


**AWS B2.1/B2.1M:2014**  
**An American National Standard**



# **Specification for Welding Procedure and Performance Qualification**



**American Welding Society®**



**AWS B2.1/B2.1M:2014  
An American National Standard**

**Approved by the  
American National Standards Institute  
November 21, 2013**

# **Specification for Welding Procedure and Performance Qualification**

**6th Edition**

**Supersedes AWS B2.1:2009**

Prepared by the  
American Welding Society (AWS) B2 Committee on Procedure and Performance Qualification

Under the Direction of the  
AWS Technical Activities Committee

Approved by the  
AWS Board of Directors

## **Abstract**

This specification provides the requirements for qualification of welding procedure specifications, welders, and welding operators for manual, semiautomatic, mechanized, and automatic welding. The welding processes included are electrogas welding, electron beam welding, electroslag welding, flux cored arc welding, gas metal arc welding, gas tungsten arc welding, laser beam welding, oxyfuel gas welding, plasma arc welding, shielded metal arc welding, stud arc welding, and submerged arc welding. Base metals, filler metals, qualification variables, welding designs, and testing requirements are also included.



**American Welding Society®**

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This standard is subject to revision at any time by the AWS B2 Committee on Procedure and Performance Qualification. It must be reviewed every five years, and if not revised, it must be either reaffirmed or withdrawn. Comments (recommendations, additions, or deletions) and any pertinent data that may be of use in improving this standard are required and should be addressed to AWS Headquarters. Such comments will receive careful consideration by the AWS B2 Committee on Procedure and Performance Qualification and the author of the comments will be informed of the Committee's response to the comments. Guests are invited to attend all meetings of the AWS B2 Committee on Procedure and Performance Qualification to express their comments verbally. Procedures for appeal of an adverse decision concerning all such comments are provided in the Rules of Operation of the Technical Activities Committee. A copy of these Rules can be obtained from the American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.

## Dedication

The B2 Committee on Procedure and Performance Qualification, humbly dedicate this edition of AWS B2.1/B2.1M:2014, *Specification for Welding Procedure and Performance Qualification*, to Dr. W. D. (D'or) Doty in recognition of his long standing dedication to the committee and his efforts in the advancement of the art and science of welding. D'or was a leading member of the originating committee of this standard and was a significant force in the development of Standard Welding Procedure Specifications promoted by this standard.

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## Foreword

This foreword is not part of AWS B2.1/B2.1M:2014, *Specification for Welding Procedure and Performance Qualification*, but is included for informational purposes only.

The AWS B2 Committee on Procedure and Performance Qualification was formed in 1979. The first edition of B2.1, *Standard for Welding Procedure and Performance Qualification*, was published in 1984. This standard introduced the concept of Standard Welding Procedure Specifications (SWPSs) in addition to a set of rules for qualifying welding procedures, welders, and welding operators. The following edition, renamed B2.1:1998, *Specification for Welding Procedure and Performance Qualification*, was an extensive revision of B2.1-84. The Committee has published sixty-two Standard Welding Procedure Specifications; B2.2, *Standard for Brazing Procedure and Performance Qualification*; B2.3, *Specification for Soldering Procedure and Performance Qualification*; and B2.4, *Specification for Welding Procedure and Performance Qualification for Thermoplastics*.

AWS B2.1-84, *Standard for Welding Procedure and Performance Qualification*, was revised in 1998, 2000, 2005, and 2009.

This is the sixth edition of B2.1, *Specification for Welding Procedure and Performance Qualification*. This revision has undergone numerous modifications including the updating of definitions and materials; the clarification of performance qualification for partial joint penetration groove welds and tack welds, and the qualification of multiple welders on a single test weldment; the addition of NAVSEA/Mil Standards and ABS as references in the Standard Welding Procedure Specification Annex and heat input formulae for waveform controlled power sources; the correction of dimensions and deletion of conflicting examples in the guided bend fixture figures; and editorial corrections throughout the document.

A vertical line in the margin or underlined text in clauses, tables, or figures indicates an editorial or technical change from the 2009 edition.

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, AWS B2 Committee on Procedure and Performance Qualification, American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.



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# Specification for Welding Procedure and Performance Qualification

## 1. General Requirements

**1.1 Scope.** This specification provides requirements for welding procedure and welding performance qualification. It is the intent that this specification be referenced by other documents, such as codes, specifications, contracts, and quality control or quality assurance manuals. Such documents are recognized in this specification as Referencing Documents. Requirements imposed by the Referencing Document supersede the requirements of this specification.

The requirements for the qualification of welding procedures are provided in Clause 4, Procedure Qualification. The requirements for the performance qualification of welders and welding operators are provided in Clause 5, Performance Qualification.

This specification also defines and establishes qualification variables. Qualification requirements are based on the premise that the Referencing Document will specify fabrication, design, base metal, filler metal, preheat, interpass temperature, postweld heat treatment (PWHT), nondestructive examination, and test requirements applicable to the product. Welding procedure and performance qualifications which meet the requirements of other codes and specifications are acceptable, provided they also meet the requirements of this specification.

Base metals and filler metals have been grouped into categories that will minimize the number of qualification tests required. Substitution of one base metal or filler metal for another, even when within the allowable rules, should only be made after an evaluation of the material's suitability for its intended use. For some materials, additional tests may be appropriate to verify the material's suitability. Materials not listed require separate qualification.

This specification is intended for use with the following welding processes:

EBW	= Electron Beam Welding
EGW	= ElectroGas Welding
ESW	= Electroslag Welding
FCAW	= Flux Cored Arc Welding
GMAW	= Gas Metal Arc Welding
GTAW	= Gas Tungsten Arc Welding
LBW	= Laser Beam Welding
OFW	= Oxyfuel Gas Welding
PAW	= Plasma Arc Welding
SAW	= Submerged Arc Welding
SMAW	= Shielded Metal Arc Welding
SW	= <u>Arc Stud</u> Welding

Employers shall be responsible for the welding performed by their organization, including the use of qualified welding procedures, qualified welders, and qualified welding operators. The welding procedure may be an AWS Standard Welding Procedure Specification (SWPS) published by the American Welding Society, or it shall be qualified by the Employer as required under the rules of Clause 4, Procedure Qualification. It is the Employer's responsibility to assure that Welding Procedure Specifications (WPSs) meet all requirements of the Referencing Document.

When not otherwise specified by the Referencing Document, the edition of this specification to be used should be established in accordance with the following:

(1) Editions may be used at any time after the effective date of issue.

(2) Latest edition of this document should be used for new contracts.

(3) Editions established by contract date may be used during the entire term of the contract, or the provisions of later editions may be used when agreed upon by the contracting parties.

**1.2 Units of Measure.** This standard makes use of both U.S. Customary Units and the International System of Units (SI). The latter are shown within brackets ([ ]) or in appropriate columns in tables and figures. The measurements may not be exact equivalents; therefore, each system must be used independently.

**1.3 Safety.** Safety and health issues and concerns are beyond the scope of this standard; some safety and health information is provided, but such issues are not fully addressed herein.

Safety and health information is available from the following sources:

American Welding Society:

(1) ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*

(2) AWS Safety and Health Fact Sheets

(3) Other safety and health information on the AWS website

Material or Equipment Manufacturers:

(1) Material Safety Data Sheets supplied by materials manufacturers

(2) Operating Manuals supplied by equipment manufacturers

Applicable Regulatory Agencies

Work performed in accordance with this standard may involve the use of materials that have been deemed hazardous, and may involve operations or equipment that may cause injury or death. This standard does not purport to address all safety and health risks that may be encountered. The user of this standard should establish an appropriate safety program to address such risks as well as to meet applicable regulatory requirements. ANSI Z49.1 should be considered when developing the safety program.

## 2. Normative References

The following standards contain provisions which, through reference in this text, constitute mandatory provisions of this AWS standard. For undated references, the latest edition of the referenced standard shall apply. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply.

AWS Documents:<sup>1</sup>

(1) AWS A2.4, *Standard Symbols for Welding, Brazing, and Nondestructive Examination*;

(2) AWS A3.0M/A3.0, *Standard Welding Terms and Definitions, Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying*;

(3) AWS B4.0, *Standard Methods for Mechanical Testing of Welds*;

(4) AWS D1.4/D1.4M, *Structural Welding Code—Reinforcing Steel*; and

(5) AWS D11.2, *Guide for Welding Iron Casting*.

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<sup>1</sup> AWS standards are published by the American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.

Other Documents:

- (1) ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*;<sup>2</sup>
- (2) ASME *Boiler and Pressure Vessel Code*, Section V;<sup>3</sup>
- (3) ASME *Boiler and Pressure Vessel Code*, Section IX; and
- (4) ASTM E165, *Standard Test Method for Liquid Penetrant Examination*.<sup>4</sup>

### 3. Terms and Definitions

AWS A3.0M/A3.0, *Standard Welding Terms and Definitions, Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying*, provides the basis for terms and definitions used herein. However, the following terms and definitions are included below to accommodate usage specific to this document.

**A-Number.** A designation used to classify ferrous weld metal for procedure qualification based upon chemical composition of a weld deposit (see Annex B).

**circumferential weld.** A fillet or groove weld that is a complete circle (360 degrees) between two faying surfaces and has a diameter of less than 24 in.

**Employer.** The contractor or manufacturer that adopts this specification for welding procedure and performance qualification. Closely related companies, including those with different names, for which effective control of welding is as one organization, shall be considered as one Employer.

**F-Number.** A designation used to group welding filler metal for procedure and performance qualifications based essentially on their usability characteristics (see Annex B).

**fracture toughness.** A mechanical property of materials exhibiting its ability to contain a crack and resist fracture as determined by any of the following tests: Charpy V-notch, dynamic tear, plane-strain fracture toughness, and drop-weight nil-ductility transition temperature.

**M-Number.** A designation used to group base metals for procedure and performance qualifications consistent with the P-Number designation established by the ASME *Boiler and Pressure Vessel Code*, Section IX, but which also incorporate materials not recognized or used under ASME rules (see Annex C).

**pipe.** Used generally to refer to pipe and tube.

**plate.** Used to refer to rolled, extruded, or forged products other than pipe and tube.

**Procedure Qualification Record (PQR).** A record of the welding variables used to produce an acceptable test weldment and the results of tests conducted on that weldment to qualify a welding procedure specification.

**procedure qualification variable.** One of a set of elements that define the qualification limits of a Welding Procedure Specification (WPS).

**performance qualification variable.** One of a set of requirements that define the qualification limits of welders and welding operators.

**qualification variable.** See **performance qualification variable** and **procedure qualification variable**.

**qualified welding procedure.** A Welding Procedure Specification (WPS) meeting the qualification requirements of this specification based on qualification tests of weldments. Qualified welding procedures are of two types:

- (1) AWS Standard Welding Procedure Specifications (SWPSs) published by the American Welding Society, and

<sup>2</sup> ANSI Z49.1 is published by the American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.

<sup>3</sup> ASME standards are published by the American Society of Mechanical Engineers, 3 Park Avenue, New York, NY 10016-5990.

<sup>4</sup> ASTM International standards are published by the American Society of Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.



(2) Welding Procedure Specifications (WPSs) qualified by an Employer for the Employer's own use.

**Qualifier.** The Employer, organization, or individual responsible for conducting and supervising qualification testing.

**radial weld.** A fillet or groove weld that is not a complete circle between two faying surfaces having rounded portions with a radius of less than 12 in.

**Referencing Document.** The fabrication code, specification, contract document, or internal document such as quality control or quality assurance manuals that invokes this specification.

**root shielding gas.** A shielding gas used to provide a protective atmosphere to the root surface of the weld.

**specimen.** The article made from a specimen blank that is evaluated for qualification purposes. In some cases, the test weldment is also the specimen.

**specimen blank.** That portion of a test weldment removed for the production of a specimen. In some cases, the specimen blank is also the specimen.

**Standard Welding Procedure Specification (SWPS).** A welding procedure specification qualified according to the requirements of AWSB2.1/B2.1M, approved by AWS, and made available for production welding by companies or individuals other than those performing the qualified test.

**T.** A symbol for base metal thickness, or for identifying a procedure qualification variable for fracture toughness applications, as appropriate.

**TS.** A symbol for test specimen thickness.

**t.** A symbol for weld metal thickness.

**test weldment.** Workpieces joined by welding to qualify welding procedures, welders, or welding operators.

**torch shielding gas.** Protective gas emanating from the torch, used to prevent or reduce atmospheric contamination.

**Welding Procedure Specification (WPS).** A document providing the required welding variables for a specific application to assure repeatability by properly trained welders and welding operators.

**welding variable.** Any controllable detail of a welding procedure which is required to be addressed on the Welding Procedure Specification (WPS).

## 4. Procedure Qualification

### 4.1 General

The purpose of a welding procedure qualification is to demonstrate the capabilities of a weld to meet required properties.

**4.1.1** Each welding procedure shall be qualified.

**4.1.2** This standard establishes two categories of qualified welding procedures:

(1) *Category 1.* Standard Welding Procedure Specifications (SWPSs) in accordance with 4.2 supported by PQRs reviewed and validated at the Welding Research Council. The basis for establishment of an SWPS is described in Annex E.

(2) *Category 2.* Welding Procedure Specifications (WPSs) qualified by the Employer in accordance with 4.3.

To determine if SWPSs or WPSs qualified by the Employer are appropriate, the flow chart in Figure 4.1 may be utilized.

**4.1.3** Tests previously conducted by an Employer to meet other codes, specifications, or earlier editions of this specification, may be used by the Employer to support a WPS in accordance with this specification. The Procedure Qualification Record(s) (PQR) must address all qualification variables (see 4.14, Procedure Qualification Variables) applicable to the welding process(es) used and the test results must meet all requirements of this specification. If all the requirements are not met, another qualification test may be conducted following the qualification variables of the original PQR. A PQR supplement shall be prepared to document the additional tests results.

**4.1.4** A matrix indicating data to be included in the WPS for a process or combination of processes is provided in 4.13, Welding Procedure Specification Data. There are no required formats for WPSs or PQRs; however suggested forms are shown in Annex F. Any format may be used providing all applicable information is recorded, including a certifying statement acknowledging the validity of the data and certifying that the weldments were made and tested in accordance with the requirements of AWS B2.1/B2.1M, *Specification for Welding Procedure and Performance Qualification*.

**4.1.5** PQRs shall not be revised except to correct errors or add new or omitted information. All such changes shall be identified, authorized by the Employer, and dated on the PQR.

**4.1.6** A WPS may require the support of more than one PQR, while one PQR may support a number of WPSs. Compatible PQRs using different qualification variables may be combined to support one WPS. Compatibility shall be determined based on either experience, or testing, or both.

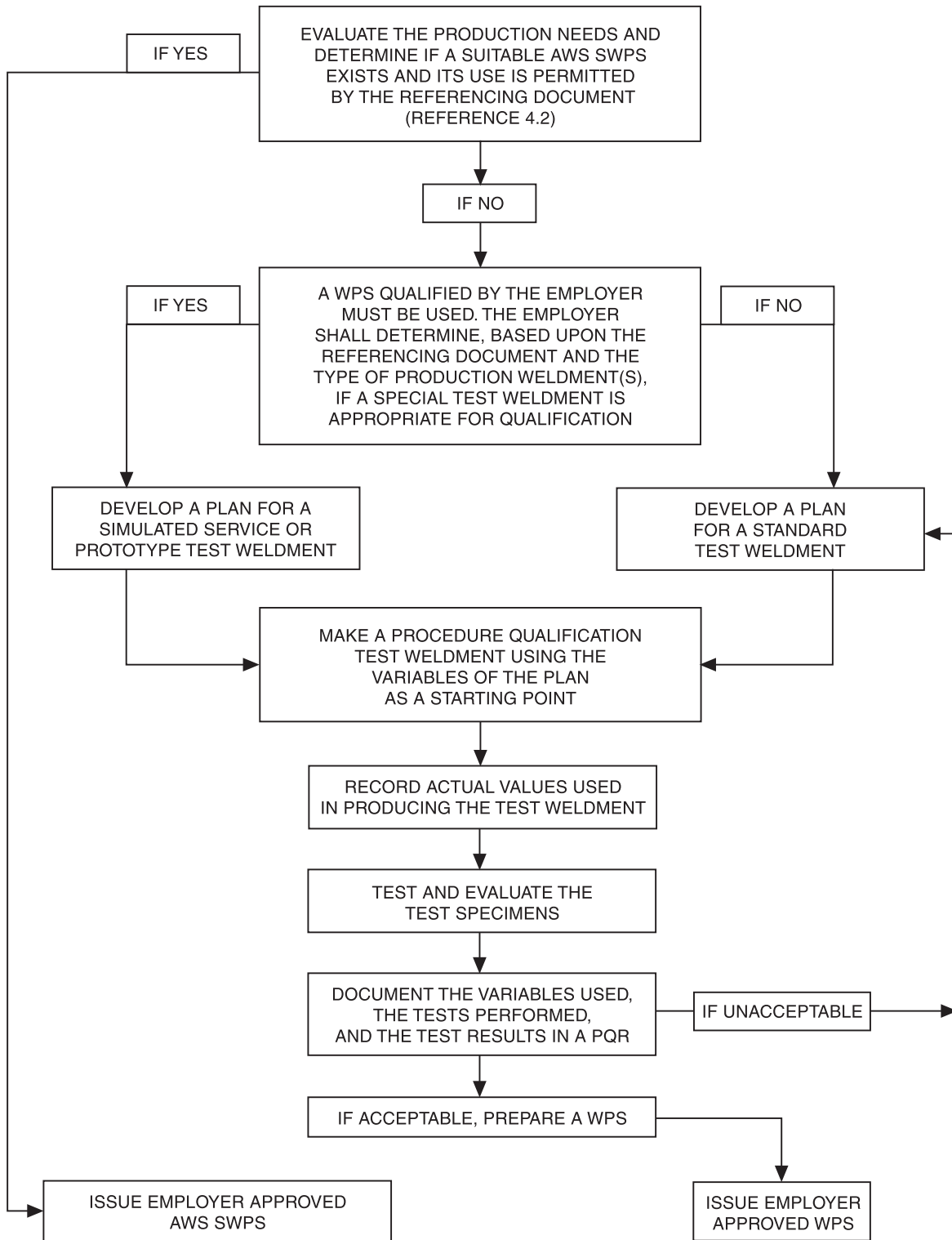
**4.1.7** WPSs and PQRs shall be identified according to a system that allows permanent traceability from the WPS to its supporting PQRs.

**4.1.8** A change in a WPS beyond that allowed in 4.14, Procedure Qualification Variables shall require requalification of the procedure and preparation of a new or revised WPS. Changes not addressed in 4.14 shall not require requalification, provided such changes are documented in a new or revised WPS.

**4.1.9** WPSs qualified to earlier editions of B2.1 shall be qualified to this edition without revision or further testing.

### 4.2 Standard Welding Procedure Specifications

**4.2.1** Procedures permitted for use without employer qualification tests shall be limited to AWS Standard Welding Procedure Specifications (SWPSs).



Note: Figure 4.1 is provided to aid the user of this standard in determining whether an AWS Standard Welding Procedure Specification (SWPS) may be used for their application, and if not, whether a special test weldment or a standard test weldment is applicable and the steps which must be taken to develop a welding procedure which meets the requirements of this document once these determinations have been made.

**Figure 4.1—Welding Procedure Selection Criteria (see 4.1.2)**

**4.2.2** Employers may use an SWPS without modification, if it provides sufficient direction for use in production. An Employer may supplement the SWPS with additional information or requirements, provided the welding variables remain within the ranges shown on the SWPS.

**4.2.3** Prior to use of an SWPS, the Employer shall signify acceptance of responsibility for the production application of the procedure by signing and dating the SWPS. SWPSs published under previous editions of this standard are acceptable for use under this edition of AWS B2.1/B2.1M, *Specification for Welding Procedure and Performance Qualification*.

**4.2.4** Welding variables shall not be changed beyond the ranges specified in the SWPS.

**4.2.5** Multiple SWPSs may not be combined to perform a single production weld.

**4.2.6** SWPSs shall not be combined with or used to supplement Employer qualified WPSs.

**4.2.7** An Employer's Procedure Qualification Record (PQR) shall not be used to modify an SWPS.

### 4.3 Welding Procedures Qualified by Employer

**4.3.1** The qualification variables for the various processes used in making a procedure qualification test weld are listed in 4.14, Procedure Qualification Variables.

**4.3.2** Mechanical test specimens shown in Annex A shall be used for testing. The provisions of AWS B4.0, *Standard Methods for Mechanical Testing of Welds*, may be used for mechanical testing of welds made for procedure qualification. However, in instances where the provisions of AWS B4.0 and AWS B2.1/B2.1M are in conflict, the provisions of AWS B2.1/B2.1M shall take precedence. The test results shall be recorded on or appended to a PQR containing the actual qualification variables.

**4.3.3** If the results meet the acceptance criteria specified, the Employer shall sign and date the PQR indicating that the PQR is an accurate record of the welding and testing of the procedure qualification test weldment. The Employer may then prepare and issue an approved WPS. The Employer shall sign and date the WPS to signify acceptance of responsibility for use of the WPS in production.

**4.3.4** Each WPS shall be supported by one or more PQRs, and shall specify a range or a single value for each welding variable applicable to the welding process identified in 4.13, Welding Procedure Specification Data. Additionally, a WPS shall specify a range or a single value for each qualification variable for the weld process used as identified in 4.14, Procedure Qualification Variables.

**4.3.5** Except as permitted in Clause 1, Scope, a WPS qualified by one Employer is not transferable to another Employer.

**4.3.6** Special test weldments may be used for procedure qualification, when permitted by the Referencing Document, and shall be governed by the limits on qualification variables given in 4.14, Procedure Qualification Variables.

**4.3.7** This specification recognizes two types of special test weldments:

(1) *Simulated Service Test Weldments*. These are test weldments in which qualification requires tests simulating service conditions. Tests may include fracture toughness, flexural, and/or static, or cyclic loading to simulate the type of loading that the weldment will encounter in service. Proof tests such as hydrostatic or leak tests may also be appropriate.

(2) *Prototype Structure Test Weldments*. These are test weldments in which a prototype of the actual weldment is subjected to field tests in which it is loaded and demonstrated to perform the function for which it was designed.

**4.3.8** Unless otherwise permitted by the Referencing Document, coated metals, such as galvanized or painted metals, require separate qualification unless the coating is removed from the weld area prior to welding.

**4.3.9** Except as otherwise provided in 4.14, the type and dimensions of the groove are not procedure qualification variables.

**4.3.10** Unless specifically required otherwise by the procedure qualification variables (4.14), a qualification in any position qualifies the procedure in all positions. The welding process and electrodes must be suitable for use in the posi-

tions permitted by the WPS. A welder or welding operator making and passing the procedure qualification test is qualified for the position tested (see 5.4.3).

**4.3.11** The base metals may consist of either plate or pipe, or other product forms. Qualification in plate also qualifies for pipe welding and vice versa. The dimensions of the test coupon shall be sufficient to provide the required test specimens (see Annex A).

**4.3.12** Base metals are grouped for qualification purposes on the basis of weldability, similar mechanical properties, chemical composition, and metallurgical compatibility. Such groups are assigned M-Numbers in Annex C of this specification.

**4.3.13** For the welding of base metals with different M-Numbers, a procedure qualification test shall be made for each combination of M-Numbers to be joined. However, a procedure qualification test with one M-Number shall also qualify for that metal welded to itself and to each of the lower M-Number metals for:

- (1) Base metals M-1, M-3, M-4, and M-5A; and
- (2) Welding processes SMAW, GTAW, GMAW, FCAW, SAW, and PAW melt-in-technique.

(Example: M-5A to M-5A would qualify for M-5A to M-5A as well as M-5A to M-4, M-5A to M-3, and M-5A to M-1.)

**4.3.14** If the Referencing Document requires fracture toughness testing, then procedure qualification shall be made for each combination M-Number and Group Number to be joined. A procedure qualification shall be made for each M-Number and Group Number combination of base metals, even though procedure qualification tests have been made for each of the two base metals welded to itself.

**4.3.14.1** If the Welding Procedure Specification (WPS) for welding the combination of base metals specifies the same qualification variables, including electrode or filler metal, as both WPSs for welding each base metal to itself, such as that the base metal is the only change, then the WPS for welding the combination of base metals is also qualified.

**4.3.14.2** When base metals of two different M-Numbers and Group Numbers are qualified using a single test weldment, that test weldment qualifies the welding of those two M-Numbers and Group Numbers to themselves as well as to each other using the variables qualified.

**4.3.15** Base metals listed in Annex C or listed in ASME *Boiler and Pressure Vessel Code*, Section IX, shall be considered as listed materials. If an unlisted base metal has the same UNS number designation as a base metal listed in Table C.1 and Table C.2, it shall be considered as assigned to that M-Number or M-Number plus Group Number; however, within this instance, only base metals listed in Table C.2 may be used for procedure qualification test coupons. PQRs for unlisted base metals shall not be used to support a WPS for welding listed base metals, other unlisted base metals, or vice versa.

**4.3.16** When fracture toughness is a requirement and a qualified procedure exists which satisfies all requirements except fracture toughness, it is necessary only to prepare an additional test weldment with sufficient material to provide the required fracture toughness specimens. The test plate shall be welded using that procedure, plus those variables applicable to fracture toughness. A new or revised PQR shall be prepared and the WPS shall then be revised or a new WPS issued to accommodate the qualification variables for fracture toughness applications listed in 4.14, Procedure Qualification Variables.

**4.3.17** Cladding and hardfacing require separate qualification for each base metal M-Number, and filler metal combination. Welds made to join clad metals to other clad metals or to unclad metals shall be separately qualified or may be qualified by a combination of a PQR for joining an unclad metal and a PQR for applying the cladding.

**4.3.18** For stud welding, the nominal chemical composition of the stud material shall be used to classify the stud as an M-Number material for purposes of procedure qualification.

**4.3.19** During the welding of procedure qualification weldments, welders and welding operators shall be under the full control and supervision of the Employer. Only activities (1), (5), (6), and (7) listed below may be subcontracted by the Employer.

- (1) Preparation of test materials for welding,
- (2) Instruction of the welder or welding operator on use of the welding procedure,

- (3) Performance of welding,
- (4) Recording of actual qualification variables used in the test (see 4.1.4),
- (5) Preparation of test specimens from the completed weldment,
- (6) Performance of examinations and tests,
- (7) Documenting of test results, and
- (8) Certification of the final PQR.

