps

The **Go Back** button traces your viewing path through a document or series of documents. You can go back up to 64 views. **Go Back** will reopen closed documents if necessary.

Retrace Your Viewing Path

- Click the **Go Back** button ◀◀ or choose *View*, *Go Back* to return to the previous page, document, or magnification level.
- Click the **Go Forward** button ▶▶ or choose *View*, *Go Forward* to reverse direction and return, one view at a time, to the view where you first used *Go Back*.

Magnifying the Page View

You can use the **Zoom** tool, the **Magnification Box** in the status bar, or the **Actual Size**, **Fit Page**, and **Fit Width** tool bar buttons to change the screen magnification. The maximum magnification level is 800%. The minimum magnification level is 12%. If you zoom in on a large document, use the hand tool to move the page around on-screen or in a thumbnail . Acrobat Reader also offers magnification level choices that are not related to a specific percentage, but to the look of the page on-screen:

- **Fit Page** scales the page to fit within the main window.
- **Fit Width** scales the page to fit the width of the main window.
- **Fit Visible** fills the window with the page's imaged area only (text and graphics).

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Magnifying the Page View (Continued)

When you select any of the **Fit** options, the magnification level resulting from the selection is displayed in the status bar.

The Fit options, **Fit Page**, **Fit Width**, and **Fit Visible,** are in a *sticky state*, which means they don't change as you page through a document unless you change the zoom level.

Increase Magnification

Choose one of the following:

- Select the **Zoom** tool  and click on the document page to double the current magnification.
- Select the **Zoom** tool  and drag to draw a rectangle, called a marquee , around the area you want to magnify.
- Click the **magnification box** in the status bar, and choose a magnification level. If you choose **Zoom To**, type in the magnification level and click *OK*.

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Decrease Magnification

Choose one of the following:

- Select the **Zoom** tool  while holding down Ctrl (Windows and UNIX) or Option (Macintosh), and click at the center of the area you want to reduce.
- Select the **Zoom** tool  while holding down Ctrl (Windows and UNIX) or Option (Macintosh), and drag to draw a rectangle, called a marquee , around the area you want to reduce.
- Click the **Magnification Box** in the status bar, and choose a magnification level. If you choose **Zoom To**, type in the magnification level and click *OK*.

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Working with Large Page Sizes

If you need to magnify a page to a size larger than the Reader window, you can use the **Hand** tool to move the page around so that you can view all the areas on it. Moving a page around with the **Hand** tool is like moving a piece of paper around on a desk with your hand.

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Choosing a Page Layout for Scrolling Ease

Acrobat Reader has three page layout options: Single Page, Continuous, and Continuous-Facing Pages. Continuous and Continuous-Facing Pages facilitate page scrolling so that you can see the bottom of one page and the top of another.

- **Single Page layout** displays one page in the document window at a time.
- **Continuous layout** arranges the pages in a continuous vertical column.
- **Continuous-Facing Pages layout** arranges the pages to appear side by side. This configuration accommodates two-page spread display and multiple-page viewing in the viewer window. If the total page count of a document is greater than two pages, the first page is displayed on the right to ensure proper display of two-page spreads. To see two-page spreads most efficiently in this page layout, choose *View*, *Fit Width*.

Choosing a Page Layout for Scrolling Ease (Continued)

Choose one of the following:

- Click the **Page Size Box** in the status bar, and choose one of the page layouts from the menu.
- Choose *Single Page*, *Continuous*, or *Continuous-Facing Pages* from the *View* menu.

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Search

Use the Search command to perform full-text searches of indexed PDF document collections.

The Search command has powerful tools for limiting and expanding the definition of the term you are searching for.

A full-text index is a searchable database of all text in a document or collection of documents. Searches of full-text indexes are very quick.

The Find command works with a single document and reads every word on every page, and is slower than the Search command.