**4.3.20** Qualification requirements for cast iron materials are given in AWS D11.2, *Guide for Welding Iron Castings*.

**4.3.21** Qualification requirements for reinforcing bar are given in AWS D1.4/D1.4M, *Structural Welding Code—Reinforcing Steel*.

## 4.4 Evaluation of Test Weldments

Test weldments shall be subjected to the applicable tests in Table 4.1. The type, number, location, and evaluation criteria for tests shall be as given in 4.6 through 4.12, except that for special test weldments the evaluation of the weldment shall be in accordance with the Referencing Document.

## 4.5 Qualification Thickness Limitations

**4.5.1** Limitations on the thickness ranges qualified by procedure qualification tests are given in the following tables:

- (1) Table 4.2—Thickness and Size Limitations for Fillet Welds for Procedure Qualification
- (2) Table 4.3—Thickness Limitations of Plate and Pipe for Groove Welds for Procedure Qualification
- (3) Table 4.4—Thickness Limitations for Cladding and Hardfacing for Procedure Qualification

**4.5.2** The limitations in the tables cited in 4.5.1 are based upon the following criteria:

- (1) The size and number of passes of a fillet weld,
- (2) The base metal and weld metal thicknesses for groove welds, or
- (3) The base metal thickness for weld cladding and hardfacing.

**4.5.3** Complete joint penetration groove welds shall also qualify partial joint penetration groove welds and fillet welds within the qualification limits given in Table 4.3.

**4.5.4** In addition to the welding data required to be included in the WPS by 4.13, Welding Procedure Specification Data, when multiple process or multiple filler metal classifications are used in a single test weldment, the thickness ranges permitted for use in the WPS shall apply separately to each welding process and filler metal classification. The weld deposit thickness for each welding process and each filler metal classification used in the qualification test shall be recorded on the PQR.

**4.5.5** In addition to the procedure qualification variables required to be recorded on the PQR by 4.14, Procedure Qualification Variables, the weld deposit thickness for each welding process and each filler metal classification used in the qualification test shall be recorded on the PQR for all applications.

## 4.6 Special Test Weldment Acceptance Criteria

Special test weldments shall be examined and tested as specified by the Referencing Document. When a test in Table 4.1 is specified by the Referencing Document, the acceptance criteria shall be as required in this specification. The criteria for other tests shall be as specified in the Referencing Document.

**Table 4.1**  
**Test Methods Required for Procedure Qualification**  
**(see 4.4, 4.6.1, 4.7.4, 4.12.2, and 4.12.4)**

	Number of Test	Groove Weld	Fillet Welds				
			Bend-Break Test	Alternate Shear Test	Stud Welds	Weld Cladding	Hard-Facing
Visual Examination	<u>1</u>	Yes	Yes	Yes	(Note b)	(Note b)	(Note b)
Guided Bend Tests	<u>4</u>	Yes <sup>a</sup>	—	—	—	Yes	—
Tension Tests	<u>2 Groove,</u> <u>5 Stud</u>	Yes	—	—	Yes, or Torque	—	—
Macro-Examination	(Note d)	(Note a)	Yes	Yes	Yes <sup>c</sup>	—	(Note b)
Bend-Break	<u>2</u>	—	Yes	—	—	—	—
Bend Tests	<u>4 Groove,</u> <u>5 Stud</u>	Yes <sup>a</sup>	—	—	Yes	—	—
Torque Tests	<u>5</u>	—	—	—	Yes, or Tension	—	—
Fracture Toughness Tests	<u>1</u>	(Note b)	—	—	—	—	—
Shear Tests	<u>2</u>	—	—	Yes	—	—	—
Penetrant Examination	<u>1</u>	—	—	—	—	Yes	(Note b)
Chemical Analysis	<u>1</u>	—	—	—	—	Yes	(Note b)
Hardness Test	<u>1</u>	—	—	—	—	—	Yes

<sup>a</sup> The use of a macro examination in lieu of bend tests shall be permitted only for welds made in M-26, M-81, and M-83 base materials.

<sup>b</sup> If specified in referencing document.

<sup>c</sup> Except that unclad, unpainted M-1 materials are exempted.

<sup>d</sup> 2 macro examinations for single pass fillets, 2 macro examination for multiple pass fillets, 5 macro examinations for stud welds.

**Table 4.2**  
**Thickness and Size Limitations for Fillet Welds for Procedure Qualification**  
**(see 4.5.1 and 4.7.1)**

Fillet Test Weldment	Thickness and Size Range Qualified	
	Base Metal Thickness <sup>a, b, c, e</sup>	Fillet Weld Size <sup>d</sup>
Single Pass	Unlimited	Maximum welded single pass fillet size and smaller
Multiple Pass	Unlimited	1/2 of that welded during qualification to unlimited

<sup>a</sup> For OFW, the maximum base metal thickness qualified is the thickness of the test weldment.

<sup>b</sup> For GMAW-S, the maximum base metal thickness qualified is 1.1 times the test weldment thickness.

<sup>c</sup> For fracture toughness applications less than 5/8 in [16 mm] thick, the base metal thickness of the test weldment is the minimum base metal thickness qualified.

<sup>d</sup> For M-11 steels, the fillet weld size qualified shall be equal to or less than the fillet size used in the test.

<sup>e</sup> If a test weldment receives a postweld heat treatment exceeding the lower transformation temperature, the maximum base metal thickness qualified is 1.1 times the base metal thickness of the test weldment.

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## Table 4.3

### Thickness Limitation of Plate and Pipe for Groove Welds for Procedure Qualification (see 4.5.1, 4.5.3, 4.7.1, Figure 4.2, Figure 4.3, Figure 4.4, and Figure 4.5)

Test Weldment Thickness (T), in [mm] <sup>a, b, c, d, f, g, h</sup>	Base Metal Thickness Qualified <sup>d, e</sup>		Deposited Weld Metals Thickness Qualified <sup>d</sup>
	Minimum, in [mm]	Maximum, in [mm]	Maximum, in [mm]
< 1/16 [1.5]	1/2T	2T	2t
1/16 to 3/8 [1.5 to 10]	1/16 [1.5]	2T	2t
> 3/8 [10], but < 3/4 [19]	3/16 [5]	2T	2t
3/4 [19] to < 1-1/2 [38]	3/16 [5]	2T	2t when t < 3/4 [19] 2T when t ≥ 3/4 [19]
1-1/2 [38] to < 6 [152]	3/16 [5]	8 [203]	2t when t < 3/4 [19] 8 [203] when t ≥ 3/4 [19]
≥ 6 [152]	1 [25]	1.33T	2t when t < 3/4 [19] 8 [203] when 3/4 [19] ≤ t < 6 [152] 1.33t when t ≥ 6 [152]

<sup>a</sup> Provided that the weld penetration can be measured. EBW and LBW qualified thickness range shall be 1.2T for test weldments 1 in [25 mm] and under in thickness and 1.1T for weldments over 1 in [25 mm] thick. If weld penetration cannot be measured, the qualified thickness ranges are 1.1T and 1.05T, respectively.

<sup>b</sup> When the groove is filled using a combination of welding processes:

(1) The test weldment thickness “T” is applicable for the base metal and shall be determined from the Base Metal Thickness Qualified column.

(2) The thickness “t” of the weld metal for each welding process shall be determined from the Deposited Weld Metal Thickness Qualified column.

(3) Each welding process qualified in this combination manner may be used separately only within the same qualification variables and the thickness limits.

<sup>c</sup> For OFW, the maximum base metal thickness qualified is the thickness of the test weldment and the maximum weld metal thickness qualified is the thickness of the weld metal deposited in the test weldment.

<sup>d</sup> For GMAW-S, the maximum thickness of base metal qualified is 1.1 times the thickness of the test weldment until the test weldment thickness is 1/2 in [13 mm], beyond which Table 4.3 applies. The maximum weld metal thickness qualified is 1.1 times the GMAW-S weld metal thickness deposited in the weldment. In addition, for thickness 3/8 in [10 mm] thick and greater, side bend tests shall be used to qualify GMAW-S short circuit WPSs.

<sup>e</sup> For fracture toughness applications less than 5/8 in [16 mm] thick, the base metal thickness of the test weldment is the minimum base metal thickness qualified.

<sup>f</sup> If any single pass in the test weldment is greater in thickness than 1/2 in [13 mm], the qualified base metal thickness is 1.1 times the test weldment thickness.

<sup>g</sup> If a test weldment receives a postweld heat treatment exceeding the lower transformation temperature, the maximum base metal thickness qualified is 1.1 times the base metal thickness of the test weldment, and the maximum weld thickness qualified is 1.1 times the weld metal of the test weldment.

<sup>h</sup> For base metals equal to or less than 3/8 in [10 mm], fillet welds have the same base metal thickness qualifications as groove welds. For base metals thickness greater than 3/8 in [10 mm], fillet welds have unlimited base metal thickness qualified.

Notes:

T = The thickness of the Test Weldment Base Metal.

t = The thickness of the Weld Deposit, excluding reinforcement.

## Table 4.4

### Thickness Limitations for Cladding and Hardfacing for Procedure Qualification (see 4.5.1 and 4.7.1)

Test Weldment Thickness (T), in [mm]	Qualified Base Metal Thickness, in [mm]	
	Minimum	Maximum
< 1 [25]	T	Unlimited
≥ 1 [25] and over	1 [25]	Unlimited

Note: The minimum weld metal thickness qualified for cladding and hardfacing is one layer if the test weldment has only one layer, and is two layers if the test weldment has two or more layers. The number of layers applies individually to each filler metal classification.



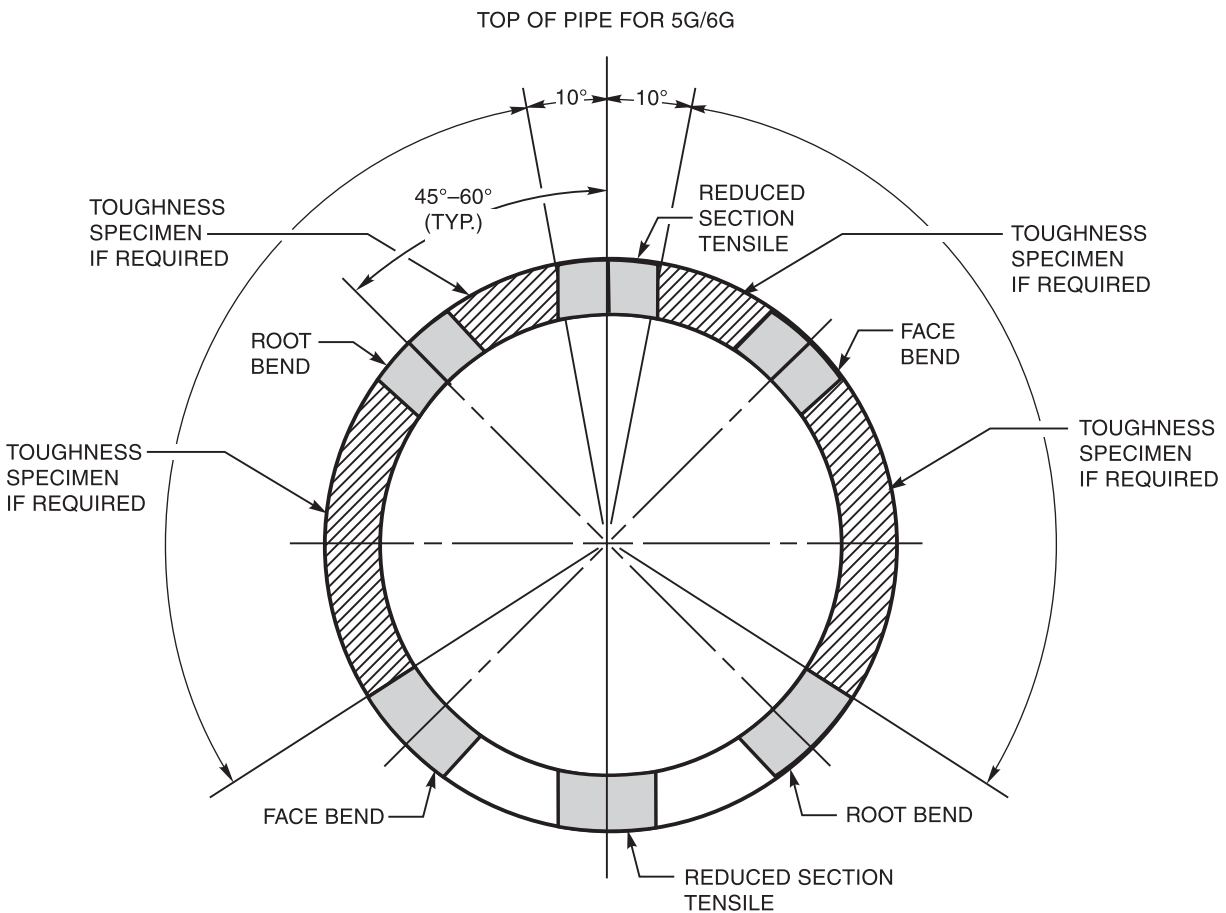
## 4.7 Pipe and Plate Groove Weld Test Weldments and Acceptance Criteria

**4.7.1** Groove test weldments shall be large enough to provide the necessary test specimens. Multiple test weldments may be necessary to provide all the required specimens. The test weldments are illustrated in Figures 4.2, 4.3, 4.4, and 4.5. The thickness of a test weldment (T) shall be determined as provided in Tables 4.2 through 4.4.

**4.7.2** Test weldments for EBW and LBW shall have a joint geometry duplicating that to be used in production.

**4.7.3** Prior to removing specimen blanks from the completed test weldment, the weld shall be visually examined on all accessible surfaces and shall meet the following criteria:

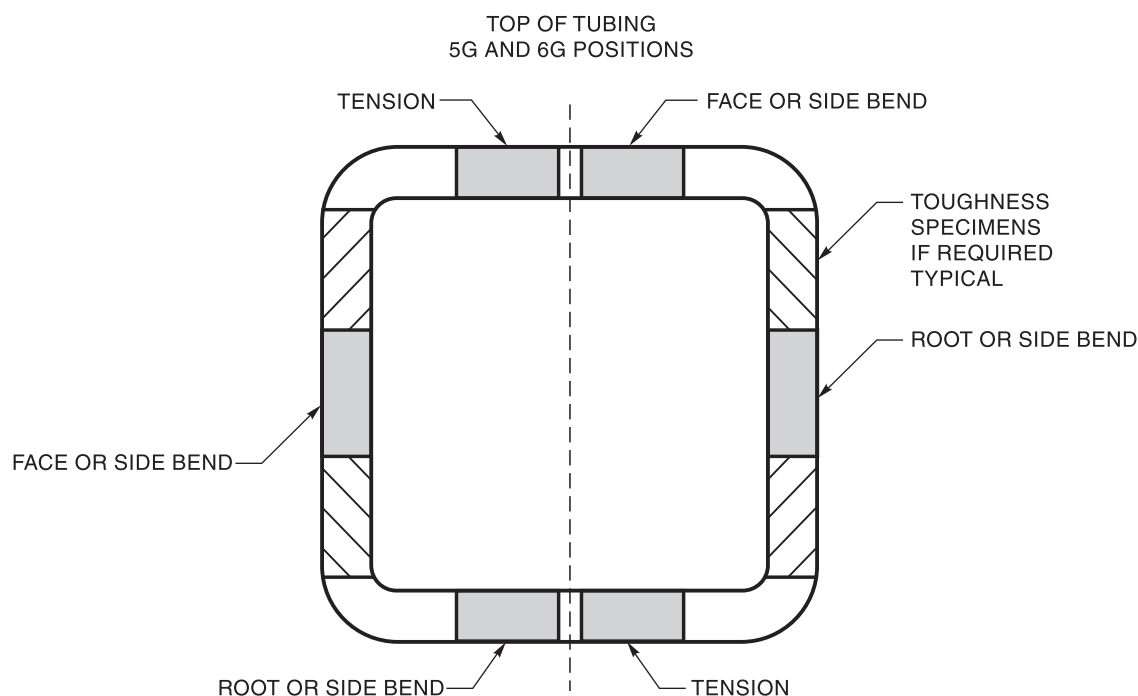
- (1) There shall be no evidence of cracks, incomplete fusion, or incomplete joint penetration.
- (2) The depth of undercut shall not exceed the lesser of 10% of the base metal thickness or 1/32 in [1 mm].
- (3) Porosity shall not exceed the limitations of the Referencing Document.



**Notes:**

1. Fracture toughness specimens, when required, shall be removed from the hatched sections.
2. Side bend specimens may be substituted for face and root bends for metal thickness from 3/8 in to 3/4 in [10 mm to 19 mm] inclusive. For metal thickness over 3/4 in [19 mm], side bends shall be used.
3. Dimensions for the specimen blanks and details of bend tests are shown in Annex A.
4. Material thickness shall be determined from the requirements provided in Table 4.3.

**Figure 4.2—Location of Groove Weld Test Specimens—Pipe (see 4.7.1, 4.7.4, and 4.7.7)**



Note: Material thickness shall be determined in accordance with Table 4.3.

**Figure 4.3—Location of Test Specimens for Welded Box Tubing (see 4.7.1, 4.7.4, and 4.7.7)**

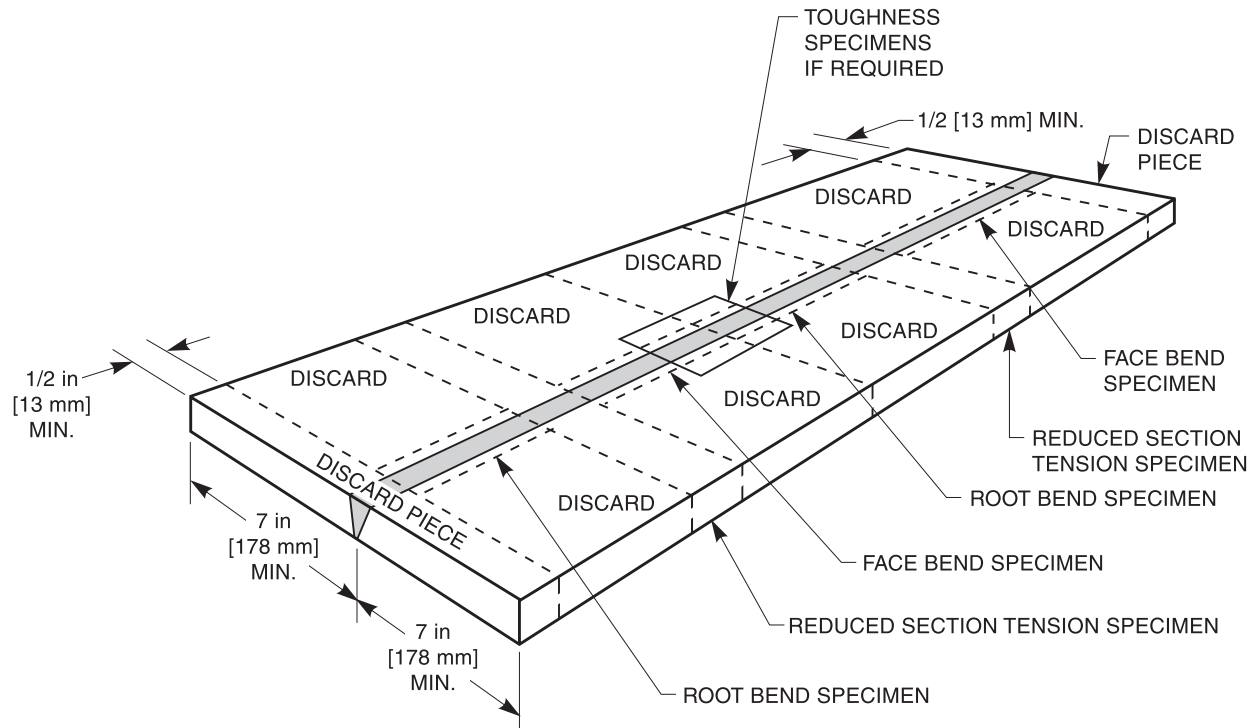
**4.7.4** After visual examination, the test weldment shall be evaluated using the tests required in Table 4.1. Specimen blanks shall be removed from the locations shown in Figures 4.2 and 4.3 for pipe and box tube, respectively, and Figure 4.4 or 4.5 for plate. The preparation and dimensions of specimen blanks shall be as provided in Annex A of this specification.

**4.7.5** Each tensile test specimen shall have a tensile strength not less than the following:

- (1) The specified minimum tensile strength of the base metal, or of the weaker of the two base metals if metals of different minimum tensile strength are used; or
- (2) The specified minimum tensile strength of the weld metal when the Referencing Document provides for the use of weld metal having a lower tensile strength than the base metal; or
- (3) If the specimen breaks in the base metal outside of the weld or weld interface, the test shall be accepted, provided the strength is not more than 5% below the specified minimum tensile strength of the base metal; or
- (4) If the base metal has no specified minimum tensile strength then failure in the base metal shall be acceptable.

**4.7.6** Bend specimens shall be bent in one of the guided bend test fixtures shown in Annex A. For transverse specimens, the weld metal and heat-affected zone shall be completely within the bent portion of the specimen after bending. There shall be no open discontinuity exceeding 1/8 in [3 mm], measured in any direction on the convex surface of the specimen after bending. Cracks occurring on the corners of the specimen during bending shall not be considered, unless there is definite evidence that they result from weld discontinuities.

**4.7.7** For fracture toughness testing, the type of test, number of specimens, and acceptance criteria shall be in accordance with the Referencing Document. The procedures and apparatus shall conform to the requirements of AWS B4.0,



## Notes:

1. Material thickness shall be determined in accordance with Table 4.3.
2. Dimensions for the specimen blanks and details of bend tests are shown in Annex A.
3. A longer test plate will be required if fracture toughness specimens are necessary. Fracture toughness specimens should be located near the midlength of the plate.
4. Make allowances for cutting.

**Figure 4.4—Location of Tension, Longitudinal Bend, and Fracture Toughness Specimens—Plate (see 4.7.1, 4.7.4, and 4.7.7)**

*Standard Methods for Mechanical Testing of Welds.* Specimen blanks shall be removed from test weldments in accordance with Figures 4.2, 4.3, 4.4, and 4.5, as applicable.

## 4.8 Fillet Test Weldments and Acceptance Criteria

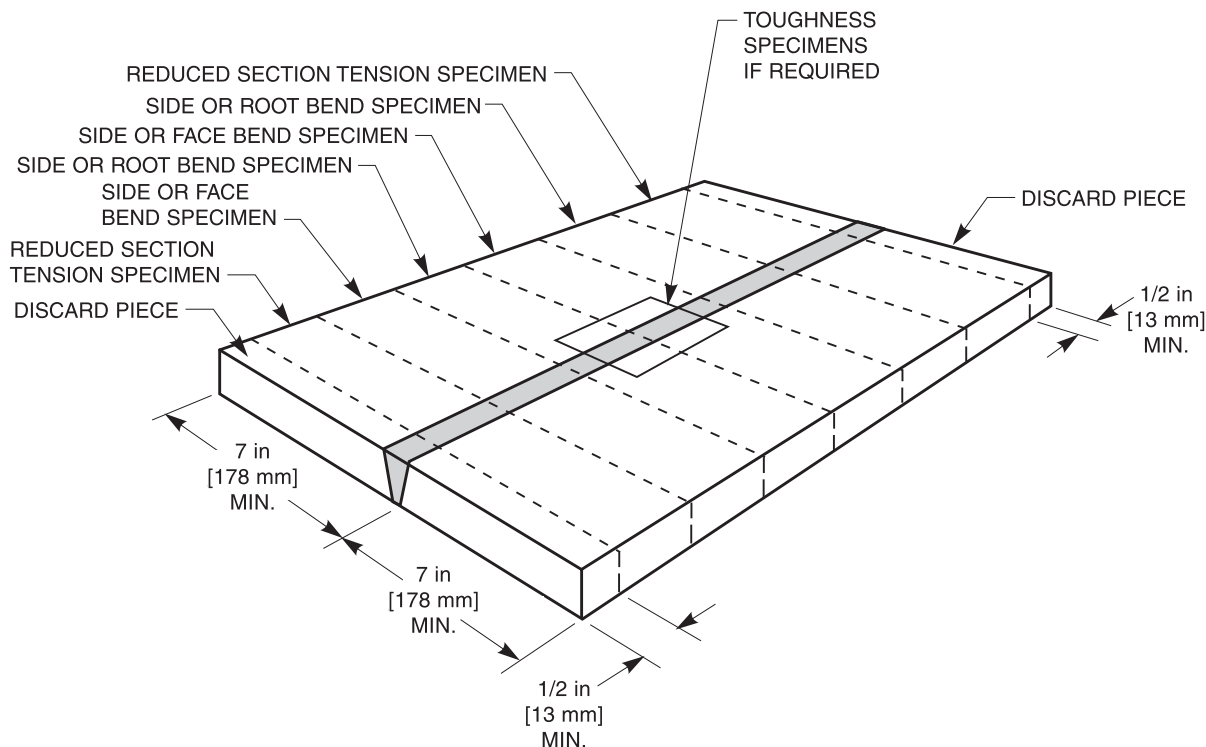
Unless otherwise stated in the Referencing Document or this document, test weldments shall be tested in accordance with AWS B4.0, *Standard Methods for Mechanical Testing of Welds*. Fillet welds may be qualified by fillet weld bend-break tests (see 4.8.5) or fillet weld shear tests (see 4.8.6).

**4.8.1** Qualification of groove welds qualifies for fillet welds but not vice versa.

**4.8.2** Fillet test weldment dimensions and test specimens are detailed in Figure 4.6 or 4.7, as appropriate.

**4.8.3** Prior to removing specimen blanks for testing, the completed test weld shall be visually examined and meet the following criteria:

- (1) There shall be no cracks or incomplete fusion.
- (2) Undercut depth shall not exceed the lesser of 10% of the base metal thickness or 1/32 in [1 mm].



## Notes:

1. Material thickness shall be determined in accordance with Table 4.3.
2. Side bend specimens may be substituted for face and root bend specimens for metal thicknesses from 3/8 to 3/4 in [10 mm to 19 mm] inclusive. For metal over 3/4 in [19 mm] thick, side bend specimens shall be used. For GMAW-S short-circuiting transfer of base metals 3/8 in [10 mm] thick and greater, side bend tests shall be used to qualify the WPS.
3. Dimensions for the specimen blanks and details of permitted bend tests are given in Annex A.
4. A longer test plate will be required if fracture toughness specimens are necessary. Fracture toughness specimens should be located near the midlength of the test plate.

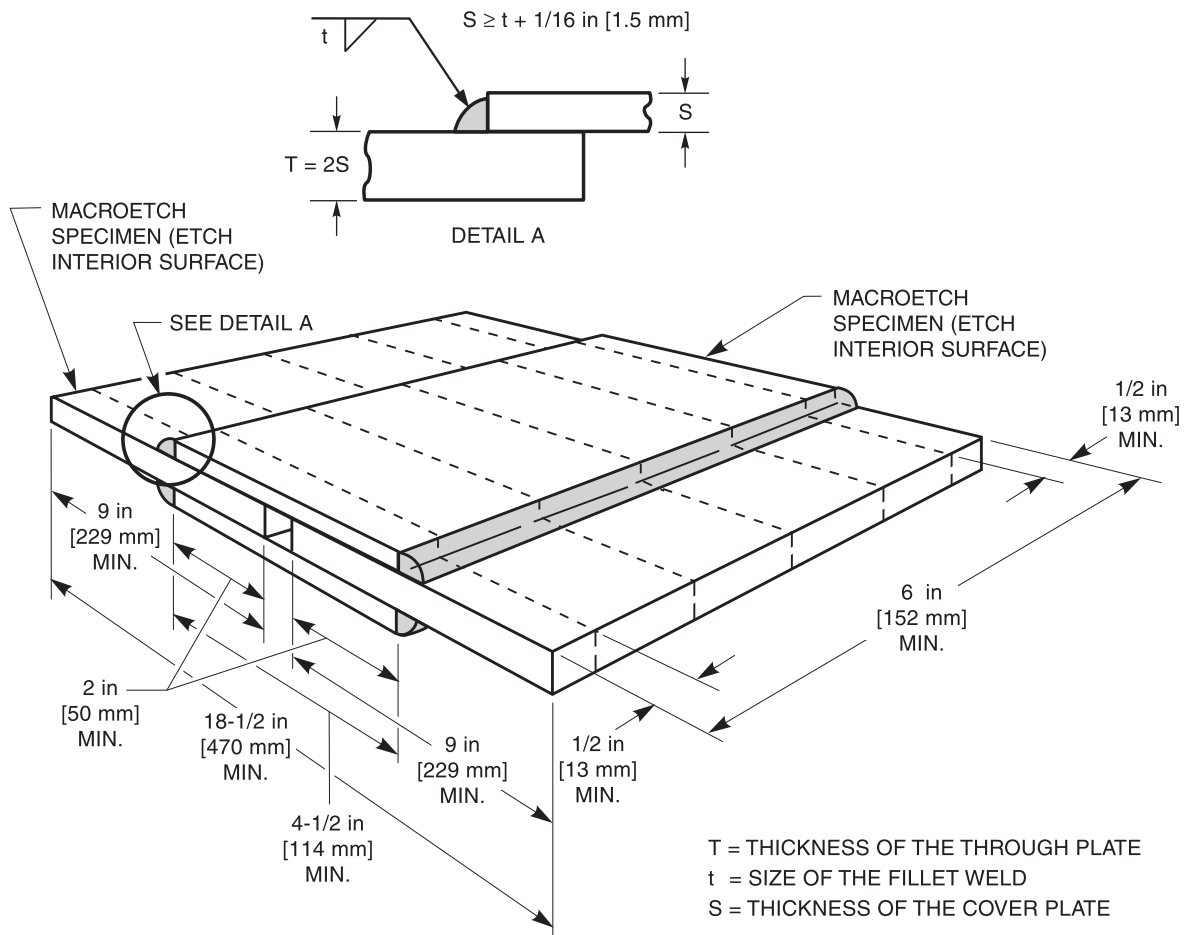
**Figure 4.5—Location of Tension, Fracture Toughness, and Transverse Bend Specimens—Plate (see 4.7.1, 4.7.4, and 4.7.7)**

(3) Profile and porosity limitations shall be in accordance with the Referencing Document.

**4.8.4 Macroetch Test Specimen.** There shall be no cracks, incomplete joint penetration, or incomplete fusion in the macro cross section.

**4.8.5 Fillet Weld Bend-Break Test.** If both single and multiple pass welds are to be qualified, one procedure qualification specimen shall be welded with the maximum size single pass to be used, and a second shall be welded with the minimum size multiple pass to be used. The test specimens are shown in Figure 4.7. Specimens shall be bent with the weld root in tension until the specimen either fractures or until it is bent flat upon itself. The specimen shall be accepted if it does not fracture or if the fillet fractures, the fractured surface shall exhibit no cracks or incomplete root fusion and no inclusion or porosity in the fracture surface exceeding 3/32 in [2 mm] in its greatest dimension. The sum of the greatest dimension of all inclusions and porosity shall not exceed 3/8 in [10 mm] in the specimen length.

**4.8.6 Fillet Shear Test.** Unless otherwise stated in the Referencing Document, the fillet shear strength shall be not less than 60% of the lower of the minimum specified tensile strength of the base metal or weld metal. If neither value is



Note: Length should be sufficient for the required number of specimens, which may be of any convenient width not less than 1 in [25 mm].

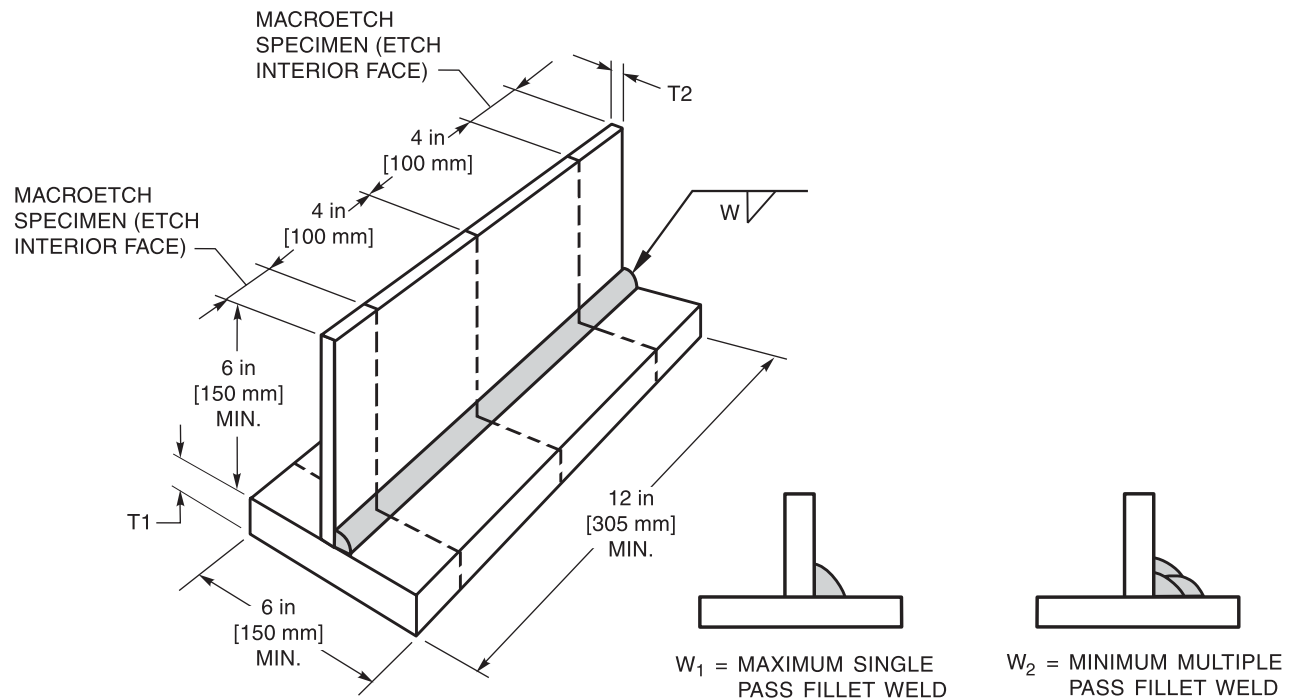
**Figure 4.6—Location of Fillet Weld Shear Test and Macroetch Specimens (see 4.8.2)**

available, two specimen blanks of the base material shall be tension tested. The lowest value determined from these tests shall be the specified minimum tensile strength for qualification purposes. The minimum shear strength of aluminum fillet welds is listed in Table 4.5.

## 4.9 Cladding Test Weldment and Acceptance Criteria

**4.9.1** The test weldment shall be welded as shown in Figure 4.8. The surface of the weld shall be prepared for liquid penetrant examination. Liquid penetrant examination shall be performed in accordance with ASTM E165, *Standard Test Method for Liquid Penetrant Examination*. The surface shall be evaluated based on the following acceptance criteria:

- (1) There shall be no linear indications longer than 1/16 in [1.5 mm].
- (2) There shall be no more than four rounded indications in a line with dimensions greater than 1/16 in [1.5 mm] and separated from each other by less than 1/16 in [1.5 mm].



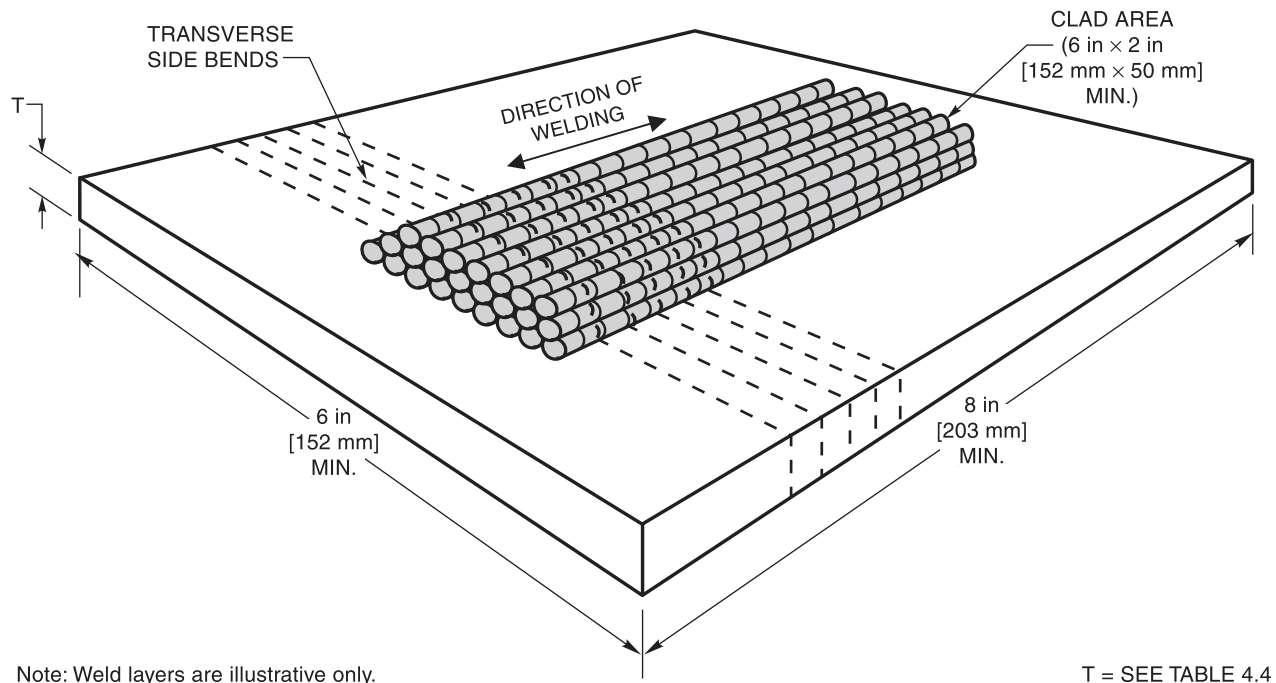
INCHES			MILLIMETERS		
W	T1 min. <sup>a</sup>	T2 min. <sup>a</sup>	W	T1 min. <sup>a</sup>	T2 min. <sup>a</sup>
3/16	1/2	3/16	5	12.7	4.8
1/4	3/4	1/4	6	19.0	6.4
5/16	1	5/16	8	25.4	8.0
3/8	1	3/8	10	25.4	9.5
1/2	1	1/2	13	25.4	12.7
5/8	1	5/8	16	25.4	15.9
3/4	1	3/4	19	25.4	19.0
>3/4	1	1	>19	25.4	25.4

<sup>a</sup>Where the maximum plate thickness used in production is less than the value shown in the table, the maximum thickness of the production pieces may be substituted for T1 and T2.

**Figure 4.7—Fillet Weld Break Test and Macroetch Specimens for Procedure Qualification (see 4.8.2 and 4.8.5)**

**Table 4.5  
Minimum Shear Strength for Aluminum Fillet Welds (see 4.12.4)**

Filler Alloy	Shear Strength	
	ksi	MPa
1100	7.5	52
2319	16.0	110
4043	15.0	103
5183	28.0	193
5356	26.0	179
5554	23.0	159
5556	30.0	207
5654	18.0	124



**Figure 4.8—Location of Cladding Test Specimens (see 4.9.1 and 4.9.2)**

**4.9.2** If the test weldment passes the liquid penetrant examination, four bend specimens shall be removed as shown in Figure 4.8.

**4.9.3** Bend specimens from cladding test weldments shall be prepared in accordance with Annex A, Figure A.4A of this specification, and bent in one of the guided-bend test fixtures shown in Figures A.5A through A.5C.

**4.9.4** Weld cladding bend specimens shall have no open discontinuity exceeding 1/16 in [1.5 mm] in the cladding, measured in any direction on the convex surface, and no open defects exceeding 1/8 in [3 mm] in length at the weld interface after bending.

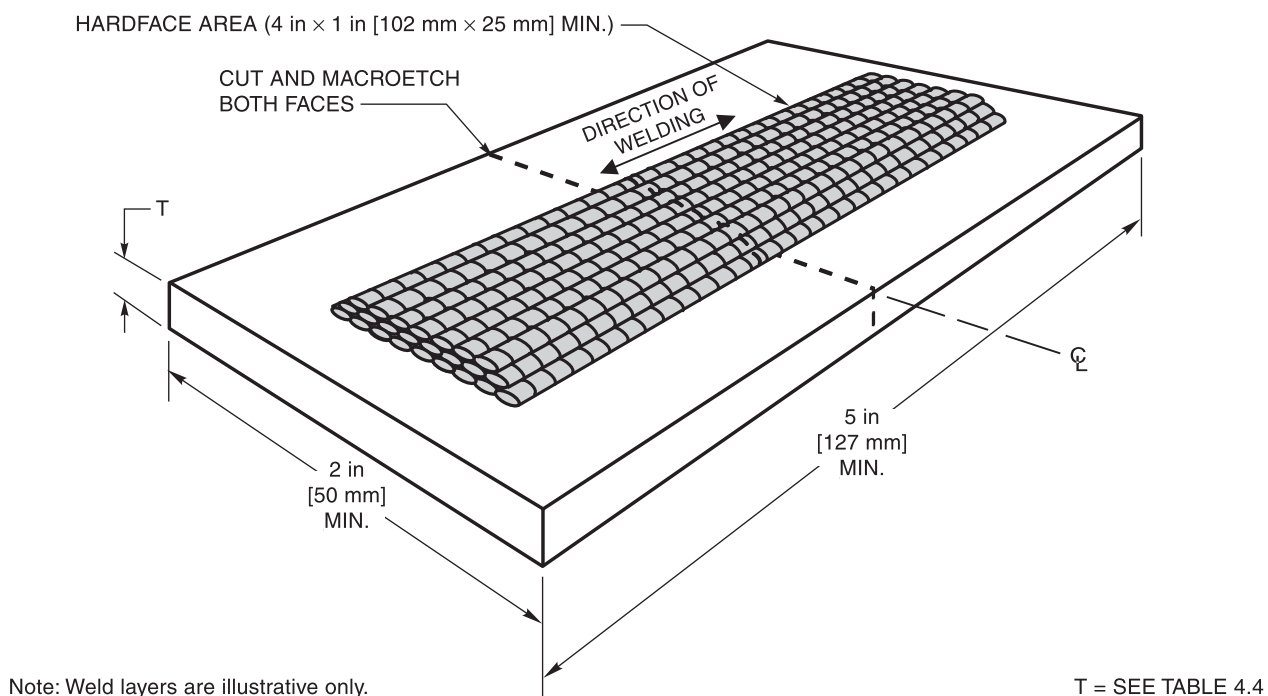
**4.9.5** A chemical analysis sample shall be removed as shown in Figure A.4B, and the results from the chemical analysis specimen shall meet the requirements of the Referencing Document.

## 4.10 Hardfacing Test Weldment and Acceptance Criteria

**4.10.1** The test weldment shall be welded as shown in Figure 4.9. The hardfaced surface shall be prepared for hardness testing at the minimum weld metal thickness to be qualified. Hardness testing shall be performed at three locations, and the result of each test shall not be less than the minimum hardness specified in the Referencing Document.

**4.10.2** If macroetch is required by the Referencing Document, the test weldment shall then be sectioned as shown in Figure 4.9. Both exposed faces shall then be polished and etched to provide a clear definition of the weld metal and the heat-affected zone in accordance with Annex G of this specification. Examination results from both faces shall meet the acceptance criteria of the Referencing Document.

**4.10.3** If specified by the Referencing Document, a sample for chemical analysis shall be obtained from one macroetch specimen as shown in Annex A, Figure A.4B.



**Figure 4.9—Location of Hardfacing Test Specimens (see 4.10.1 and 4.10.2)**

## 4.11 Stud Welds and Acceptance Criteria

**4.11.1** For studs welded to M-1 materials, ten welds are required to qualify each procedure. The following tests shall be applied to these welds:

- (1) Five bend specimens, and
- (2) Five tensile load specimens (or torque specimens).

**4.11.2** For studs welded to other than M-1 materials, fifteen welds are required to qualify each procedure. The required tests are the same as provided in 4.11.1 for M-1 materials, except that five macroetch specimens are required in addition to the bend and tension specimens. Macroetch specimens shall consist of a cross section through the weld on the stud centerline. Specimens shall be polished and etched to provide a clear definition of the weld metal and heat-affected zone in accordance with Annex G. There shall be no visible cracks on any of the five specimens.

**4.11.3 Bend Tests.** Studs shall be bent a minimum of 15° using a fixture similar to that shown in Annex A, Figure A.5D. Alternatively the studs shall be bent a minimum of 15° by hammer blows. Each of five welded studs shall be free of visible separation or fracture after bending.

**4.11.4 Tensile Load Tests.** Five stud welds shall be tested in a fixture similar to that shown in Annex A, Figure A.5F. Failure load shall be based on the minor diameter of the threaded section of externally threaded studs, except where the shank diameter is less than the minor diameter, or on the original cross-sectional area where failure occurs in a non-threaded, internally threaded, or reduced diameter stud. Each stud weld shall meet the strength requirements shown below, except a stud weld that breaks in the base metal outside of the weld or weld interface shall be acceptable.

- (1) *Ferrous metals.* The failure strength shall be 35 000 psi [241 MPa], minimum.
- (2) *Aluminum.* The failure load shall not be less than the values in Table 4.6.



**Table 4.6**  
**Minimum Tensile Load Requirements for Aluminum Stud Welds (see 4.11.4)**

Stud Size	Stud Alloy	M-Number	Load	
			lb	N
6-32	1100	21	175	800
	5356	25	335	1500
8-32	1100	21	265	1200
	5356	25	550	2400
10-24	1100	21	340	1500
	5356	25	700	3100
10-32	1100	21	390	1700
	2319	24	1050	4700
1/4-20	1100	21	600	2700
	2319	24	1550	6900
	5356	25	1300	5800
	6061	23	1475	6600
5/16-18	1100	21	1075	4800
	5356	25	2200	9800
3/8-16	1100	21	1540	6900
	2319	24	3350	14 900
	5356	25	3175	14 100
7/16-14	5356	25	4300	19 100
1/2-13	5356	25	5800	25 800

(3) *Nonferrous metals.* Other than aluminum, the failure strength shall not be less than 1/2 of the minimum specified tensile strength of the stud.

**4.11.5 Alternate Torque Test.** Each of the five stud welds, in the unlubricated condition, shall resist the applicable torque shown in Table 4.7 for steel and Table 4.8 for aluminum before failure occurs. A test fixture similar to that shown in Annex A, Figure A.5E shall be used.

## 4.12 Test Weldments Less than 1/16 in [1.5 mm] Acceptance Criteria

**4.12.1** The test weldment(s) shall be selected, depending upon the application, from those detailed in Figure 4.4 or 4.5. The required tests shall be in accordance with Table 4.1.

**4.12.2** Completed groove test weldment(s) shall be visually examined and shall meet the following acceptance criteria:

(1) No incomplete joint penetration or incomplete fusion.

(2) Not more than one visible pore or inclusion exceeding 0.25 of the base metal thickness, shall be permitted in any 1 in [25 mm] of weld.

(3) Visible pores shall not extend through the weld thickness.

(4) The weld reinforcement shall not exceed 1/8 in [3 mm].

**Table 4.7**  
**Minimum Torque Requirements for Steel Stud Welds (see 4.11.5)**

Nominal Diameter		Thread	Torque	
in	mm		lb·ft	N·m
1/4	6	28 UNF	5	7
1/4	6	20 UNC	4	5
5/16	8	24 UNF	9	12
5/16	8	18 UNC	8	11
3/8	10	24 UNF	17	23
3/8	10	16 UNC	15	20
7/16	11	20 UNF	27	37
7/16	11	14 UNC	24	33
1/2	12	20 UNF	42	57
1/2	12	13 UNC	37	50
9/16	14	18 UNF	60	81
9/16	14	12 UNC	54	73
5/8	16	18 UNF	84	114
5/8	16	11 UNC	74	100
3/4	20	16 UNF	147	199
3/4	20	10 UNC	132	179
7/8	22	14 UNF	234	317
7/8	22	9 UNC	212	287
1	24	12 UNF	348	472
1	24	8 UNC	318	431

**Table 4.8**  
**Minimum Torque Requirements for Aluminum Stud Welds (see 4.11.5)**

Stud Size	Stud Alloy	M-No.	Torque	
			lb·in	N·m
6-32	1100	21	2.5	0.3
	5356	25	3.5	0.4
8-32	1100	21	5.0	0.6
	5356	25	7.5	0.8
10-24	1100	21	6.5	0.7
	5356	25	10.0	1.1
1/4-20	1100	21	21.5	2.4
	2319	24	60.0	6.8
	5356	25	32.5	3.7
	6061	23	55.0	6.2
5/16-18	1100	21	36.0	4.1
	5356	25	54.5	6.2
3/8-16	1100	21	53.0	6.0
	2319	24	135.0	15.3
	5356	25	81.0	9.2
7/16-14	5356	25	140.0	15.8

(5) Undercut shall not exceed 0.15 times the thickness of the test weldment base metal. After visual examination, the test weldment(s) shall be subjected to the same tests required for groove welds in Table 4.1 and shall meet the following requirements for acceptance:

**4.12.2.1** Tension test(s) shall demonstrate that the welded joint meets the minimum specified tensile strength of the base metal.

**4.12.2.2** Bend tests may be conducted in a test fixture similar to Annex A, Figure(s) A.5A, A.5B, or A.5C, and shall be acceptable if there are no cracks evident in the base metal or weld metal exceeding 1/16 in [1.5 mm] after bending. Alternatively bend test(s) may consist of bending the specimen blank back upon itself, with the axis of the bend being parallel to the axis of the weld. Fractures or cracks resulting from bending shall show no evidence of weld related defects.

**4.12.3** Completed fillet test weldment(s) shall be visually examined, and except for the first and last 1/2 in [13 mm] of weld shall meet the following acceptance criteria:

- (1) The macro section specimens shall show complete fusion at the root and be free of cracks.
- (2) Undercut shall not exceed 0.15 times the thickness of test weldment(s).
- (3) Not more than one visible pore or inclusion exceeding 0.25 of the base metal thickness, shall be permitted in any 1 in [25 mm] of weld.
- (4) The weld shall be free of overlap or cracks.

**4.12.4** After visual examination, the fillet test weldment shall be subjected to the tests required for fillet welds in Table 4.1 and shall meet the following requirements:

- (1) The macro section specimens shall show complete fusion at the root and be free of cracks.
- (2) If not stated in the Referencing Document, the shear test shall demonstrate a shear strength not less than 60% of the lower of the minimum specified base metal tensile strength or of the minimum specified weld metal tensile strength. The shear strength of aluminum welds is listed in Table 4.5.

## 4.13 Welding Procedure Specification Data

The following matrix indicates the welding data to be included in a WPS for each welding process. A WPS may be presented in any format, written or tabular, provided the data required in this matrix are included (see 4.1.4). The WPS may list variables recorded on the PQR within the full range permitted for a qualification variable and practical limits determined by the Employer for other than qualification variables.