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Searching

Perform a Full-Text Search

1. From the Main Menu click on Search, or at any time from the menu bar you may choose *Tools*, *Search*, *Query* or click the *Search Query* button  on the tool bar to open the Search window. Type the text you want to find in the *Find Results Containing Text* box, and click *Search*. The text can be a single word, a number, a term, or a phrase. When you click *Search*, the Search window is hidden, however, the search results can be seen by clicking on the  icon located on the tool bar. The Search Results window displays the number of hits for the search.

2. Use the *Search Next* button  and *Search Previous* button  to go to other matches in the document. Alternatively, redefine the query by typing new text or by using other techniques to expand the search to more documents or to limit the search to fewer hits. If you want to do this without having to redisplay the Search windows, change the default preference that hides it “on view.”

Defining Search Queries

You can search for a word, a number, a term, or a phrase made up of several terms. You can also use the other techniques listed below to define a search query.

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Searching for a Term or Phrase

To find matches for a single term, type the term in the text box labeled *Find Results Containing Text* and click *Search*. The term can be a word, a word with wild-card characters, or any combination of letters, numbers, and symbols.

- If the phrase includes the word *and*, *or*, or *not* used in its ordinary sense (not as a Boolean operator), put the phrase in quotes. The search phrase "*rock or mineral*" finds all occurrences of the phrase *rock or mineral*, not all occurrences of *rock* and all occurrences of *mineral* as it would without the quotes.

- If the phrase includes punctuation (other than the apostrophe) or special characters such as @ and *, they are ignored. For example, either of the terms *up-todate*, *up to date* finds all occurrences of both *up-to-date* and *up to date*.

Expanding a Search

If a search returns too few hits or no hits at all, make sure you are searching the appropriate key words. Also, make sure that settings left over from a previous search aren't limiting the current one.

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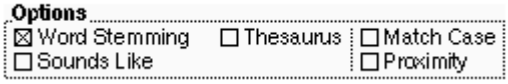
Using Search Options

Query Techniques

- The **Word Stemming** option finds words that share a stem with a search word.
- The **Sounds Like** option finds different spellings of proper names.
- The **Thesaurus** option finds words that have meanings similar to the meaning of a search word.
- **Match Case** finds text only when it has the same capitalization as the text you type.
- **Proximity** limits AND searches so that words must be within three pages of each other.
- **Boolean OR, AND, NOT** operators between key words can narrow or expand searches.
- Using **Operator Names** and **Symbols** Literally
- **Wild-card** characters, such as * or ?, in the search text increase the number of matches for the text.

The options in the Search window expand or limit the results of searches with single terms and phrases and with Boolean expressions. All options are initially disabled in the window by default.



The **Word Stemming**, **Thesaurus**, and **Sounds Like** options expand searches. (Before you perform a search with one of these options, you can see the effects of using it with the **Word Assistant**.)

The **Match Case** and **Proximity** options limit searches.

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Word Stemming Option

The **Word Stemming** option expands the search by finding words that share a word stem with the search word you type.

Example: with Word Stemming selected, searching for *engineering* finds *engineer* and *engineers* as well as *engineering*.

Before searching with the **Word Stemming** option, consider using the **Word Assistant** to see whether the option would find too many irrelevant words to be practical.
The Word Stemming option:

- Applies to single words, not phrases.
- Does not apply to words that contain wild-card characters.
- Finds words that end in **ing**, **ed**, **s**, **ion**, and so on (but not **er**).
- Cannot be used with the **Match Case** option.

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Sounds Like Option

The **Sounds Like** option expands the search for a proper name by finding words that begin with the same letter as a search word and that share some phonetic feature with it.

Example: with Sounds Like selected, searching for *color* also finds *colour* and *colore*.

Searching for *color* with the **Sounds Like** option also finds *clear* and *chaleur*. Before searching with the option, try using the **Word Assistant** to see whether the option will find relevant words.