	E B W	E G W	E S W	F C A W	G M A W	G T A W	L B W	O F W	P A W	S A W	S M A W	S W
<b>4.13.1 Joint Design</b>												
(1) Joint type and dimensions.	X	X	X	X	X	X	X	X	X	X	X	
(2) Treatment of backside, method of gouging/ preparation.	X	X	X	X	X	X	X	X	X	X	X	
(3) Backing material, if used.	X	X	X	X	X	X	X	X	X	X	X	
(4) Size, shape, ferrule/flux type.												X
<b>4.13.2 Base Metal</b>												
(1) M-Number and Group Number.	X	X	X	X	X	X	X	X	X	X	X	X
(2) Thickness range qualified.	X	X	X	X	X	X	X	X	X	X	X	X
(3) Diameter (tubular only).	X	X	X	X	X	X	X	X	X	X	X	X
(4) The coating description or type, if present.	X	X	X	X	X	X	X	X	X	X	X	X
<b>4.13.3 Filler Metal</b>												
(1) Specification, classification, F- and A-Number, or if not classified the nominal composition.	X	X	X	X	X	X	X	X	X	X	X	
(2) Weld metal thickness by process and filler metal classification.				X	X	X		X	X	X	X	
(3) Filler metal size or diameter.	X	X	X	X	X	X	X	X	X	X	X	
(4) Flux-electrode classification.			X							X		
(5) Penetration enhancing flux.						X						
(6) Supplemental filler metal.	X	X	X	X	X	X	X		X	X		
(7) Consumable insert and type.						X			X			
(8) Consumable guide.		X	X									
(9) Supplemental deoxidant.	X						X					
(10) Energized filler metal “hot.”						X			X			
<b>4.13.4 Position</b>												
(1) Welding position(s).	X	X	X	X	X	X	X	X	X	X	X	X
(2) Progression for vertical welding.	X			X	X	X	X	X	X	X	X	
<b>4.13.5 Preheat and Interpass</b>												
(1) Preheat minimum.	X			X	X	X	X		X	X	X	X
(2) Interpass temperature maximum (if applicable).	X			X	X	X	X		X	X	X	
(3) Preheat maintenance.	X			X	X	X	X		X	X	X	
<b>4.13.6 Heat Treatment</b>												
(1) PWHT temperature and time.	X	X	X	X	X	X	X	X	X	X	X	X

	E B W	E G W	E S W	F C A W	G M A W	G T A W	L B W	O F W	P A W	S A W	S M A W	S W
<b>4.13.7 Shielding Gas</b>												
(1) Torch shielding gas and flow rate range.		X		X	X	X	X		X			X
(2) Root shielding gas and flow rate range.						X			X			
(3) Environmental shielding and vacuum pressure.	X						X					
<b>4.13.8 Electrical</b>												
(1) Current (or wire feed speed), current type, and polarity.	X	X	X	X	X	X			X	X	X	X
(2) Voltage range (except for manual welding).	X	X	X	X	X	X			X	X		
(3) Beam focus current pulse frequency range, and filament type, shape and size.	X											
(4) Specification, classification, and diameter of tungsten electrode.						X			X			
(5) Transfer mode.				X	X							
(6) A change to or from pulsed current.				X	X	X			X		X	
<b>4.13.9 Variables (see 4.14.9)</b>												
(1) Welding process and whether manual, semiautomatic, mechanized, or automatic.	X	X	X	X	X	X	X	X	X	X	X	X
(2) For mechanized or automatic, single or multiple electrode and spacing.	X	X	X	X	X	X			X	X		
(3) Single or multipass.	X	X	X	X	X	X	X	X	X	X	X	
(4) Contact tube to work distance.		X	X	X	X					X		
(5) Cleaning.	X	X	X	X	X	X	X		X	X	X	X
(6) Peening.		X	X	X	X	X			X	X	X	
(7) Conventional or keyhole technique.	X						X		X			
(8) Stud gun model and lift.												X
(9) Standoff distance for mechanized and automatic welding.	X						X		X			
(10) Backing shoe type.		X	X									
(11) Stringer or weave bead.				X	X	X			X	X	X	
(12) Travel-speed range for mechanized or automatic welding and manual applications requiring heat input calculations.	X	X	X	X	X	X	X		X	X		
(13) Fuel gas and flame type (oxidizing, neutral, or reducing).								X				

# WPS重要变素

## 4.14 Procedure Qualification Variables

This matrix lists the procedure qualification variables to be recorded on the PQR for each welding process. A change in a procedure qualification variable beyond the limits shown in 4.14 shall require a new or revised WPS and a new PQR (see 4.1.8). The PQR shall list the actual values of the variables used. The key to the entries in the body of the table is as follows:

- Q— Qualification variable for all applications  
 T— Qualification variable for all fracture toughness applications  
 C— Qualification variable for weld cladding applications  
 H— Qualification variable for hardfacing applications

	E B W	E G W	E S W	F C A W	G M A W	G T A W	L B W	O F W	P A W	S A W	S M A W	S W
<b>4.14.1 Joint Design</b>												
(1) A change in groove type (V-groove, U-groove, single bevel, etc.).	Q						Q					
(2) A change from a fillet to a groove weld.	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
(3) A change in the M-Number of backing.	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
(4) The addition of thermal backgouging on M-11, M-23, M-24, M-26, or M-27 heat-treatable base metal.	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
(5) The addition or deletion of nonmetallic retainers or nonfusing metal retainers.		Q	Q									
(6) The addition or deletion of backing or backing shoes.		Q	Q									
(7) An increase in fitup gap beyond that used in the qualification test.	Q						Q					
<b>4.14.2 Base Metal</b>												
(1) A change in base metal thickness beyond the range permitted in 4.5.	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
(2) A change from one M-Number base metal to another M-Number base metal or to a combination of M-Number base metals, except as permitted in 4.3.13.	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
(3) A change from one unlisted base metal to a different unlisted base metal or to a listed base metal or vice versa.	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
(4) A change from one M-Number Group Number to any other M-Number Group Number, except as permitted in 4.3.14.	Q	T	T	T	T	T	Q		T	T	T	
(5) A change from one M-5 group (A, B, etc.) to any other. A change from M-9A to M-9B, but not vice versa. A change from one M-10 or M-11 group (A, B, etc.) to any other group.	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
(6) A change from an uncoated metal to a coated (such as painted or galvanized) metal unless the coating is removed from the weld area prior to welding, but not vice versa, except as permitted in 4.3.8.	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q

**4.14.3 Filler Metals**

	E B W	E G W	E S W	F C A W	G M A W	G T A W	L B W	O F W	P A W	S A W	S M A W	S W
(1) A change from one F-Number to any other F-Number or to any filler metal not listed in Annex B.	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
(2) For ferrous materials, a change from one A-Number to any other A-Number or to a filler metal analysis not listed in Annex B (the PQR and WPS shall state the nominal chemical composition, the AWS specification and classification, or the manufacturer's designation for filler metals which do not fall in an A-Number group). Qualification with A-1 shall qualify for A-2 and vice versa.	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
(3) For surfacing, a change in the chemical composition of the weld metal (A-Number or alloy type). Each layer shall be considered independent of other layers.			C, H	C, H	C, H	C, H		C, H	C, H	C, H	C, H	
(4) A change in AWS filler metal specification and classification.	T	T	T	T	T	T	Q	Q	T	T	T	
(5) A change in filler metal tensile strength exceeding 10 000 psi [69 MPa], or a change in filler metal classified to a strength lower than the specified minimum tensile strength designator of the base metal.	Q	Q	Q	Q	Q	Q		Q	Q	Q	Q	
(6) If the weld metal alloy content is largely dependent upon the composition of the flux, any change in the welding procedure which would result in the important weld metal alloying elements being outside the specified chemical composition range of the WPS.			Q							Q		
(7) A change in the cross-sectional area of filler metal added (excluding buttering) of ±10%.	Q						Q					
(8) The addition or deletion of filler material.	Q					Q	Q		Q			
(9) A decrease in thickness or a change in the nominal chemical composition of surfacing or buttering beyond that qualified.	C, H		C, H	C, H	C, H	C, H	C, H	C, H	C, H	C, H	C, H	
(10) A change of filler metal/electrode nominal size/shape in the first layer.				C, H	C, H					C, H	C, H	
(11) Addition or deletion of supplementary filler metal (powder or wire), or a change of 10% in the amount.	T	T	T	T	Q	T	Q	Q	Q	Q	Q	T
(12) A change from single to multiple supplementary filler metal or vice versa.				C, H	C, H	C, H		C, H	C, H	C, H		
(13) A change from consumable guide to nonconsumable guide, and vice versa.			Q									

	E B W	E G W	E S W	F C A W	G M A W	G T A W	L B W	O F W	P A W	S A W	S M A W	S W
<b>4.14.3 Filler Metals (Cont'd)</b>												
(14) Addition or deletion, or a change in the nominal amount or composition of supplementary metal (in addition to filler metal) beyond that qualified.		Q			Q					Q		
(15) A change from wire to strip electrodes and vice versa.			Q							Q		
(16) A change from one AWS flux-electrode classification listed to any other electrode-flux-electrode classification, or to an unlisted electrode-flux classification. A variation of 0.5% of the molybdenum content of the weld metal does not require requalification.			Q							Q		
(17) A change in the weld metal thickness beyond that permitted in 4.5.	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	
(18) The addition or deletion, or a change in the nominal amount or composition of supplementary deoxidation material beyond that qualified.	Q						Q					
<b>4.14.4 Position</b>												
(1) A change from any position to the vertical position, uphill progression. Vertical uphill progression qualifies all positions.				T	T	T			T		T	
(2) The addition of a welding position, except that positions other than flat also qualify for flat.				C, H	C, H	C, H		C, H	C, H	C, H	C, H	Q
<b>4.14.5 Preheat and Interpass Temperature</b>												
(1) A decrease in preheat of more than 100°F [38°C] from that qualified.	Q			Q	Q	Q	Q		Q	Q	Q	Q
(2) An increase of more than 100°F [38°C] in the maximum interpass temperature from that recorded on the PQR.				T	T	T			T	T	T	
(3) For M-23, M-24, M-26, and M-27 heat-treatable materials an increase in the preheat or interpass temperature of more than 100°F [38°C] from that qualified.					Q	Q			Q		Q	
<b>4.14.6 Postweld Heat Treatment</b>												
(1) For the following M-Numbers 1, 3, 4, 5, 6, 7, 9, 10, 11, and 12, a change from any one condition to any other requires requalification: (a) No PWHT. (b) PWHT below the lower transformation temperature. (c) PWHT within the transformation temperature range.	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q



	E B W	E G W	E S W	F C A W	G M A W	G T A W	L B W	O F W	P A W	S A W	S M A W	S W
<b>4.14.6 Postweld Heat Treatment (Cont'd)</b>												
(d) PWHT above the upper transformation temperature.	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
(e) PWHT above the upper transformation temperature, followed by treatment below the lower transformation temperature.												
(2) For all materials not covered above, a separate PQR is required for no PWHT and PWHT.	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
(3) The qualification test weldment shall be subjected to heat treatment essentially equivalent to that of the production weldment, including at least 80% of the aggregate time at temperature.	T	T	T	T	T	T		T	T	T	T	
<b>4.14.7 Shielding Gas</b>												
(1) Addition or deletion of torch shielding gas.		Q		Q	Q	Q	Q		Q			Q
(2) A change in the specified nominal composition of shielding gas.		Q		Q	Q	Q	Q		Q			Q
(3) A change of shielding environment from vacuum to an inert gas or vice versa.	Q						Q					
(4) An increase in vacuum pressure.	Q											
(5) A change in shielding, as a result of a change in ferrule or flux type.												Q
(6) For M-51, M-52, M-61, and M-10I base metal, a change in the nominal composition or a decrease of 15% in the root shielding flow rate.					Q	Q			Q			
(7) For M-21 through M-27, an increase of 50% or more, or a decrease of 20% or more in the shielding gas flow rate used for qualification.					Q	Q			Q			
(8) The addition, deletion, or a change in composition, or a decrease exceeding 15% in the flow rate of root shielding gas on single-sided M-4X groove joints and for all welds in M-51 through M-54, M-61 and M-62, M-10I, M-10J, and M-10K.					Q	Q			Q			
(9) For M-10I, M-51 through M-54, and M-61 and M-62, the deletion of, or a change in composition of, or a decrease exceeding 10% in the trailing gas flow rate.					Q	Q	Q		Q			
(10) The addition, deletion, a 5% flow rate change for any gas used in the process, or a change in the orientation of the plasma-removing gas jet relative to the workpiece (e.g., coaxial transverse to beam).							Q					

**4.14.8 Electrical Characteristics**

An increase in heat input, or an increase in volume of weld metal deposited per unit length of weld, over that qualified. The increase shall be determined by (a), (b), or (c) for nonwaveform controlled welding, or by (b) or (c) for waveform controlled welding.

(a) Heat input (J/in [J/mm])

$$= \frac{\text{Voltage} \times \text{Amperage} \times 60}{\text{Travel Speed (in/min [mm/min])}}$$

(b) Volume of weld metal measured by

(1) an increase in bead size (width × thickness), or

(2) a decrease in length of weld bead per unit length of electrode.

(c) Heat input determined using instantaneous energy or power by

(1) for instantaneous energy measurements in joules (J)

Heat input (J/in [J/mm])

$$= \frac{\text{Energy (J)}}{\text{Weld Bead Length (in [mm])}}$$

(2) for instantaneous power measurements in joules per second (J/s) or Watts (W)

Heat input (J/in [J/mm])

$$= \frac{\text{Power (J/s or W)} \times \text{arc time (s)}}{\text{Weld Bead Length (in [mm])}}$$

The requirement for measuring the heat input or volume of deposited weld metal does not apply when the WPS is qualified with a PWHT above the upper transformation temperature or when an austenitic or P-No. 10H material is solution annealed after welding.

**4.14.9 Other Variables**

(1) A change in welding process.

(2) A change in the number of electrodes in the same weld pool.

(3) A change from multipass per side to single pass per side.

	E B W	E G W	E S W	F C A W	G M A W	G T A W	L B W	O F W	P A W	S A W	S M A W	S W
4.14.8 Electrical Characteristics	T	T	T	T	T	T	T		T	T	T	
(1) A change in welding process.	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
(2) A change in the number of electrodes in the same weld pool.		Q	Q	T	T	T			T	T		
(3) A change from multipass per side to single pass per side.	Q			T	T	T	Q		T	T	T	

	E B W	E G W	E S W	F C A W	G M A W	G T A W	L B W	O F W	P A W	S A W	S M A W	S W
<b>4.14.9 Other Variables (Cont'd)</b>												
(5) A change in the stud gun model, or a change exceeding 1/32 in [1 mm] in the nominal lift.												Q
(6) A change exceeding ±5% in gun-to-workpiece distance, or axis of beam angle related to work.	Q											
(7) A change exceeding ±20% in oscillation length or width from that qualified, or the addition of a cosmetic wash pass.	Q											
(8) A change in design or material of backing shoes.	Q	Q	Q									
(9) A change exceeding ±20% in the oscillation variables for mechanized or automatic welding.				T	T	T			T	T		
(10) A change exceeding ±10% in travel speed for mechanized or automatic welding.				C, H	C, H	C, H			C, H	C, H		
(11) A change from stringer bead to weave bead for manual welding.				C, H	C, H	C, H			C, H	C, H	C, H	
(12) A change from a stringer to a weave bead, but not vice versa, for M-23, M-24, M-26, and M-27 heat-treatable materials.					Q	Q			Q			
(13) A change from a stringer bead to a weave bead in vertical uphill welding.				T	T	T			T		T	
(14) A change in the nominal size or shape of the stud at the section to be welded.												Q
(15) A change in the type of fuel or type of flame.								Q				
(16) A change from single-sided welds to double-sided or vice versa.	Q						Q					

## 5. Performance Qualification

### 5.1 General

The purpose of welder qualification testing is to determine the ability of welders to produce a sound weld in the welding test positions. The purpose of welding operator qualification tests is to determine the ability of welding operators to operate mechanized or automatic equipment.

**5.1.1** Qualification of welders and welding operators requires that a weldment shall be made according to a Standard Welding Procedure Specification (SWPS) or a qualified Welding Procedure Specification (WPS). The weldment shall be prepared and tested in accordance with the requirements of this specification. If the WPS requires preheat or PWHT, they may be omitted at the discretion of the Qualifier.

**5.1.2** Welders and welding operators currently qualified to earlier editions of AWS B2.1 are also qualified to this edition.

**5.1.3** Personnel currently qualified by the Employer to meet the requirements of other codes or specifications are considered qualified under AWS B2.1 provided the basis for their qualification meets all requirements of this specification. However, the limits of qualification shall be in accordance with 5.6, Performance Qualification Variables. In such cases, a certification form shall be initiated and signed by the Employer attesting to compliance with this specification. If an existing form is used, the certifying statement shall be added or appended. If a new form is issued, it shall reference any prior certification form which shall be attached to or traceable from the new form.

**5.1.4** Qualification testing using one of two methods is permitted:

- (1) Qualification by Standard Test (see 5.2)
- (2) Qualification by Workmanship Test (see 5.3). For selection of performance qualification methods, see Figure 5.1.

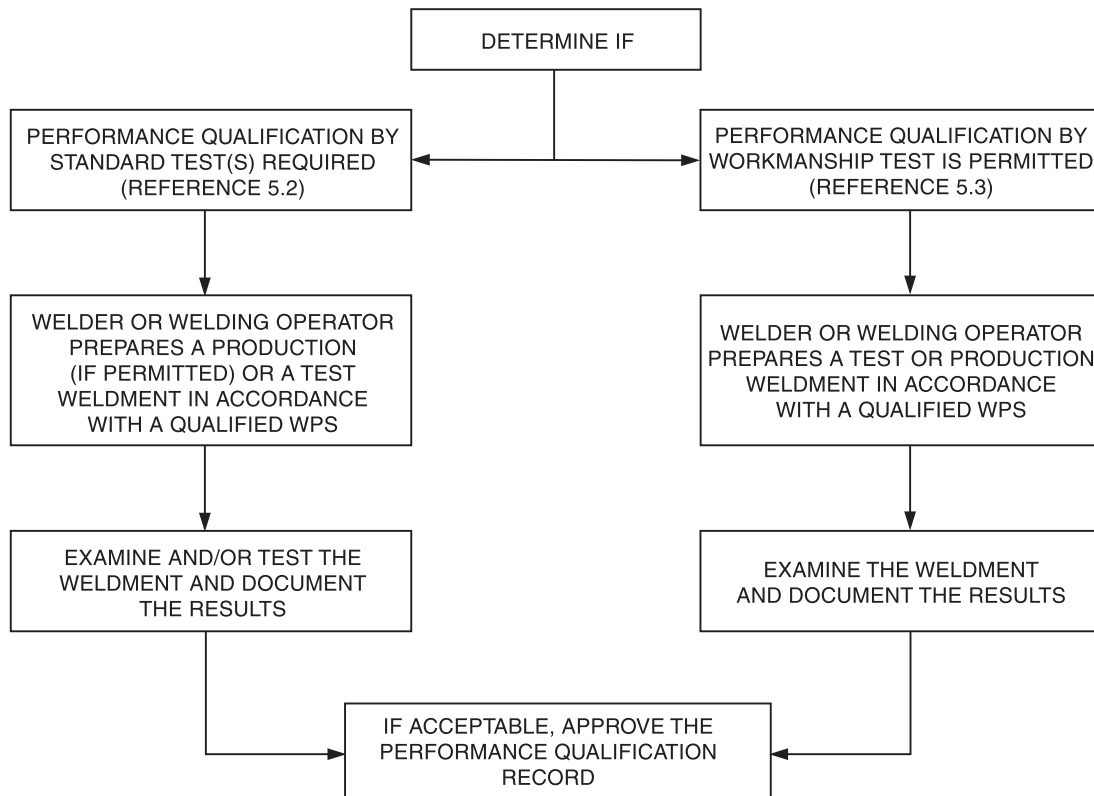
**5.1.5** A Standard Test shall qualify the individual to perform production welding where either a Standard Test or a Workmanship Test is specified. Where the Referencing Document permits qualification by visual examination, a Workmanship Test may qualify a welder or welding operator for production welding.

**5.1.6** A Workmanship Test is permitted on a production weldment, if such qualification is also permitted by the Referencing Document. Qualification by Standard Test is also permitted to be performed on a production weld where Table 5.1 permits the use of radiography in lieu of bend tests. Production radiography shall meet the requirements of 5.5.2, Radiographic Examination.

**5.1.7** The welder or welding operator undertaking performance qualification tests shall be under the full supervision and control of the Qualifier during the welding of test weldments.

**5.1.8** The qualification test for each welder or welding operator shall be documented by the Qualifier for both acceptable and unacceptable tests (see example in Annex F). There is no required format for Performance Qualification Test Records (PQTR). Any PQTR form may be used. Documentation shall:

- (1) Identify the WPS used;
- (2) Address each of the qualification variables in 5.6, Performance Qualification Variables;
- (3) Identify test and examination methods used and results; and
- (4) Identify the limits of qualification for the welder or welding operator.



Note: Figure 5.1 is provided to aid the user in determining the type of examinations or tests that are required to qualify a welder or welding operator using this specification.

**Figure 5.1—Selection of Performance Qualification Method—  
Workmanship Test or Standard Test (see 5.1.4)**

**Table 5.1  
Examination Requirements for Performance Qualification<sup>d</sup> (see 5.1.6 and 5.2.1)**

Type of Test	Pipe or Plate Less than 1/16 in [1.5 mm]		Pipe or Plate Equal to or Greater than 1/16 in [1.5 mm]		Surfacing		<u>Stud Welding</u>
	Groove	Fillet	Groove	Fillet	Cladding	Hardfacing	
Visual Examination	Yes	Yes	Yes	Yes	Yes	Yes	
Radiography	Yes <sup>a</sup> (in lieu of bends)		Yes <sup>a</sup> (in lieu of bends)				
Bend Test	Yes <sup>a</sup>		Yes <sup>a</sup>		Yes		<u>Yes<sup>e</sup></u>
Break Test <sup>c</sup>		Yes		Yes <sup>c</sup>			
Macro-Examination <sup>b</sup>				Yes <sup>c</sup>		Yes	

<sup>a</sup> Radiography may be substituted for bend testing for the SMAW, GTAW, GMAW (except short-circuiting), FCAW, PAW, and SAW processes, as applicable, for qualifications on all base metals except M-51 to M-55 and M-61 to M-62. GTAW tests in M-51 to M-55 and M-61 to M-62 may be qualified with radiography.

<sup>b</sup> The use of a macro examination in lieu of bend tests shall be permitted only for welds made in M-26, M-81, and M-83 base materials.

<sup>c</sup> The requirement for a break test and macro is waived for welders who successfully complete fillet procedure qualification tests (where shear tests, plus visual and macro examinations are used).

<sup>d</sup> See Table 5.2.

<sup>e</sup> Each stud (five) shall be tested either by hammering over until one-fourth of its length is flat on the test piece or by bending the stud to an angle of at least 15° and returning it to its original position using a test jig and an adapter location dimension that are in accordance Annex A, Figure A.5D.

**5.1.9** Acceptance of test results is the responsibility of the Qualifier. Qualification records shall be signed and dated by the Qualifier. Qualification records shall reference and may include mechanical test and nondestructive examination test reports that are signed by others. Retention of mechanical test and nondestructive examination test reports is not required after acceptance by the Qualifier.

**5.1.10** A welder or welding operator who fails the performance test may be retested at the option of the Qualifier, using (1) or (2) below:

(1) If a retest is permitted by the Qualifier without further training or practice, it shall consist of two test weldments for each position failed. Both test weldments shall be acceptable for the welder or welding operator to qualify.

(2) Provided there is evidence satisfactory to the Qualifier that the welder or welding operator has had further training or practice, one test weld for each position failed is permitted.

**5.1.11** The performance qualification of a welder or welding operator shall be affected when one of the following conditions occur:

(1) When he or she has not welded with a process during a period of 6 months or more, his or her qualifications for that process shall expire.

(2) Requalification as a result of (1) is permitted by having the welder or welding operator make one test weldment using the same process. If the test weldment meets the requirements of this specification, then all of the welder's or welding operator's previous qualifications for that process, for materials, thicknesses, product forms, and other variables are reinstated.

(3) When there is a specific reason to question his or her ability to make welds that meet the specification, the qualifications which support the welding he or she is doing shall be revoked. All other qualifications not questioned remain in effect.

(4) Requalification as a result of (3) is permitted by having the welder or welding operator successfully complete performance qualification test(s) that support the qualification(s) questioned.

**5.1.12** Completion of an acceptable procedure or performance qualification test shall qualify the welder or welding operator who welded the test weldment within the limits of performance qualification variables specified in 5.6, Performance Qualification Variables.

**5.1.13** Successful qualification using the test WPS shall also qualify an individual to weld with any other WPS using the same process and within the limits of performance variables in 5.6, Performance Qualification Variables. Qualification as a welder does not qualify the individual as a welding operator or vice versa.

**5.1.14** Qualification on a complete joint penetration groove weld also qualifies the welder or welding operator for partial joint penetration groove welds, fillet welds and tack welds. Qualification on a fillet weld qualifies only for fillet welding and tack welding.

**5.1.15** Welders qualified on a groove weld are also qualified to perform weld build up of surfaces to replace or repair base material with similar composition weld metal within the limits of 5.6.1.1, Welders. Cladding qualification qualifies only for cladding. Hardfacing qualification qualifies only for hardfacing.

**5.1.16** Stud welding qualification qualifies only for stud welding.

**5.1.17** Performance qualification requirements for cast iron and for reinforcing bar are covered in AWS D11.2, *Guide for Welding Iron Castings*, and in AWS D1.4/D1.4M, *Structural Welding Code—Reinforcing Steel*, respectively.

## 5.2 Qualification by Standard Test

**5.2.1** Qualification requires completion of a standard test weldment in accordance with a qualified WPS, evaluation of the test weldment by the methods listed in Table 5.1, and acceptance of the weldment in accordance with the criteria of 5.5, Examination Procedures and Acceptance Criteria. The number of bend tests required for each position and product form is shown in Table 5.2.

**Table 5.2**  
**Number of Bend Tests for Performance Qualification (see 5.2.1 and Table 5.1)**

	Product Form				
	Plate	Pipe	Tube	Sheet	Stud
1G	2	2	2	2	—
2G	2	2	2	2	—
3G	2	—	—	2	—
4G	2	—	—	2	—
5G	—	4	4	—	—
6G	—	4	4	—	—
<u>1S</u>	—	—	—	—	<u>5</u>
<u>2S</u>	—	—	—	—	<u>5</u>
<u>4S</u>	—	—	—	—	<u>5</u>

**5.2.2** Five stud-welds are required to qualify each stud-welding operator. The equipment used for stud welding shall be completely automatic except for manual starting.

### 5.3 Qualification by Workmanship Test

**5.3.1** Qualification by workmanship test is permitted only when allowed by the Referencing Document.

**5.3.2** Qualification requires completion of a workmanship test welded in accordance with a qualified WPS which addresses typical production joints and conditions.

Workmanship weldments are accepted or rejected primarily on the basis of the visual examination criteria of 5.5, Examination Procedures and Acceptance Criteria. Other tests or examinations (macro examination, etc.) may be specified by the Referencing Document. Some typical workmanship test weldments are shown in Figure 5.2.

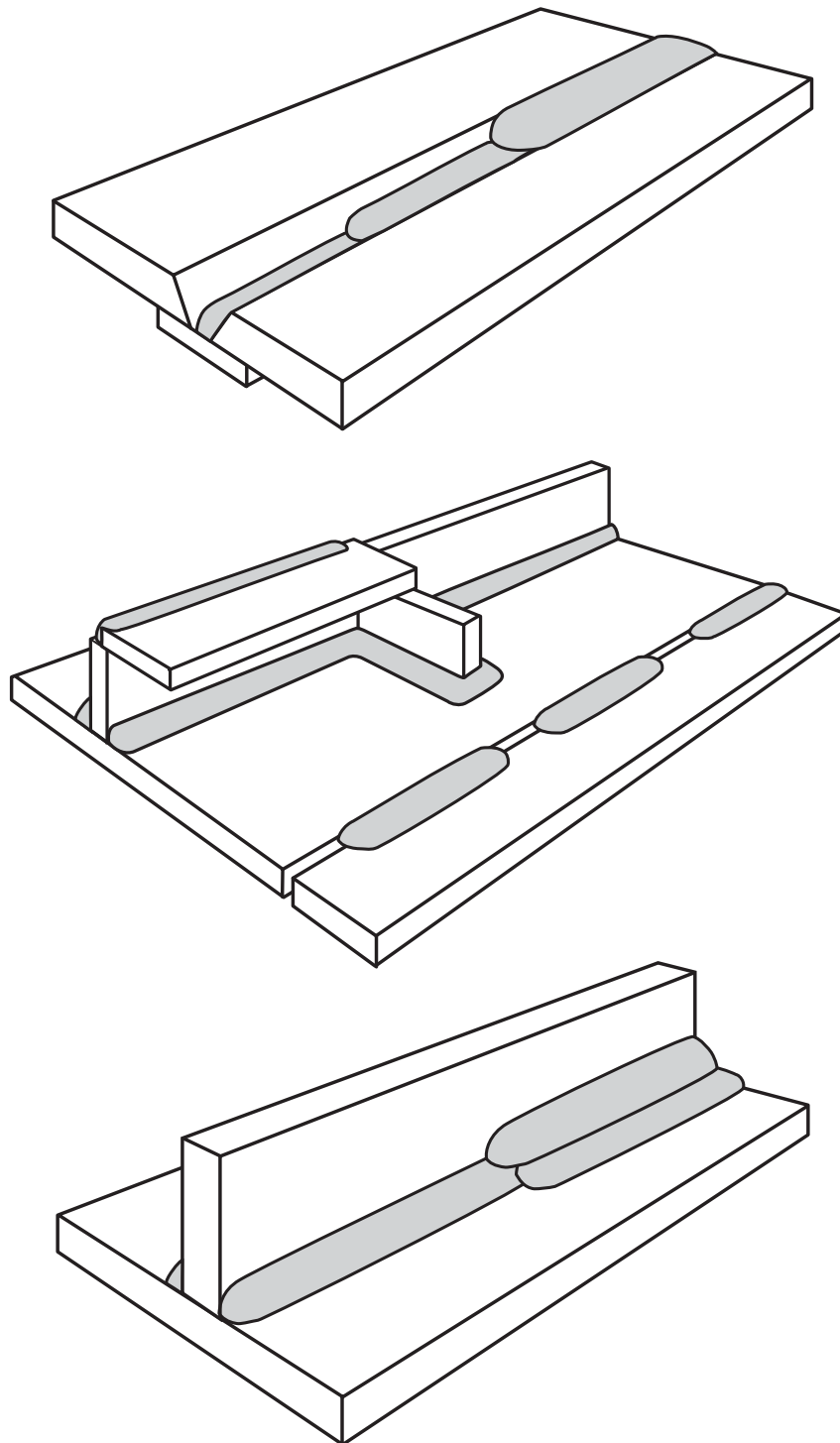
### 5.4 Test Weldments

**5.4.1** Qualification is valid only for metals having the same M-Numbers, except as otherwise permitted in Table 5.3.

**5.4.2** Tests shall be performed using a filler metal which has an assigned F-Number listed in Annex B. Table 5.4 provides a matrix showing filler metals which, if used in qualification testing, will qualify that welder and welding operator to use other filler metals without further testing. A test using a filler metal not assigned an F-Number in Annex B shall qualify only for that filler metal.

**5.4.3** Test coupons welded in the specific test positions described in Annex A1.1 and A1.3 qualify the welder to weld plate or pipe as permitted in Table 5.5. Weldment orientation other than the specific test positions shown in Annex A is permitted, but such tests qualify only for the orientation tested. Figures A.1B and A.1D show the permitted angular deviation in weld axis inclination and weld face rotation for each test position passed.

**5.4.4** One or more welding processes may be qualified on a single test weldment. Multiple welders and welding operators may be qualified on a single test weldment, providing each welder or welding operator deposits a minimum of one layer. Each qualification shall be based on the weld metal deposited. Failure of any portion of such test weldments constitutes failure for all processes, welders and welding operators used in that test weldment.



Note: The top figure illustrates a weldment intended to demonstrate ability to weld a single or multiple pass groove weld with a backing strip. The center figure illustrates a weldment intended to demonstrate ability to weld fillet, corner, and square groove joints. The bottom figure illustrates a weldment intended to demonstrate ability to weld single and multiple pass fillet welds.

**Figure 5.2—Typical Workmanship Test Weldments (see 5.3.2)**



**Table 5.3**  
**Allowable Base Metals for Performance Qualification (see 5.4.1)**

Test Weldment Material <sup>a</sup>	Qualifies for Production Welding Materials <sup>b</sup>
M-1 through M-11, M-34, and M-41 through M-47	M-1 through M-11, and M-41 through M-47 and M-34
M-21 through M-27	Any M-21 through M-27 material
M-31 through M-33 and M-35	Only the specific M-Number used in the qualification test
M-34 or M-42	Any M-34 and M-41 through M-47 material
M-51 through M-54 and M-61 and M-62	M-51 through M-54 and M-61 and M-62
M-81 or M-83	Any M-81 and M-83

<sup>a</sup> If materials not listed in Annex C are used for qualification tests, the welder or welding operator shall be qualified to weld only on the material used in the test weldment.

<sup>b</sup> Also qualifies unlisted materials of similar chemical composition to the test materials.

**Table 5.4**  
**Allowable Filler Metals for Performance Qualification (see 5.4.2)**

Filler Metal Used in Qualification Test	Qualifies a Welder and a Welding Operator to Use the Filler Metals Listed Below
F-Number 1 through 5	The F-Number used in the test and any lower F-Number
F-Number 6 <sup>a</sup>	All F-Number 6 filler metals
F-Number 2X	All F-Number 2X filler metals
F-Number 3X	Only for the specific F-Number 3X filler metal
F-Number 4X	F-Number 1 through 5 and all F-Number 4X
F-Number 5X	All F-Number 5X filler metals
F-Number 61	All F-Number 61 filler metals
F-Number 71	Only for the specific F-Number 71 filler metal
F-Number 91	All F-Number 91 filler metals

<sup>a</sup> Deposited solid bare wire, which is not covered by an AWS specification but which conforms to an A-Number analysis in Annex B, Table B.2, may be considered classified as F-Number 6.

**5.4.5** Figures 5.3 through 5.13 illustrate the various performance test weldments which are permitted, and give the locations for the removal of required specimen blanks.

**5.4.6 Cladding.** The clad weldment shall be visually examined in accordance with 5.5, Examination Procedures and Acceptance Criteria. If acceptable, the clad surface shall be machined to the minimum weld metal thickness specified in the WPS. Two bend specimens are required except that 6G cladding pipe performance qualification requires three bend specimens, and the 2G cladding pipe performance qualification requires only one bend specimen.

**5.4.7 Hardfacing.** Prior to removing test specimen blanks identified in Figure 5.13, the hardfaced surface shall be visually examined in accordance with the Referencing Document. Unless otherwise specified in the Referencing Document one transverse macro shall be removed as shown in Figure 5.13, and the weld shall show complete fusion.

**Table 5.5**  
**Position Limitations for Performance Tests (see 5.4.3, 5.6.1.1, 5.6.1.2, and Figure 5.13)**

Qualified Positions <sup>c, e</sup>						
Weld	Test Positions <sup>f</sup>	Groove		Fillet	Clad and Hardfacing	Stud Welding
		Plate and Pipe Over 24 in [610 mm] O.D.	Pipe ≤24 in [610 mm] O.D.	Plate and Pipe	Plate and Pipe	Any
Plate Groove	1G	F		F, H	—	—
	2G	F, H		F, H	—	—
	3G	F, V		F, H, V	—	—
	4G	F, O		F, H, O	—	—
	3G and 4G	F, V, O		All	—	—
	2G, 3G, and 4G	All		All	—	—
Plate Fillet	1F	—	—	F	—	—
	2F	—	—	F, H	—	—
	3F	—	—	F, H, V	—	—
	4F	—	—	F, H, O	—	—
	3F and 4F	—	—	All	—	—
Pipe Groove <sup>a, b</sup>	1G	F	F	F, H	—	—
	2G	F, H	F, H	F, H	—	—
	5G	F, V, O	F, V, O	All	—	—
	6G	All	All	All	—	—
	2G and 5G	All	All	All	—	—
Pipe-Fillet	1F	—	—	F	—	—
	2F	—	—	F, H	—	—
	2FR	—	—	F, H	—	—
	4F	—	—	F, H, O	—	—
	5F	—	—	All	—	—
Clad or Hardfacing <sup>d</sup> (Pipe or Plate) <sup>e</sup>	1C	—	—	—	F	—
	2C	—	—	—	F, H	—
	3C	—	—	—	F, V	—
	4C	—	—	—	F, O	—
	3C and 4C	—	—	—	F, V, O	—
	2C, 3C, and 4C	—	—	—	All	—
	5C (pipe only) 6C (pipe only)	—	—	—	F, V, O All	—
Stud <sup>g</sup>	1S	—	—	—	—	F
	2S	—	—	—	—	H
	4S	—	—	—	—	F, O
	2S and 4S	—	—	—	—	All

<sup>a</sup> Welders qualified on tubular product forms may weld on both tubular and plate in accordance with any restrictions on diameter contained in other portions of this document.

<sup>b</sup> See Table 5.6.

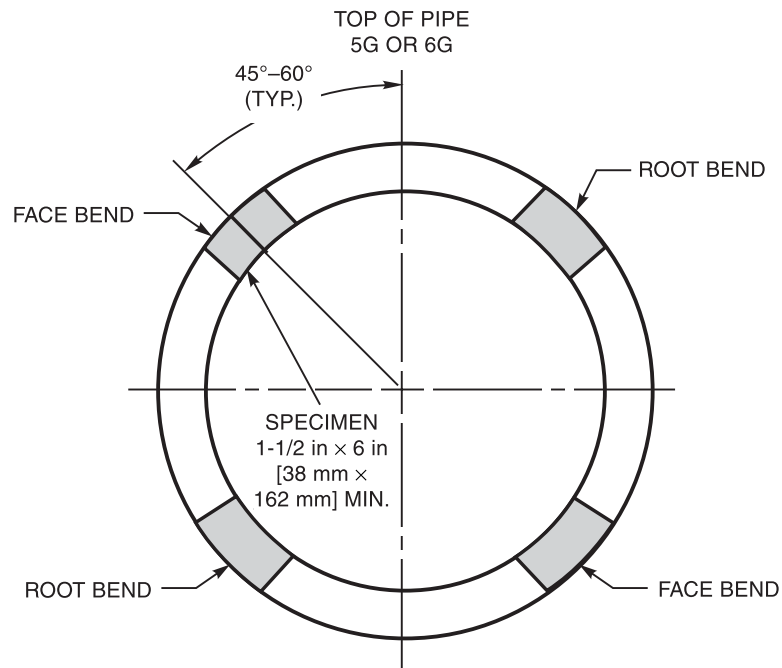
<sup>c</sup> F = Flat, H = Horizontal, V = Vertical, O = Overhead. Refer to A1.2, A1.4, and Figures A.1B and A.1D of Annex A.

<sup>d</sup> Positions for surfacing applications are defined as 1C = Flat, 2C = Horizontal, 3C = Vertical, 4C = Overhead, 5C = Circumferential pipe horizontal position, 6C = Circumferential pipe joint with pipe inclined 45°.

<sup>e</sup> For surfacing applications, qualification on plate qualifies for plate only except that qualification on plate in the flat position also qualifies on pipe in the flat position. Qualification on pipe in any position shown above for cladding or hardfacing also qualifies for plate in the positions allowed in the table.

<sup>f</sup> Refer to A1.1 and A1.3 for welding test position definitions.

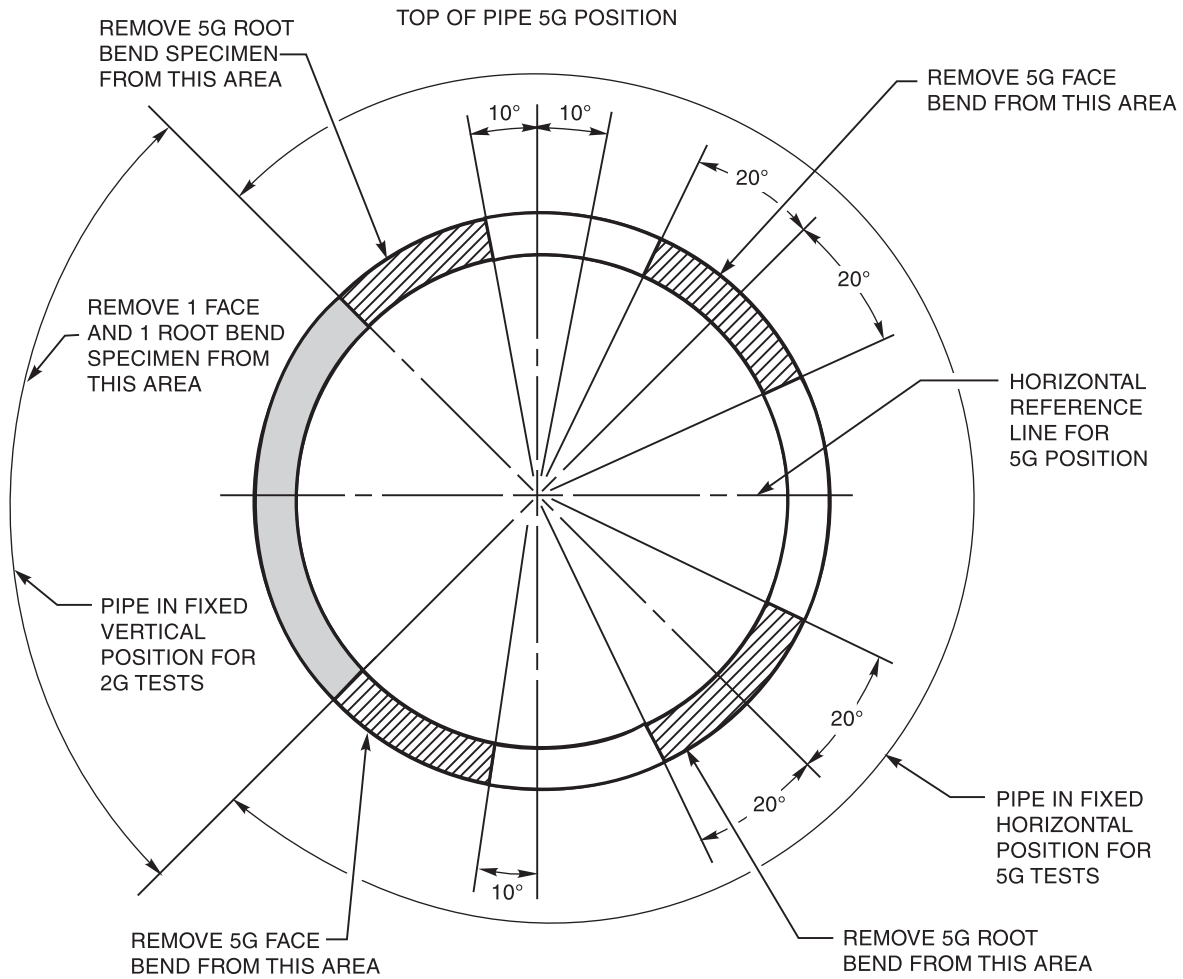
<sup>g</sup> Refer to A1.5 for stud welding test position definitions.



Notes:

1. For pipe over 3/8 in [10 mm] thick, side bends may be taken in lieu of face and root bends. For base metals which exceed 3/4 in [19 mm], side bends shall be taken.
2. See Table 5.6 for diameter and thickness limitations.

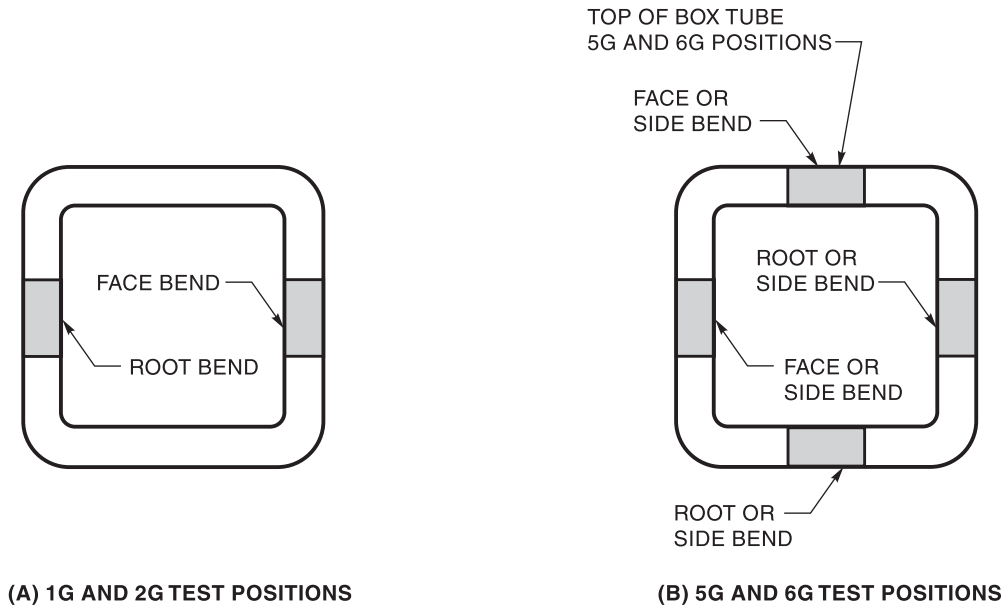
**Figure 5.3—Location of 1G, 2G, 5G, and 6G Bend Specimens—Pipe Groove Weldment (see 5.4.5)**



## Notes:

1. For pipe over 3/8 in [10 mm] thick, side bends may be taken in lieu of face and root bends. For base metal thicknesses which exceed 3/4 in [19 mm], side bends shall be taken.
2. See Table 5.6 for diameter and thickness limitations.
3. Six specimen blanks shall be removed from the appropriate locations shown, 1 face and 1 root bend specimen from the 2G portion of the test weldment and 2 face and 2 root bend specimens from the 5G portion of the test weldment.
4. Dimensions for the specimen blanks and details of bend tests are shown in Annex A.

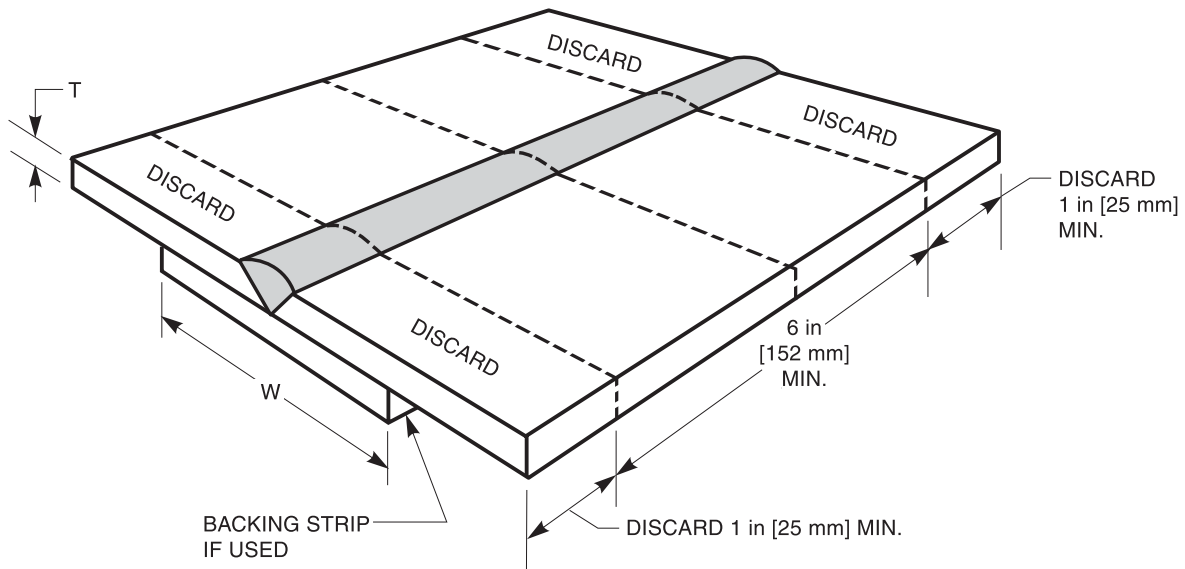
**Figure 5.4—Location of Bend Specimens—Combined Pipe Positions 2G and 5G (see 5.4.5)**



Notes:

1. For pipe over 3/8 in [10 mm] thick, side bends may be taken in lieu of face and root bends. For base metals which exceed 3/4 in [19 mm], side bends shall be taken.
2. The outside diameter of square and rectangular tube is defined as the shortest distance across opposite sides.
3. See Table 5.6 for diameter and thickness limitations.

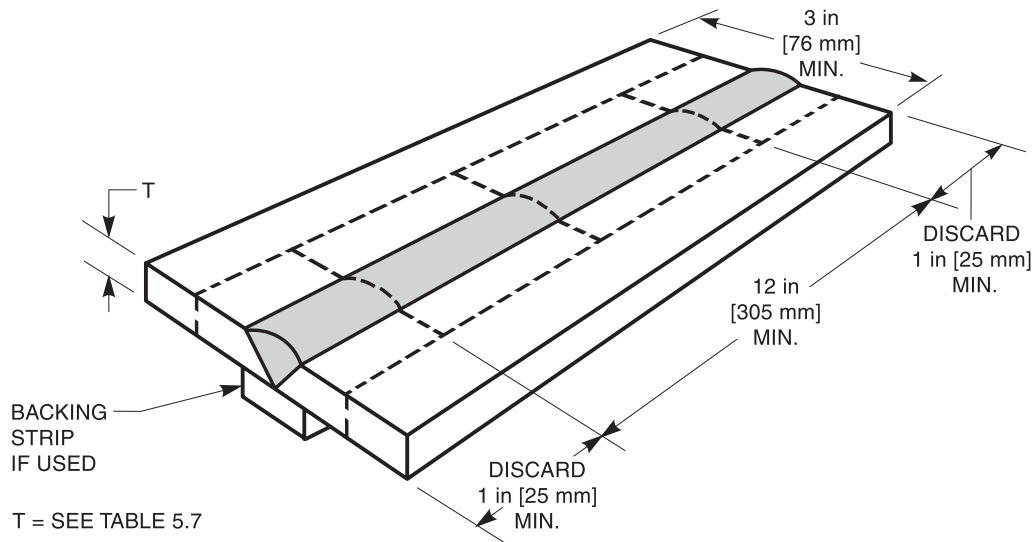
**Figure 5.5—Location of Bend Specimens for Box Tube (see 5.4.5)**



Notes:

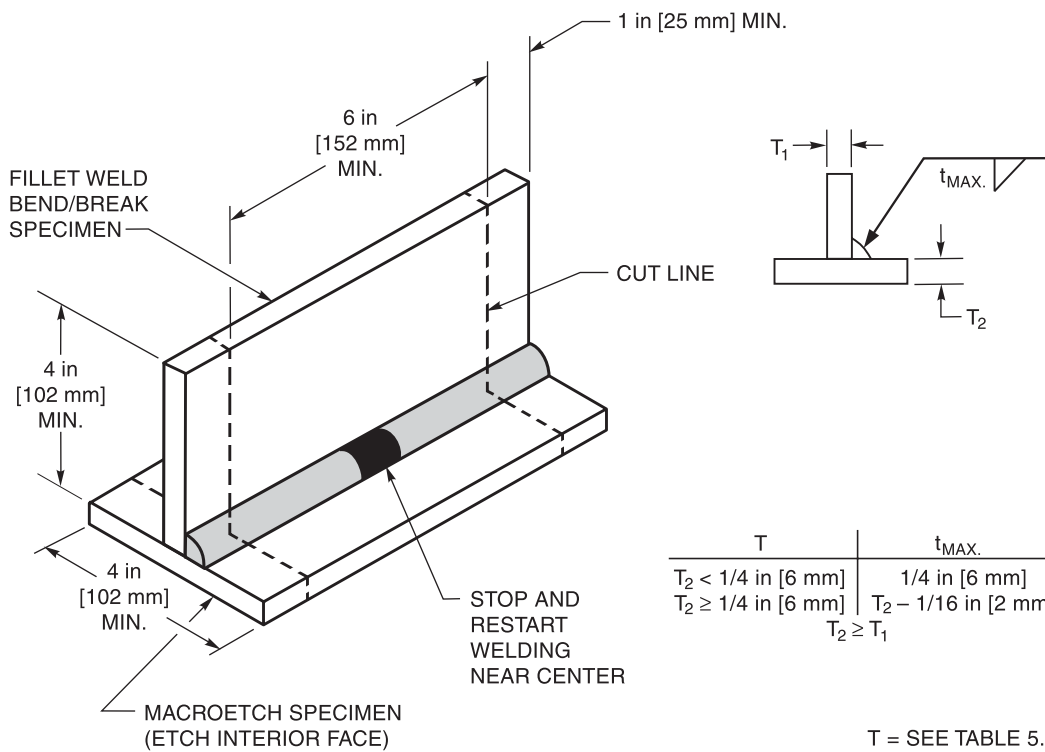
1. Longitudinal bend specimens as shown in Figure 5.7 may be substituted for transverse bend specimens for welds that differ markedly in bending behavior between two base metals or between base metal and weld metal.
2. For thicknesses (T) from 3/8 in to 3/4 in [10 mm to 19 mm], side bends may be substituted for the face and root bends shown. For thicknesses over 3/4 in [19 mm], side bends shall be used. The specimens and their order of removal shall be the same for weldments with or without the optional backing strip shown in these drawings.
3. Dimensions of test specimens and detail of test fixtures are shown in Annex A.
4. Backing width (W) shall be 3 in [76 mm] minimum if radiography is used.