The Sounds Like option:

- Applies to single words, not phrases.
- Does not apply to words that contain wild-card characters.
- Cannot be used with the **Match Case** option.

Thesaurus Option

The **Thesaurus** option expands the search by finding words with meanings similar to the meaning of the search word.

Example: with **Thesaurus** selected, searching for *begin* finds *start*.

Searching for *begin* with the **Thesaurus** option also finds *attack* and *produce*. Before searching with the option, try using the **Word Assistant** to see whether the option will find relevant words.

The Thesaurus option:

- Applies to single words, not phrases.
- Does not apply to words that contain wild-card characters.
- Cannot be used with the **Match Case** option.
- Finds only the similar words that appear in the documents you are searching, not all the similar words you might find in a complete Thesaurus.

Match Case Option

The **Match Case** option limits the results of the search by finding only those documents that contain words with the same capitalization as the search word or phrase you type.

Example: with Match Case selected, searching for *Metal* finds all occurrences of ***M****etal*, but not occurrences of ***m****etal*.

You can use the **Match Case** option with a Boolean expression or with terms that use wild-card characters. Characters matched by wild-card characters can be either uppercase or lowercase. You cannot use the **Match Case** option with the **Word Stemming**, **Thesaurus**, or **Sounds Like** option.

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Proximity Option

The **Proximity** option limits the results of simple AND searches to one pair of matches closest together. The two matches must be within three pages or fewer of each other. The option is useful for locating a search that concentrates on some topic of interest.

Example: searching for information about *arc welding* with *arc* AND *welding* would be less likely to locate information about *mig welding* or *circle arcs* if the **Proximity** option was used.

Proximity will not work with complex AND searches, for example, *welding* AND (*arc* OR *mig*).

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Searching with Boolean AND

Use AND to find two or more search terms.

Example: *installation* AND *instructions* finds only those hits that contain both *installation* and *instructions*.

You can also use the ampersand (&) to specify an AND search.

Example: *installation* & *instructions*.

Choosing the **Proximity** option changes the way AND searches work. Without the **Proximity** option, items in an AND search can be anywhere in a document.
With the **Proximity** option, items in an AND search must be within three pages of each other to be found.

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Searching with Boolean OR

Use OR to find hits containing any of two or more search terms.

Example: *metal* OR *alloy* finds all hits that contain either or both *metal* and *alloy*.

You can also use a comma (,) or a vertical bar (|) to separate items in an OR search.

Example: *metal*, *alloy* and *metal* | *alloy*.

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Combining Boolean Operators

Be careful when combining operators to build Boolean expressions because it is easy to build an expression that does not mean what you think it means.

When you combine AND and OR in the same expression, AND is evaluated before OR.

Example: *alloy* OR *metallurgy* AND *stainless* finds all documents that contain *alloy* or that contain both *metallurgy* and *stainless*.

You can use parentheses to change the default order of evaluation for Boolean operators.
Example: (*alloy* OR *metallurgy*) AND *stainless* finds all documents that contain either *alloy* and *stainless* or that contain *metallurgy* and *stainless*. Parentheses can be nested, i.e., parentheses can be placed within parentheses.

Using Operator Names and Symbols Literally

When you use a literal phrase that contains an operator name, a symbol for an operator name (such as & for AND), or parentheses, the phrase must be enclosed in quotation marks.

Example: *"salt and rock"* finds all hits that contain the phrase *salt and rock*, not all hits that contain either the word *salt* or the word *rock*. The phrase *salt & rock* also needs quotes to be interpreted literally.

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Searching with Wild-Card Characters

You can use **wild-card** characters to find words that contain a word fragment or all the terms that match a character pattern:

- ***** asterisk, matches zero, one, or more characters
- ? question mark, matches any one character

You can use wild-card characters in a term that is part of a Boolean expression. You cannot use wild cards to represent separator characters such as the hyphen (-) and the slash (/).