**Figure 5.6—Location of Transverse Bend Specimens—Plate Groove Weldment (see 5.4.5 and 5.6.1.1)**



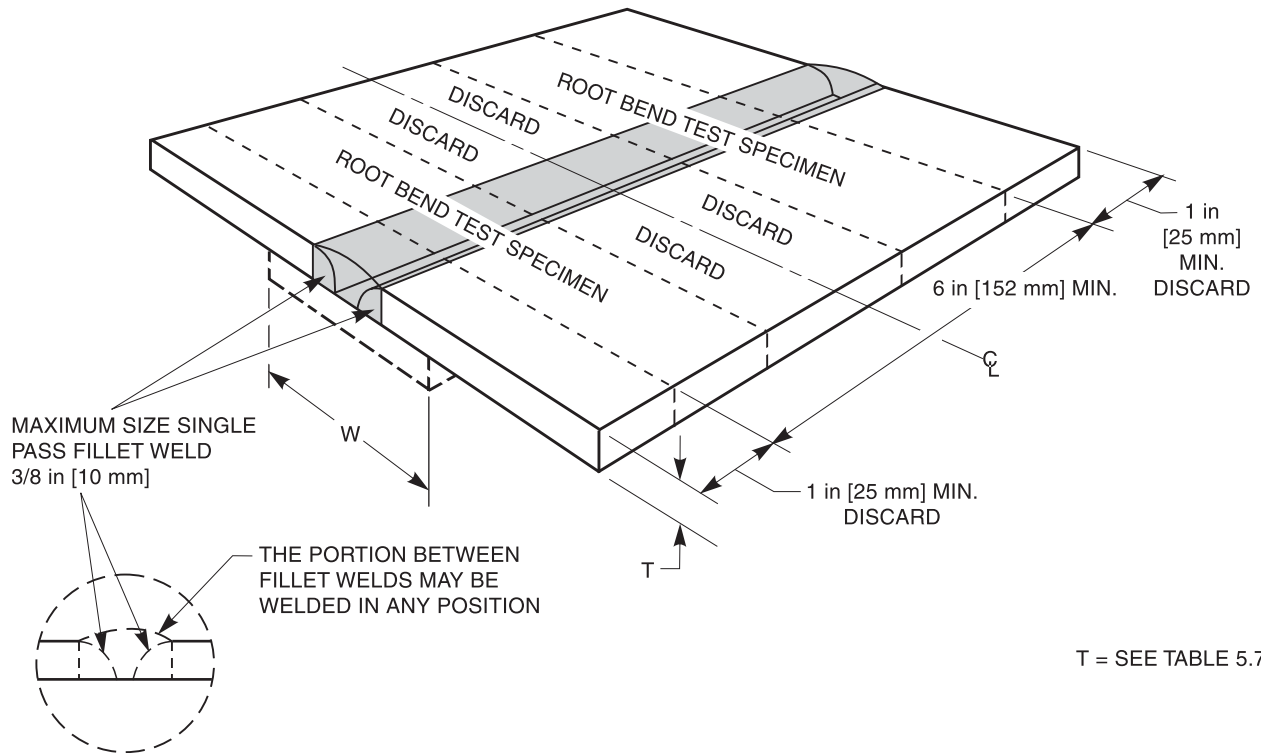
Note: Dimensions of test specimens and test fixtures are shown in Annex A.

**Figure 5.7—Location of Longitudinal Bend Specimens—Plate Groove Test Weldment (see 5.4.5, 5.6.1.1, Figure 5.6, and Figure 5.9)**



Note: The center 6 in [152 mm] segment shall be bent with the root in tension until it fractures or bends flat.

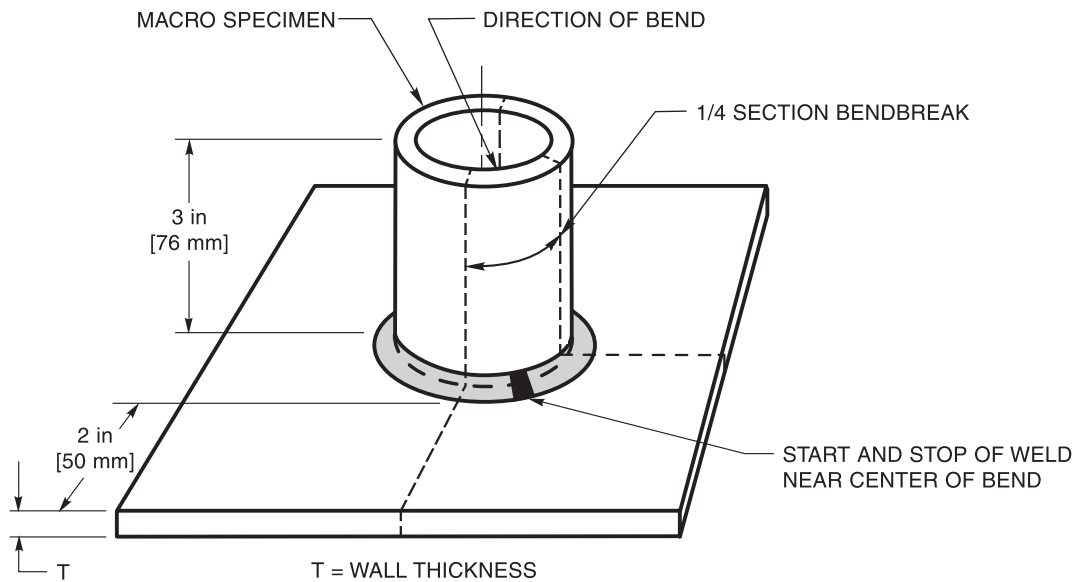
**Figure 5.8—Location of Fillet Test Specimens—Plate (see 5.4.5 and 5.6.1.1)**



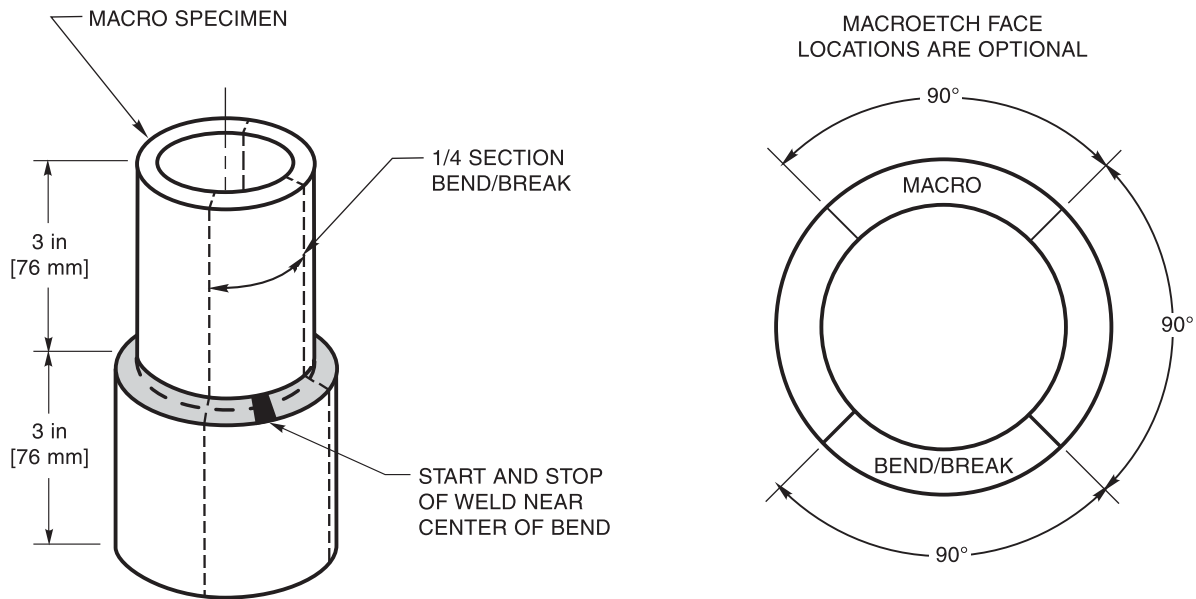
Notes:

1. Longitudinal bend specimens as shown in Figure 5.7 may be substituted for transverse bend specimens for welds that differ markedly in bending behavior between two base metals or between base metal and weld metal.
2. Dimensions of test specimens and detail of test fixtures are shown in Annex A.
3. Backing width ( $W$ ) shall be 3 in [76 mm] minimum if radiography is used.

**Figure 5.9—Location of Fillet Test Specimens—Alternate Weldment—Plate (see 5.4.5)**

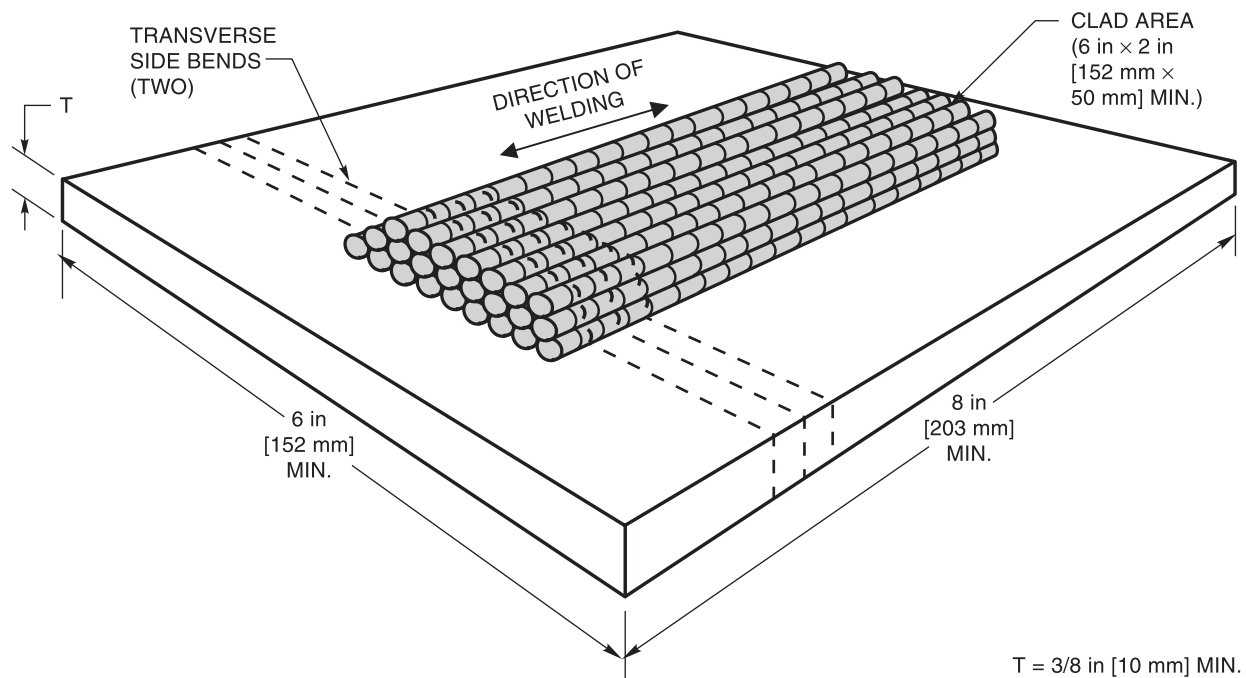


**Figure 5.10—Location of Fillet Test Specimens—Pipe (see 5.4.5)**



Note: The bend/break specimen shall be removed from the lower 90° for 5F weldments.

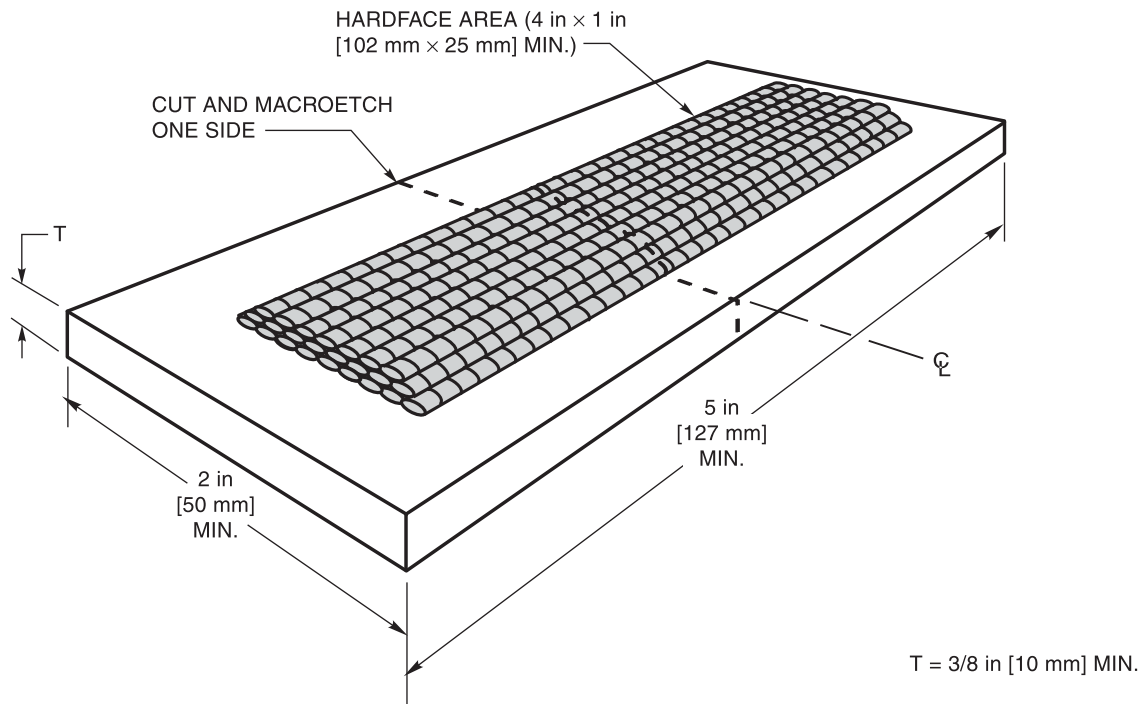
**Figure 5.11—Location of Fillet Test Specimens—Alternate Weld—Pipe (see 5.4.5)**



Note: Weld layers are illustrative only. Two transverse side bend specimen shall be removed from the test coupon for each position for which the welder is being qualified, except as otherwise required in 5.4.6.

**Figure 5.12—Location of Cladding Specimens—Plate (see 5.4.5)**





Note: Weld layers are illustrative only. One transverse macro specimen shall be removed from the test coupon for each position for which the welder is being qualified, except as otherwise permitted in Table 5.5.

**Figure 5.13—Location of Test Specimen—Hardfacing Test Weldment—Plate (see 5.4.5 and 5.4.7)**

## 5.5 Examination Procedures and Acceptance Criteria

Unless otherwise specified in the Referencing Document, examination procedures and acceptance criteria shall be as specified in the following subclauses.

**5.5.1 Visual Examination.** The test weld may be examined visually by the Qualifier at any time, and the test terminated at any stage if the necessary skills are not exhibited. The completed test weld shall be visually examined without magnification.

**5.5.1.1 Standard Test Weldments.** Acceptance criteria for visual examination of standard test weldments shall be as follows:

(1) Plate and Pipe Weldments

- (a) No cracks or incomplete fusion.
- (b) No incomplete joint penetration in groove welds, except where partial joint penetration groove welds are specified.
- (c) Undercut depth shall not exceed the lesser of 10% of the base metal thickness or 1/32 in [1 mm].
- (d) Face reinforcement or root reinforcement shall not exceed 1/8 in [3 mm].
- (e) No single pore shall exceed 3/32 in [2 mm] diameter.
- (f) For fillet weld tests, concavity or convexity of the weld face shall not exceed 1/16 in [1.5 mm]. The two fillet weld sizes shall not differ by more than 1/8 in [3 mm].

(2) Cladding/Hardfacing Weldments

The appearance of the weld shall satisfy the Qualifier that the welder is skilled in applying the WPS used for the test weldment.

(3) Test Weldments Less than 1/16 in [1.5 mm] Base Metal Thickness

- (a) No cracks or incomplete fusion.
- (b) No melt-through (burn-through) which results in a hole.
- (c) No weld reinforcement for groove welds or convexity for fillet welds that exceed 1/8 in [3 mm].
- (d) No visible porosity or inclusions.

(4) Stud Weldments

**Bend and Hammer Test.** In order to pass the test(s), each of the five stud welds and heat-affected zones shall be free of visible separation or fracture after bending and return bending or after hammering.

**5.5.1.2 Workmanship Test Weldments.** Acceptance criteria for visual examination of workmanship test weldments shall be as specified below. If visual examination is the only criterion for acceptance, all weld beads are subject to examination.

(1) No cracks or incomplete fusion.

(2) Undercut shall not exceed the lesser of 10% of the base metal thickness or 1/32 in [1 mm] Except that 1/16 in [1.5 mm] undercut is acceptable if less than 1/4 in [6 mm] long, provided the accumulated length of such undercut is less than 3/4 in [19 mm] in any 12 in [305 mm] of weld.

(3) Reinforcement shall not exceed 1/8 in [3 mm].

(4) No single pore shall exceed 3/32 in [2 mm] diameter.

**5.5.2 Radiographic Examination.** Unless otherwise specified in the Referencing Document, the radiographic procedure and acceptance criteria shall be in accordance with Annex D.

**5.5.3 Bend Tests.** Specimens shall be bent in one of the guided-bend test fixtures shown in Figures A.5A, A.5B, and A.5C.

**5.5.3.1** For face bend specimens, the weld face side shall be on the convex side of the bend specimen. For root bend specimens, the weld root side shall be on the convex side of the bend specimen. Side bend specimens may be bent in either direction. For all transverse bend specimens, the weld metal and heat-affected zone shall be completely within the bent portion of the specimen after bending.

**5.5.3.2** Bend specimens from groove welds shall have no open discontinuity exceeding 1/8 in [3 mm], measured in any direction on the convex surface of the specimen after bending. Cracks occurring on the corners of the specimen during bending shall not be considered, unless there is definite evidence that they result from slag inclusions or other discontinuities.

**5.5.3.3** For weld cladding, no open discontinuity exceeding 1/16 in [1.5 mm] measured in any direction on the surface shall be permitted in the cladding, and no open defects exceeding 1/8 in [3 mm] in length shall be permitted at the weld interface after bending.

**5.5.4 Fillet Weld Bend-Break Tests.** Specimens shall be bent with the weld root in tension until the specimen either fractures or until it is bent flat upon itself. The specimen shall be accepted if:

- (1) The specimen does not fracture; or
- (2) If the fillet fractures, the fractured surface shall exhibit no cracks or incomplete root fusion and no inclusion or porosity in the fracture surface exceeding 3/32 in [2 mm] in its greatest dimension; or
- (3) The sum of the greatest dimension of all inclusions and porosity do not exceed 3/8 in [10 mm] in the specimen length.

**5.5.5 Macro Examination.** Specimens shall be polished and etched to provide a clear definition of the weld metal and heat-affected zone (see Annex G). Visual examination of etched surfaces shall be without magnification.

(1) *Fillet Welds.* Both weld cross sections of the macroetch specimen from the fillet weld shall be examined. The weld cross section shall show no incomplete fusion and no cracks. Discontinuities at the weld root, not exceeding 1/32 in [1 mm], shall be acceptable.

(2) *Hardfacing.* The specimen shall show complete fusion.

## 5.6 Performance Qualification Variables

**5.6.1** Qualification on one WPS will also qualify for welding with any other WPS within the limits given in 5.4 and the following performance qualification variables.

**5.6.1.1 Welders.** A change in any variable listed below from that which was used in a welder's qualification test will require requalification of that welder:

- (1) A change in welding process except that welders qualified with GMAW spray, pulsed spray, or globular transfer are also qualified to weld with gas shielded FCAW and vice versa.
- (2) The deletion of backing.
- (3) A change in filler metal F-Number except as allowed in 5.4.2.
- (4) A change in base metal except as permitted in 5.4.1.
- (5) For OFW, a change in the type of fuel gas.
- (6) For GTAW, a change from alternating to direct current or vice versa, or a change in polarity.
- (7) A change in position from that qualified, except as permitted in 5.4.3 and Table 5.5.
- (8) A change in vertical weld progression from uphill to downhill, or vice versa for any pass except root passes that are completely removed by back gouging or final passes used to dress the final weld surface.
- (9) For GMAW, a change from spray transfer, globular transfer, or pulsed spray welding to short-circuiting transfer; or vice versa.

(10) For GMAW, GTAW, or PAW, omission or addition of consumable inserts, or deletion of root shielding gas except for double welded butt joints, partial joint penetration groove, and fillet welds.

(11) A change in thickness or diameter from that tested except as permitted in Tables 5.6, 5.7, and 5.8. Circumferential or radial fillet or groove weldments other than pipe (such as round stock or reinforcing plates), shall be considered the same as pipe, in accordance with tables 5.5, 5.6, 5.7, and 5.8.

**5.6.1.2 Welding Operator.** A change in any variable listed below from that which was used in the welding operator's qualification test will require requalification of the welding operator:

(1) A change in welding process except that welding operators qualified with GMAW spray, pulsed spray, or globular transfer are also qualified to weld with gas shielded FCAW and vice versa.

(2) A change from direct visual to remote visual control or vice versa.

(3) A change in position except as permitted in Table 5.5.

(4) Deletion of consumable inserts.

(5) For GMAW welding a change from any transfer mode to the short-circuiting mode.

(6) A change in base metal except as permitted in 5.4.1.

**Table 5.6**  
**Limitations for Performance Qualification on Groove Welds in Pipe and Tube**  
**(see 5.6.1.1, Figure 5.3, Figure 5.4, Figure 5.5, and Table 5.5)**

Test Weldment, in [mm]		Qualifies for Pipe and Plate			
		Minimum Outside Diameter, in [mm]		Maximum Deposit Thickness	
Outside Diameter	Deposit Thickness (t)	Grooves	Fillets	Grooves	Fillets
< 1 [25]		Size welded	All		
1 through 2-7/8 [25 through 73]		1 [25]	All		
> 2-7/8 [73]		2-7/8 [73]	All		
	< 3/4 [19]			2t	All
	≥ 3/4 [19]			Unlimited	All

t = thickness of the deposited weld metal

Note: For GMAW-S, the maximum weld metal thickness deposited shall not exceed 1.1 times the thickness of weld metal deposited by the GMAW-S process in the qualification test. For base metals 3/8 in [10 mm] thick and greater, side bends are required for GMAW-S.

**Table 5.7**  
**Limitations for Performance Qualification in Plate Groove Welds (see 5.6.1.1)**

Base Metal Thickness (T), in [mm]	Qualifies for Plate	
	Deposit Thickness (t), Maximum	Fillet Weld Size
< 3/4 [19]	2t	Unlimited
≥ 3/4 [19]	Unlimited	Unlimited

Notes:

1. Qualification on plate will also qualify for groove welds in pipe over 24 in [610 mm] in diameter.

2. For GMAW-S, the maximum weld metal thickness deposited shall not exceed 1.1 times the thickness of weld metal deposited by the GMAW-S process in the qualification test. For base metals 3/8 in [10 mm] thick and greater, side bends are required for GMAW-S.

**Table 5.8**  
**Limitations for Performance Qualification in Pipe Fillet Welds (see 5.6.1.1)**

Test Weldment, in [mm]	Qualifies for Fillets		
	Outside Diameter, in [mm]	Fillet Weld Size	Base Metal Thickness
Pipe < 1 [25] outside diameter	Size welded and over	Unlimited	Unlimited
Pipe 1 to 2-7/8 [25 to 73] outside diameter	1 [25] and over	Unlimited	Unlimited
Pipe > 2-7/8 [73] outside diameter	> 2-7/8 [73]	Unlimited	Unlimited
Plate	> 24 [610]	Unlimited	Unlimited

## Notes:

1. Qualification on any pipe groove weld also qualifies for fillet welds.
2. For GMAW-S, the maximum weld metal thickness deposited shall not exceed 1.1 times the thickness of weld metal deposited by the GMAW-S process in the qualification test. For base metals 3/8 in [10 mm] thick and greater, side bends are required for GMAW-S.

## Annexes

### Normative Information

These annexes contain information and requirements that are considered part of the standard.

- Annex A Illustrations—Welding Position, Test Specimens, and Test Fixtures
- Annex B Filler Metal Grouping
- Annex C Base Metal Grouping
- Annex D Radiographic Examination Procedure

### Informative Information

These annexes are not considered part of the standard, and are provided for informational purposes.

- Annex E Basis for Establishing a Standard Welding Procedure Specification (SWPS)
- Annex F Sample Forms
- Annex G Macroetch Procedure
- Annex H Guidelines for the Preparation of Technical Inquiries
- Annex I Guidelines for Requesting Adoption of New Materials Under the AWS B2.1 Standard

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**Cross Reference for Renumbered Annexes from the  
AWS B2.1/B2.1M:2009 to the AWS B2.1/B2.1M:2014 Edition**

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Location in AWS B2.1/B2.1M:2009		Location in AWS B2.1/B2.1M:2014
Annex A	Basis for Establishing a Standard Welding Procedure Specification (SWPS)	Annex <u>E</u>
Annex B	Illustrations—Welding Position, Test Specimens, and Test Fixtures	Annex <u>A</u>
Annex C	Filler Metal Grouping	Annex <u>B</u>
Annex D	Base Metal Grouping	Annex <u>C</u>
Annex E	Radiographic Examination Procedure	Annex <u>D</u>
Annex F	Sample Forms	Annex F
Annex G	Macroetch Procedure	Annex G
Annex H	Guidelines for the Preparation of Technical Inquiries	Annex H
Annex I	Guidelines for Requesting Adoption of New Materials Under the AWS B2.1 Standard	Annex I

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## Annex A (Normative)

### Illustrations—Weld Position, Test Specimens, and Test Fixtures

**(see 4.3.2, 4.7.4, 4.7.6, 4.9.3, 4.10.3, 4.11.3, 4.11.4, 4.11.5, 4.12.2.2, 5.4.3, Figure 4.2, Figure 4.4, Figure 4.5, Figure 5.4, Figure 5.5, Figure 5.6, Figure 5.7, and Figure 5.9)**

This annex is part of AWS B2.1/B2.1M:2014, *Specification for Welding Procedure and Performance Qualification*, and includes mandatory elements for use with this standard.

#### **A1. Welding Positions—Illustrated**

**A1.1 Standard Groove Test Weldment Positions.** Figure A.1A illustrates and identifies the positions permitted for Standard Groove Test Weldments. Standard Groove Test Weldments shall be positioned in the applicable position(s) as shown in Figure A.1A, except that an angular deviation of  $\pm 15^\circ$  from the specified horizontal and vertical planes and  $\pm 5^\circ$  from the specified inclined plane is permitted.

**A1.2 Groove Weld Position Changes.** Figure A.1B specifies the points at which groove weld position changes occur.

**A1.3 Standard Fillet Test Weldment Positions.** Figure A.1C illustrates and identifies the positions for Standard Fillet Weld Test Weldments, except that an angular deviation of  $\pm 15^\circ$  from the specified horizontal and vertical planes and  $\pm 5^\circ$  from the specified inclined plane is permitted. Standard Fillet Test Weldments shall be positioned in the applicable position(s) as illustrated.

**A1.4 Fillet Weld Position Changes.** Figure A.1D specifies the points at which fillet weld position changes occur.

**A1.5 Standard Stud Test Weldment Positions.** Figure A.1E illustrates and identifies the positions for Standard Stud Test Weldments. Standard Stud Test Weldments shall be positioned in the applicable position illustrated within the limitations shown in Figure A.1E.

#### **A2. Guided Bend Specimens**

**A2.1 Preparation of Groove Weld Specimens.** Guided bend test specimens shall be prepared by cutting the test plate or pipe to form specimens as illustrated in Figures A.2A, A.2B, and A.2C. The cut surfaces of Figures A.2A and A.2B are designated the specimen sides. The other two surfaces of Figures A.2A and A.2B are designated the face and root surfaces. A side-bend specimen is illustrated in Figure A.2C.

**A2.2** Weld reinforcement and backing of face- and root- bend specimens shall be removed flush with the specimen surface. Cut surfaces shall be parallel, may be thermally cut, and shall be machined or ground a minimum of 1/8 in [3 mm] on thermally cut edges, except that M-1 metals may be bent “as-cut” if no objectionable surface roughness exists.



**A2.3 Subsize Transverse Face and Root Bends.** For pipe of 4 in [102 mm] outside diameter or less, the bend specimen width may be 3/4 in [19 mm], measured around the outside surface. Alternatively, for outside diameters less than 2-7/8 in [73 mm], the width may be that obtained by cutting the pipe into quarter sections.

**A2.4 Nonstandard Bend Specimens.** For base metal thickness less than 3/8 in [10 mm], the thickness of the specimen may be the thickness of the base metal, except that M-23 and M-35 materials (excluding alloys C95200 and C95400 for which 3/8 in [10 mm] is required) shall be a maximum of 1/8 in [3 mm] thick. For metals less than 1/8 in [3 mm] thick, the specimen thickness shall be the thickness of the base metal.

### **A3. Tension Specimens**

Tension test specimens are illustrated in Figures A.3A, A.3B, A.3C, and A.3D.

**A3.1** For thicknesses up to and including 1 in [25 mm], a full thickness specimen shall be used for each required tension test.

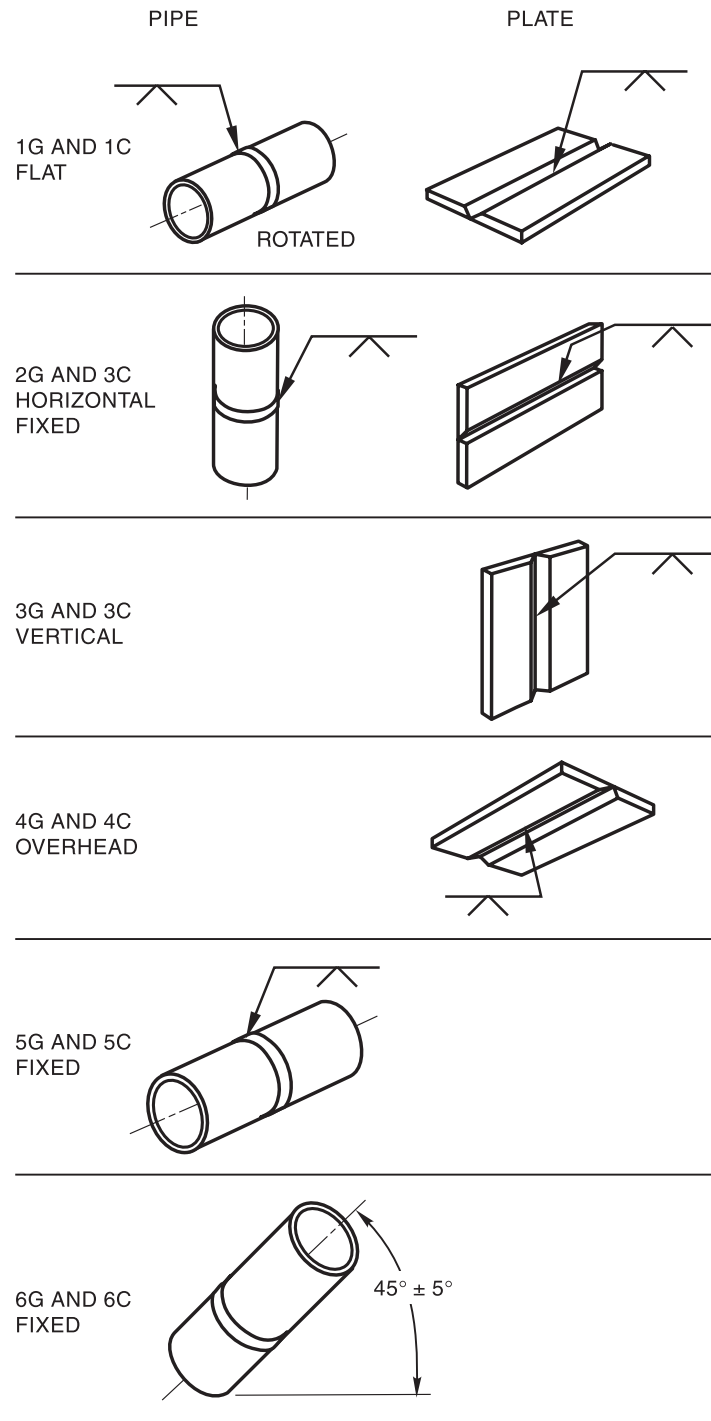
**A3.2** For thicknesses over 1 in [25 mm], single or multiple specimens may be used provided that: (1) Collectively, multiple specimens, representing the full thickness of the weld at one location, shall comprise a set. (2) The entire thickness shall be mechanically cut into approximately equal strips. For specimens that are not turned, specimen thicknesses shall be the maximum size that can be tested in available equipment.

### **A4. Cladding and Hardfacing Specimens**

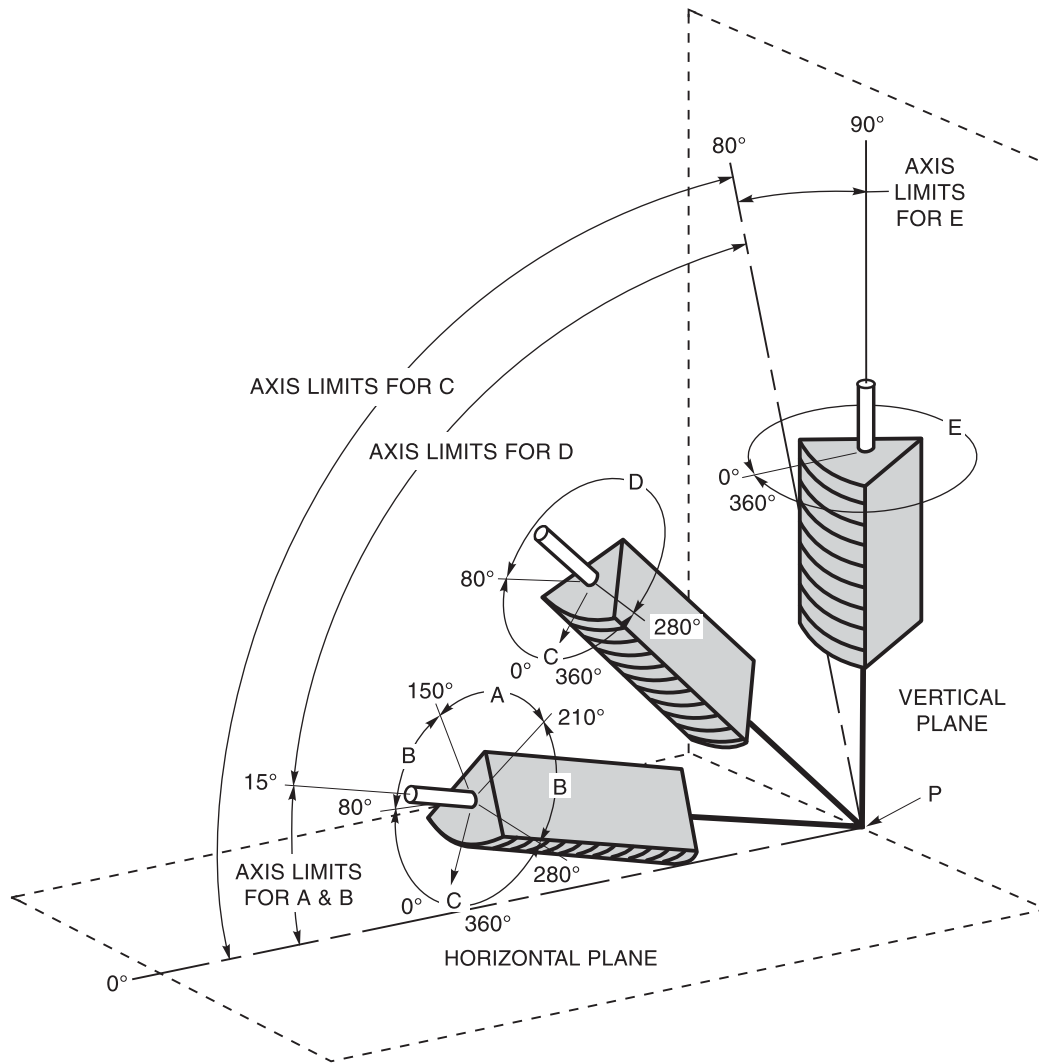
Bend test and chemical analysis specimens shall be prepared as shown in Figures A.4A and A.4B.

### **A5. Test Fixtures**

Bend and stud test fixtures are shown in Figures A.5A through A.5F.



**Figure A.1A—Welding Test Positions—Groove, Cladding, and Hardfacing Welds (see A1.1)**

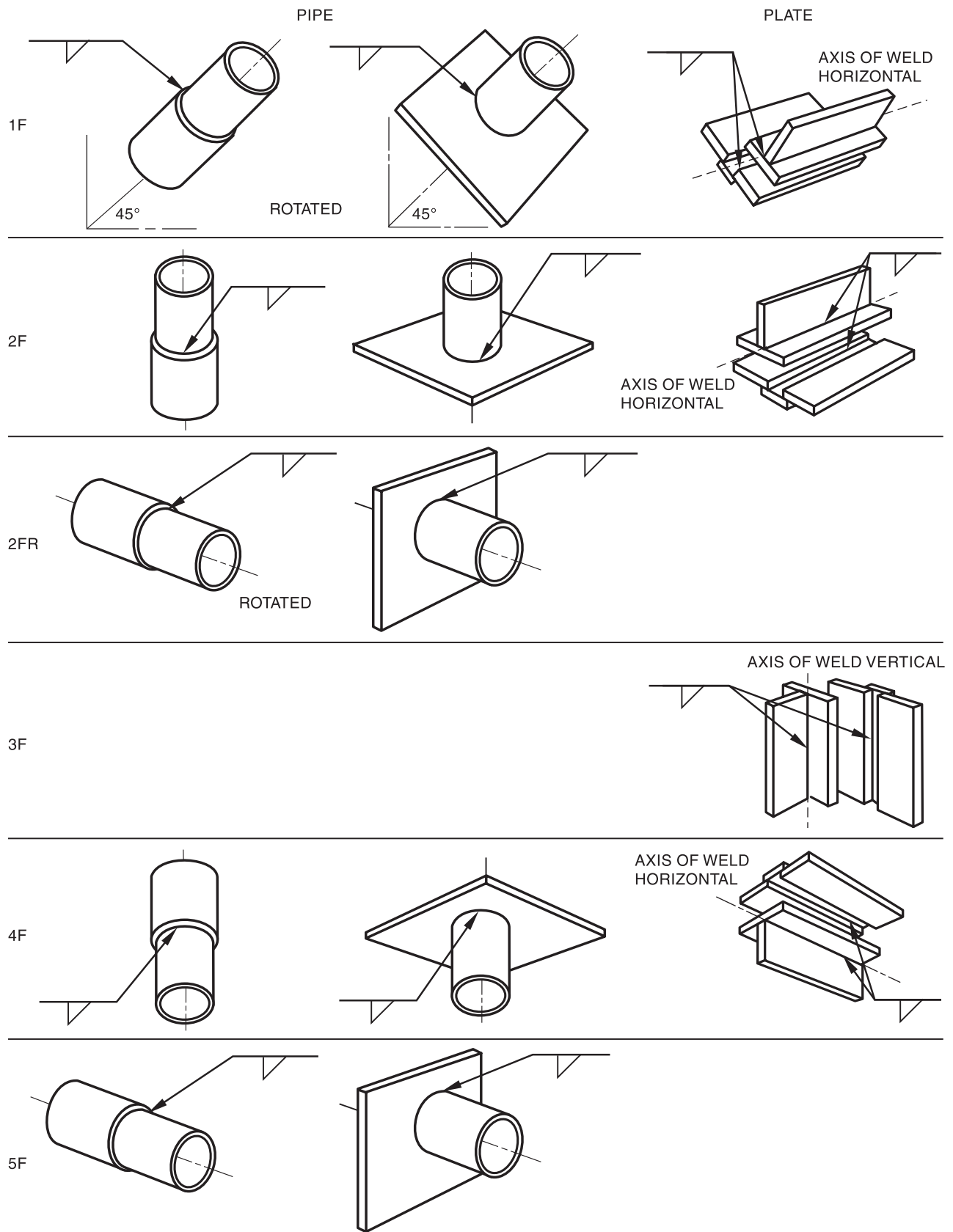


Tabulation of Positions of Groove Welds			
Position	Diagram Reference	Inclination of Axis	Rotation of Face
Flat	A	0° to 15°	150° to 210°
Horizontal	B	0° to 15°	80° to 150° 210° to 360°
Overhead	C	0° to 80°	0° to 80° 280° to 360°
Vertical	D	15° to 80°	80° to 280°
	E	80° to 90°	0° to 360°

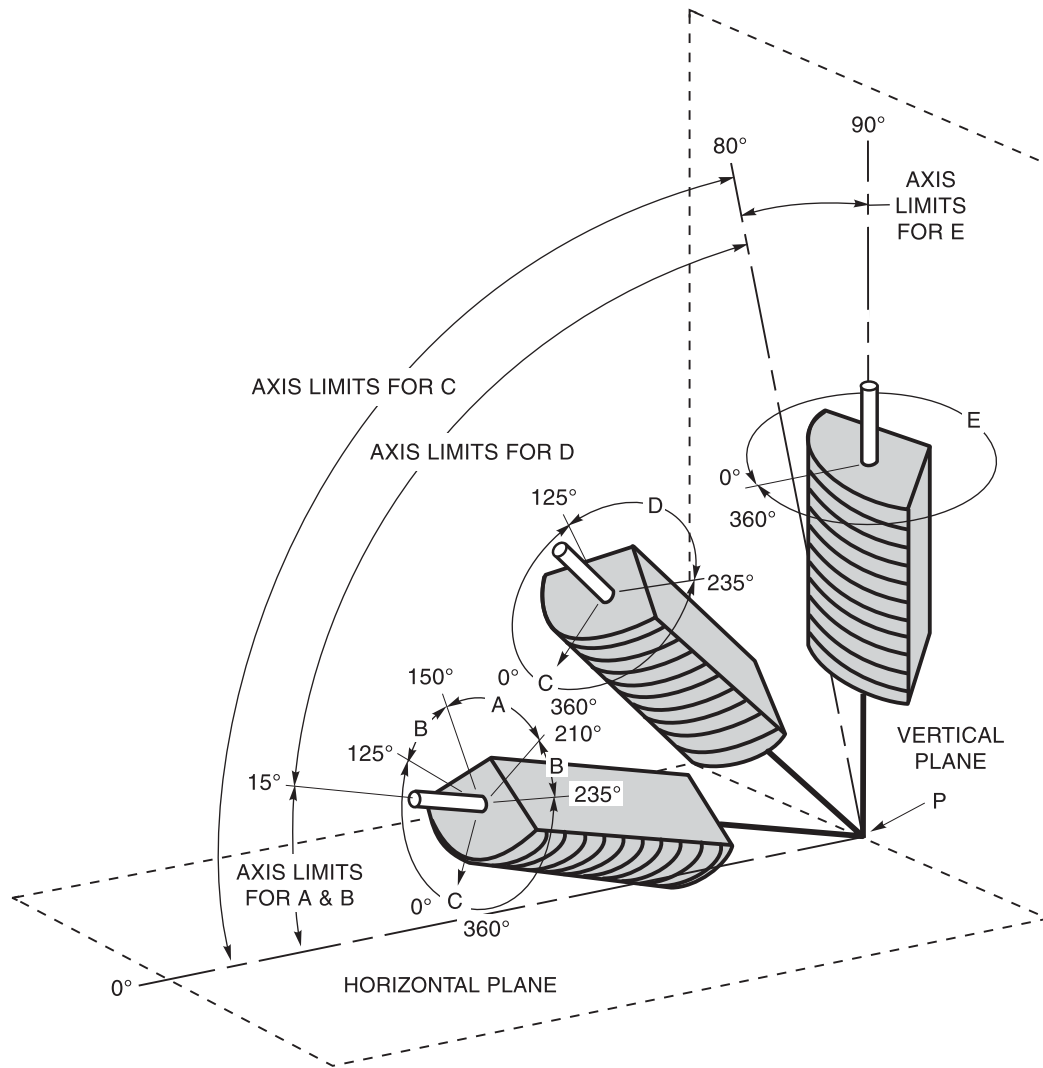
Notes:

1. The horizontal reference plane is always taken to lie below the weld under construction.
2. The inclination of the weld axis is measured from the horizontal reference plane toward the vertical reference point.
3. The axis of rotation of the weld face is determined by a line perpendicular to the weld face at its center which passes through the weld axis. The reference position (0°) of rotation of the weld face invariably points in the direction opposite to that in which the weld axis angle increases. When looking at point "P," the angle of rotation of the weld face is measured in a clockwise direction from the reference position (0°).

**Figure A.1B—Limits of Welding Positions—Groove, Cladding, and Hardfacing Welds**  
(see 5.4.3, A1.2, and Table 5.5)



**Figure A.1C—Welding Test Positions—Fillet Welds (see A1.3)**

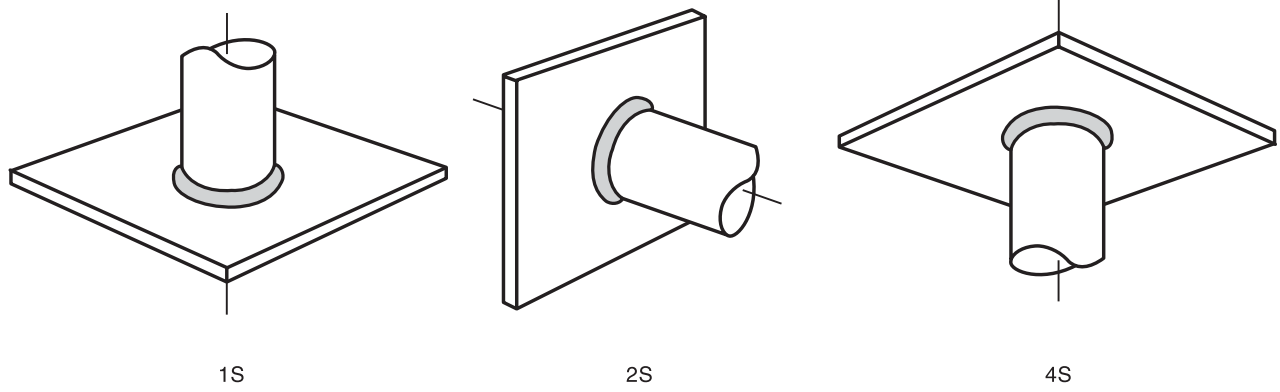


Tabulation of Fillet Welds			
Position	Diagram Reference	Inclination of Axis	Rotation of Face
Flat	A	0° to 15°	150° to 210°
Horizontal	B	0° to 15°	125° to 150° 210° to 235°
Overhead	C	0° to 80°	0° to 125° 235° to 360°
Vertical	D	15° to 80°	125° to 235°
	E	80° to 90°	0° to 360°

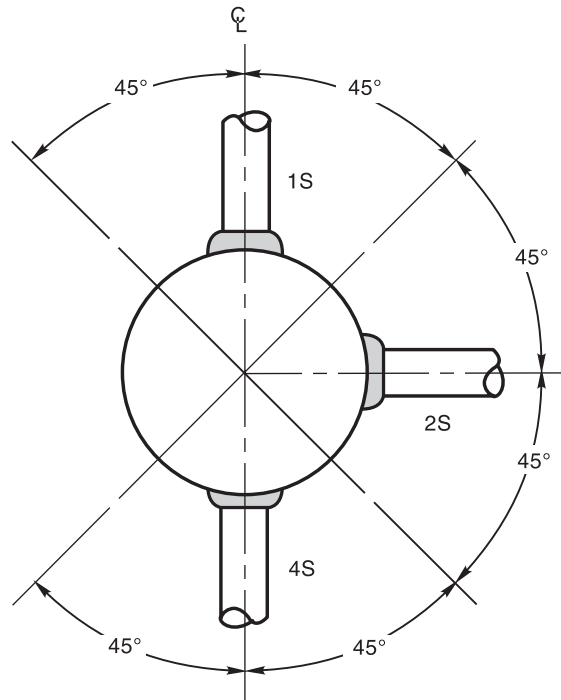
Notes:

1. The horizontal reference plane is always taken to lie below the weld under construction.
2. The inclination of the weld axis is measured from the horizontal reference plane toward the vertical reference point.
3. The axis of rotation of the weld face is determined by a line perpendicular to the weld face at its center which passes through the weld axis. The reference position (0°) of rotation of the weld face invariably points in the direction opposite to that in which the weld axis angle increases. When looking at point "P," the angle of rotation of the weld face is measured in a clockwise direction from the reference position (0°).

**Figure A.1D—Limits of Welding Positions—Fillet Welds (see 5.4.3, A1.4, and Table 5.5)**



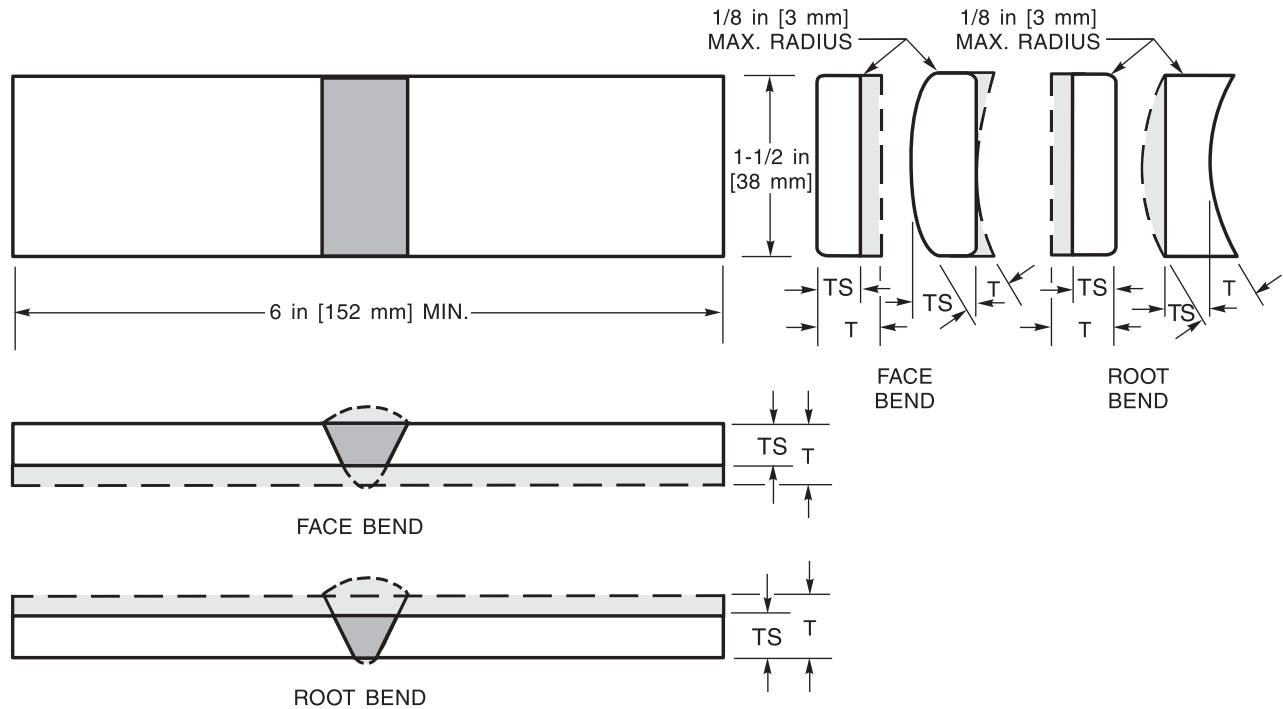
STUD WELDING POSITIONS



LIMITS OF POSITIONS FOR PLATE OR PIPE

STUD WELDING POSITIONS

**Figure A.1E—Welding Positions—Stud Welds (see A1.5)**

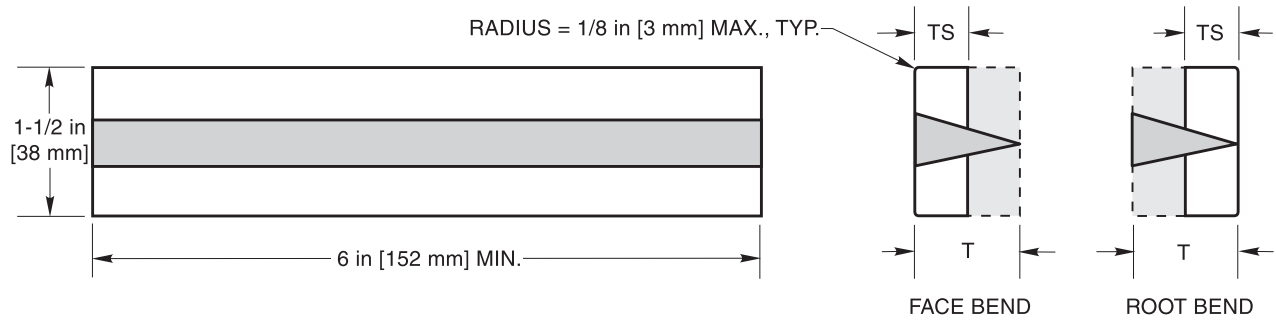


INCHES			MILLIMETERS		
Thickness of Base Materials (T)	Specimen Thickness (TS)		Thickness of Base Materials (T)	Specimen Thickness (TS)	
	All Base Metal Welded with F-23 Filler Metals	All Other Materials		All Base Metal Welded with F-23 Filler Metals	All Other Materials
1/16 to 1/8	T	T	1.5 to 3	T	T
1/8 to 3/8	1/8	T	3 to 10	3	T
Over 3/8	1/8	3/8	Over 10	3	10

Notes:

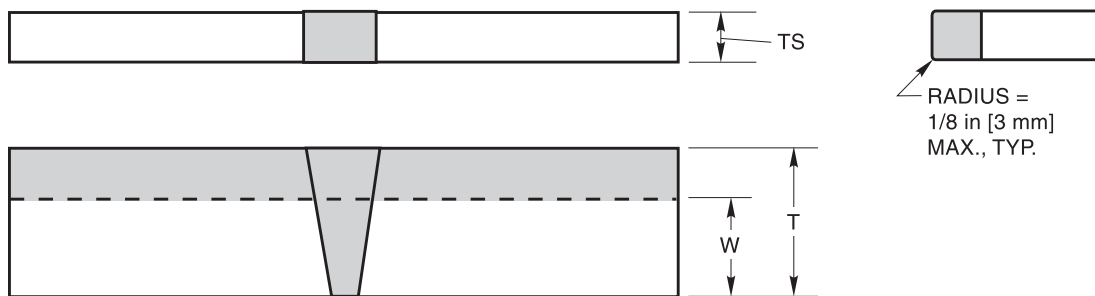
1. Weld reinforcement and backing strip or backing ring, if any, shall be removed flush with the surface of the specimen.
2. If thermal cut, the edges shall be dressed by grinding, except in M-1 materials.
3. For pipe diameters of 2 in through 4 in [51 mm through 102 mm] NPS, the width of the bend specimen may be 3/4 in [19 mm] for pipe diameters of 3/8 in to 2 in [10 mm through 51 mm]. NPS, the bend specimen width may be 3/8 in [10 mm], with an alternative (permitted for pipe 1 NPS in and less) of cutting the pipe into quarter sections, in which case the weld reinforcement may be removed and no other preparation of the specimens is required.