Examples:
geo* matches geodesic, Geoffrey, and geothermal
*tic matches austenitic and ferritic
?ight matches light and might but not bright
S3???? matches all six-digit alphanumerical sets with the S3 prefix, e.g., S30403, S30400
pr?m* matches prime, primary, and primed

Limiting a Search

If a search returns too many hits or provides too many matches in individual searches, try any of these query techniques:

- A **Boolean AND operator** between two words returns only hits containing both words.
- The **Proximity** option limits AND searches so that words must be close to each other – within three pages or fewer.
- The **Match Case** option finds text only when it has the same capitalization as the text you type.

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Word Assistant

Use the **Word Assistant** to build a list of terms that will appear when the search of a document uses the **Sounds Like**, **Word Stemming**, or **Thesaurus** option. The list will show you whether the option you are using is likely to be helpful in the search. If the list is too long or full of irrelevant words, you can quickly construct a list of words to find with the option turned off by copying words from the **Word Assistant** dialog box and pasting them into the Search window.

Look up the effects of a search option on a search word:

1. Choose *Tools*, *Search*, *Word Assistant*.
2. Enter the search word in the **Word text** box.
3. Select the **Search** option from the **Assist** menu.
4. Click on **Look Up**. All the words that will be found in a search for this word with this option are listed.

Word Assistant (Continued)

Search with words copied from the Word Assistant dialog box:

1. If the **Search** window is closed, click the **Search Query** button on the tool bar to open it.
2. Use the **Word Assistant** to look up the effects of a search option on a search word and to display a list of related words.
3. Double-click a word in the list that you want to use in a search. The word appears in the **Word** text box.
4. Double-click the word to select it, and copy it to the clipboard (Ctrl + C).
5. In the **Search** window, click the **Find Results Containing Text** box and paste (Ctrl + V) the selected word into the text box.
6. Repeat steps 3 through 5 for each word you want to use and separate each pair of words in the **Find Results Containing Text** box with AND or OR.

Changing Search Preferences

You may need to change the default settings in the **Search Preferences** dialog box.

1. Choose *File*, *Preferences*, *Search*.
2. Change preferences in the dialog box as necessary.
3. Click *OK*.

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Selecting Indexes to Search

If you use Acrobat Reader to view and search documents other than this CD-ROM, you will need to understand how **Indexes** work. Otherwise, each time you start a search while using this CD-ROM, the appropriate **Index** will automatically be installed. If the search function does not work or the Search button is grayed-out, read the following information about **Indexes**.

Choosing *Tools*, *Search*, *Indexes* lists the available indexes. On a Macintosh, the list may also include indexes on currently unavailable file server volumes or CD-ROMs.

To be searchable, an index must be in the search list and it must be selected. When you add an index to the list, it is automatically selected. You can deselect or reselect it for specific searches or remove it from the list altogether. You can view a description of any index in the list.

Add an Index to the Search List

1. Choose *Tools*, *Search*, *Indexes*. (If the Search window is open, click the *Indexes* button in it instead.)
2. Click on *Add*.
3. Locate and select the appropriate index for this CD-ROM (e.g., blackcd for The Metals Black Book - on CD-ROM, or redcd, bluecd, etc.). Acrobat index-definition filenames usually end with with the extension .pdx.
4. Double-click the name of the index you want to use.

The new index is added to the search list.

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Select or Deselect an Index

In the **Index Selection** dialog box, click the box of any index whose status you want to change and click *OK*.

Remove an Index from the Search List

1. In the **Index Selection** dialog box, highlight the name of the index you want to remove.
2. Click on *Remove*.
3. Click *OK*.

View a Description of an Index

1. In the **Index Selection** dialog box, highlight the name of the index you want information about.
2. Click on *Info* to view the information.
3. Click OK.

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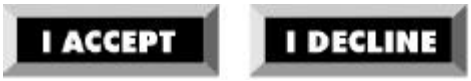

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