**Figure A.2A—Transverse Face and Root Bend Specimens (see A2.1)**



INCHES			MILLIMETERS		
Specimen Thickness (TS)			Specimen Thickness (TS)		
Thickness of Base Materials (T)	All Base Metal Welded with F-23 Filler Metals	All Other Materials	Thickness of Base Materials (T)	All Base Metal Welded with F-23 Filler Metals	All Other Materials
1/16 to 1/8	T	T	1.5 to 3	T	T
1/8 to 3/8	1/8	T	3 to 10	3	T
Over 3/8	1/8	3/8	Over 10	3	10

**Figure A.2B—Longitudinal Face and Root Bend Specimens (see A2.1)**



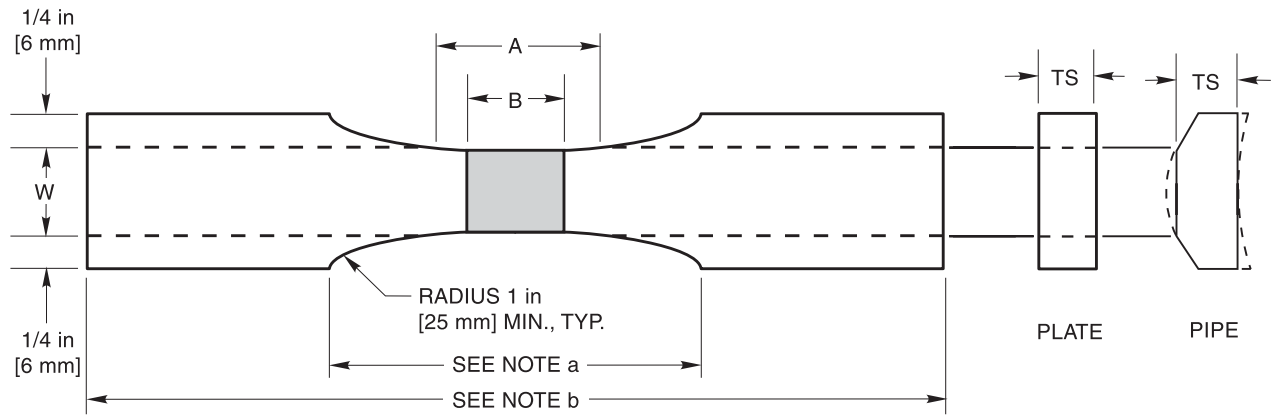
INCHES				MILLIMETERS			
Specimen Thickness (TS)				Specimen Thickness (TS)			
Weld Thickness	All Base Metal Welded with F-23 Filler Metals	All Other M Numbers	Width of Specimen (W)	Weld Thickness	All Base Metal Welded with F-23 Filler Metals	All Other M Numbers	Width of Specimen (W)
3/8 to 1-1/2	1/8	3/8	T	10 to 38	3	10	T
Over 1-1/2	1/8	3/8	See Note 3	Over 38	3	10	See Note 3

Notes:

1. Weld reinforcement and backing strip or backing ring, if any, shall be removed flush with the surface of the specimen. If a recessed ring is used, this surface of the specimen may be machined to a depth not exceeding the depth of the recess to remove the ring, except that in such cases the thickness of the finished specimen shall be that specified above.
2. If thermal cut, the edges shall be dressed by grinding, except in M-1 materials.
3. When a side bend specimen thickness "T" exceeds 1-1/2 in [38 mm], it may be bent at full width, or it may be cut into multiple test specimens of approximately equal dimensions provided the specimens are not less than 3/4 in [19 mm] wide.

**Figure A.2C—Transverse Side Bend Specimens (see A2.1)**





INCHES				MILLIMETERS			
Test Weldment				Test Weldment			
Dimensions	Plate	Pipe Outside Diameter		Dimensions	Plate	Pipe Outside Diameter	
		<3	>3			<76	>76
B		See Note c		B		See Note c	
A		See Note d		A		See Note d	
W	3/4	1/2	3/4	W	19	13	19
TS	TS <sup>e,f</sup>	See Note e		TS	TS <sup>e,f</sup>	See Note e	

<sup>a</sup> This section shall be cut by machining or grinding.

<sup>b</sup> The specimen length shall be as required by the tension testing equipment.

<sup>c</sup> B shall be equal to the greater dimension of the weld metal in the direction of the specimen longitudinal axis.

<sup>d</sup> The length of the reduced section A shall be equal to B, plus 1/2 in [13 mm]; with a minimum of 2-1/4 in [57 mm]. The ends shall not differ in width from the ends to the center, but the width at either end shall not be more than 0.015 in [0.40 mm] greater than the width at the center. The weld shall be in the center of the reduced section.

<sup>e</sup> The amount removed shall be the minimum needed to obtain plane parallel surfaces across the width of the reduced section.

<sup>f</sup> For base metal thicknesses greater than 1 in [25 mm], multiple tension specimens may be substituted for the single tension specimen from each blank. If multiple specimens are used, one complete set shall be made for each required test. The specimen blank shall be cut into strips of approximately equal thickness.

**Figure A.3A—Reduced Section Tension Specimen—Rectangular (see A3)**

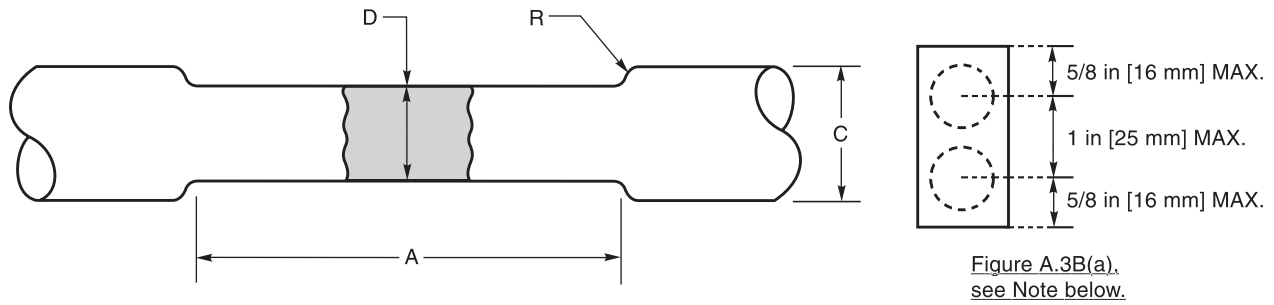


Figure A.3B(a), see Note below.

Dimensions	INCHES				Dimensions	MILLIMETERS			
	Standard Specimen Dimensions <sup>a,c</sup>					Standard Specimen Dimensions <sup>a,c</sup>			
A = Length of Reduced Section <sup>b,d</sup>	0.505	0.353	0.252	0.188	A = Length of Reduced Section <sup>b,d</sup>	13	9	6	5
D = Diameter	0.500 ± 0.010	0.350 ± 0.007	0.250 ± 0.005	0.188 ± 0.003	D = Diameter	13 ± 0.25	9 ± 0.18	6 ± 0.13	5 ± 0.08
R = Radius, min.	3/8	1/4	3/16	1/8	R = Radius, min.	10	6	5	3
C = Diameter	3/4	1/2	3/8	1/4	C = Diameter	19	13	10	6

<sup>a</sup> The standard specimen selected shall be based upon the maximum diameter specimen that can be cut from the specimen blank.

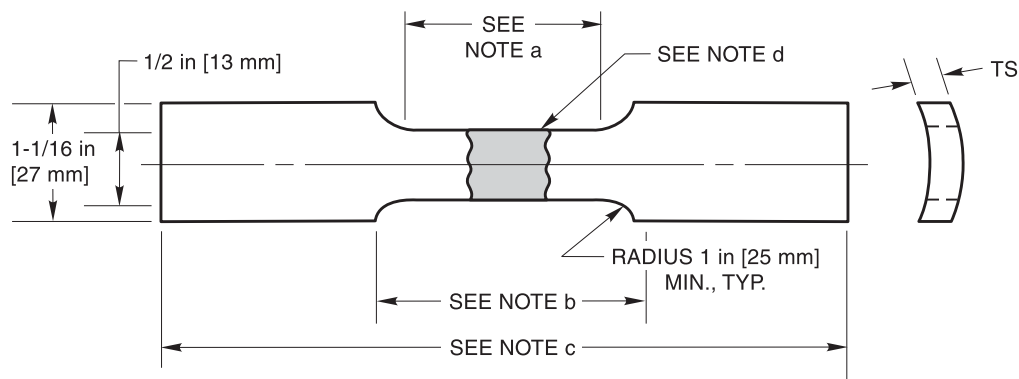
<sup>b</sup> The weld shall be in the center of the reduced section.

<sup>c</sup> Where only a single specimen from a blank is required, the specimen longitudinal axis shall be midway between the base metal surfaces.

<sup>d</sup> The length of the reduced section shall be not less than the width of the weld metal plus 2D. It may have a gradual taper from the ends toward the center, with the ends not more than 1% greater in diameter than the center, which shall be the dimension D. The ends may be of any length and shape as required by the testing machine.

Note: For thickness over 1 in [25 mm], multiple specimens shall be cut through the full thickness of the weld with their centers parallel to the metal surface and not over 1 in [25 mm] apart. The centers of the specimens adjacent to the metal surface shall not exceed 5/8 in [16 mm] from the surface [see Figure A.3B(a)].

Figure A.3B—Reduced Section Tension Specimen—Round (see A3)



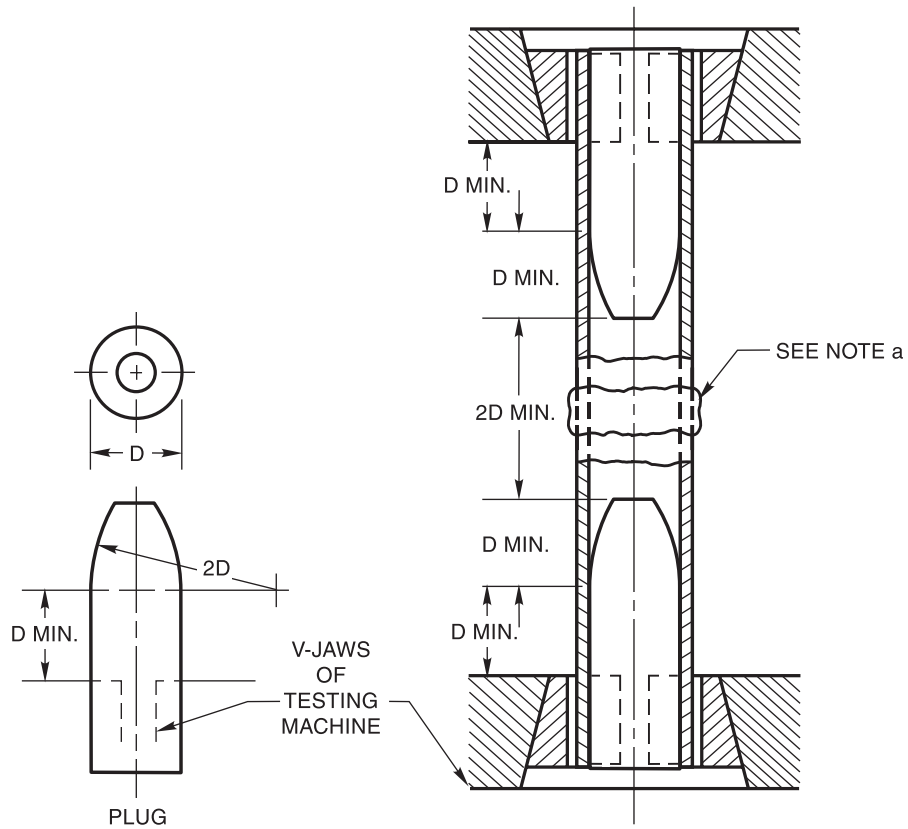
<sup>a</sup> The length of the reduced section shall be equal to the greater dimension of the weld metal in the direction of the specimen longitudinal axis, plus 2T. The sides shall be approximately parallel. The weld shall be in the center of the reduced section.

<sup>b</sup> The reduced section shall be cut by machining or grinding.

<sup>c</sup> The specimen length shall be as required by the tension testing equipment.

<sup>d</sup> The weld reinforcement shall be removed such that the weld metal thickness equals that of the base metal thickness.

Figure A.3C—Alternate Tension Specimen for Pipe 3 in [76 mm] O.D. or Less (see A3)

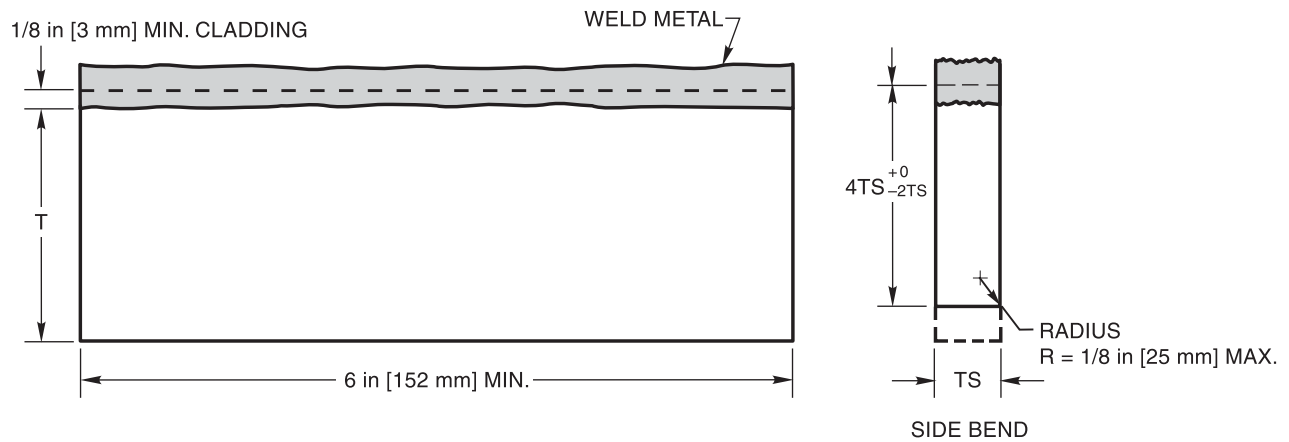


<sup>a</sup> The weld reinforcement shall be removed such that the weld metal thickness equals that of the base metal thickness.

Notes:

1. The length of the reduced section shall be equal to the greater dimension of the weld metal in the direction of the specimen longitudinal axis, plus 2 times the thickness of the test weldment. The sides shall be approximately parallel. The weld shall be in the center of the reduced section.
2. This section shall be cut by machining and grinding.
3. The specimen length shall be as required by the tension testing equipment.

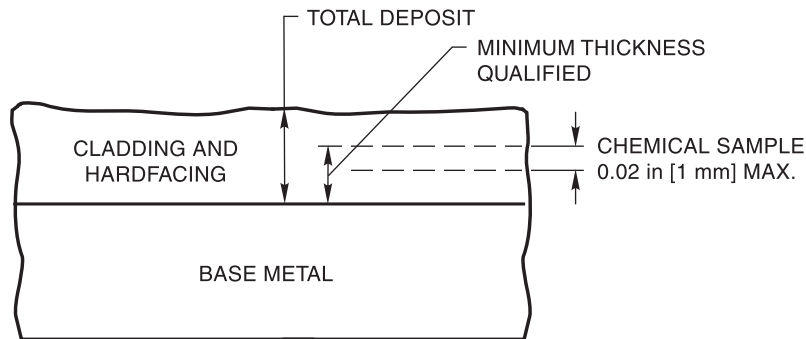
**Figure A.3D—Alternate Tension Specimen for Pipe 2 in [51 mm] O.D. or Less (see A3)**



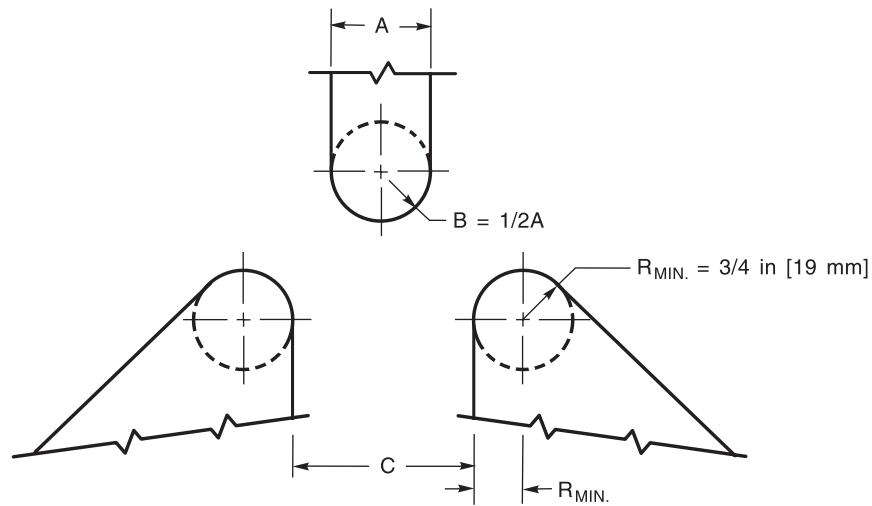
INCHES		MILLIMETERS	
T <sup>a</sup>	TS <sup>b</sup>	T <sup>a</sup>	TS <sup>b</sup>
1/8 to 3/8	T	3 to 10	T
Over 3/8	3/8	Over 10	10

<sup>a</sup>T = the thickness of base metal.  
<sup>b</sup>TS = thickness of test specimen.

**Figure A.4A—Weld Cladding Side Bend Specimens (see 4.9.3 and A4)**



**Figure A.4B—Weld Cladding and Hardfacing Chemical Analysis Specimens (see 4.9.5, 4.10.3, and A4)**



Base Metal <sup>b</sup>	INCHES			MILLIMETERS			
	TS <sup>a</sup>	A	C	Base Metal <sup>b</sup>	TS <sup>a</sup>	A	C
M-23 (as welded)				M-23 (as welded)			
M-35 except B148 and B271	<1/8	(16-1/2)TS	(18-1/2)TS + 1/16	M-35 except B148 and B271	<3	(16-1/2)TS	(18-1/2)TS + 1-1/2
All base metals welded with F-23 consumables	1/8	2-1/16	2-3/8	All base metals welded with F-23 consumables	3	50	57
M-11				M-11			
M-23 (annealed)	<3/8	(6-2/3)TS	(8-2/3)TS + 1/8	M-23 (annealed)	<10	(6-2/3)TS	(8-2/3)TS + 3
M-25	3/8	2-1/2	3-3/8	M-25	10	67	90
M-35, B148, and B271				M-35, B148, and B271			
M-24 (annealed)	≤3/8	8TS	10TS + 1/8	M-24 (annealed)	≤10	8TS	10TS + 3
M-27, M-61, and M-62				M-27, M-61, and M-62			
M-52 and M-53	≤3/8	10TS	12TS + 1/8	M-52 and M-53	≤10	10TS	12TS + 3
M-54	≤3/8	14TS	16TS + 1/8	M-54	≤10	14TS	16TS + 3
All other M-Number metals	<3/8	4TS	6TS + 1/8	All other M-Number metals	<10	4TS	6TS + 3
	3/8	1-1/2	2-3/8		10	40	63

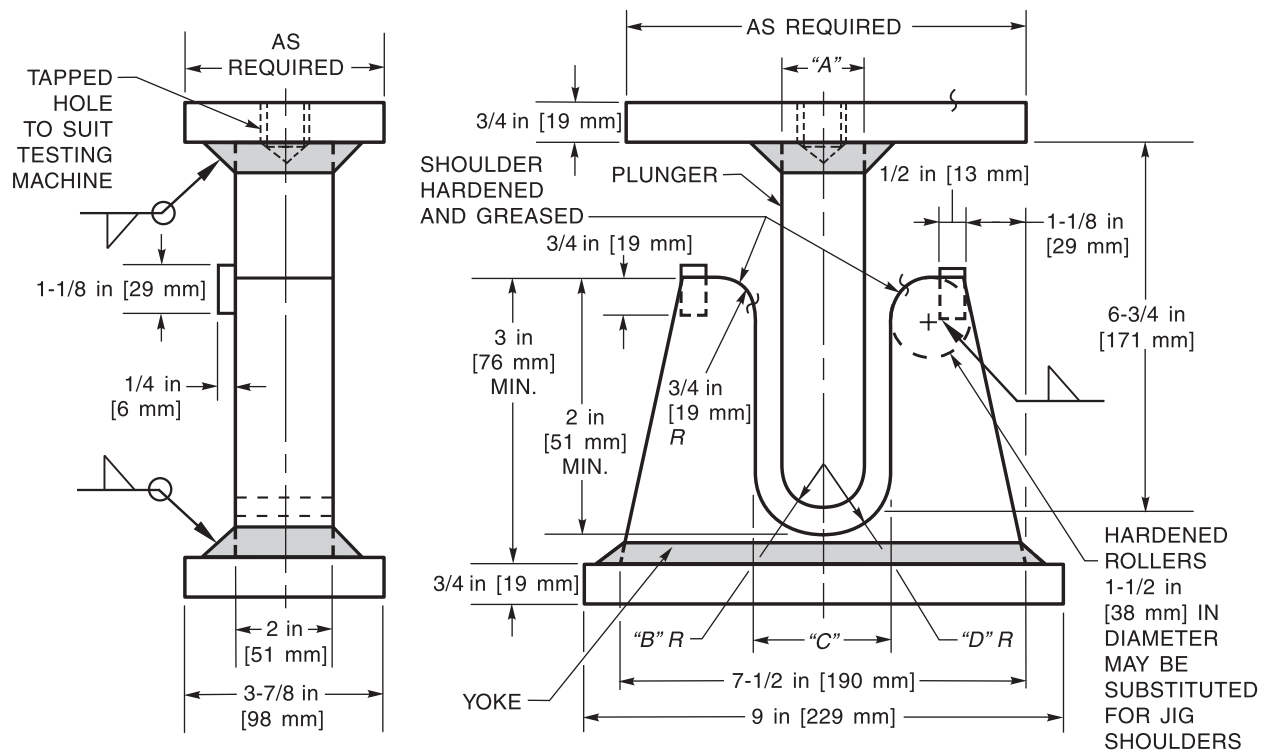
<sup>a</sup> TS = Specimen thickness.

<sup>b</sup> For M-26, M-81, and M-83 materials, two macroetch specimens shall be used in lieu of guided bend testing (see also Figures A.5B and A.5C).

Notes:

1. To calculate the maximum bend diameter for any thickness specimen, use the following formula:  $A = (100 TS/E) - TS$   
Where  $A$  = bend diameter,  $E$  = minimum tensile elongation, and  $TS$  = test specimen thickness.
2. The shoulders of the test figure shall either be hardened rollers free to rotate or hardened and greased fixed shoulder.

**Figure A.5A—Guided Bend Fixture—Bottom Ejecting Type  
(see 4.9.3, 4.12.2.2, 5.5.3, A5, Figure A.5B, and Figure A.5C)**



	INCHES			MILLIMETERS				
	Base Metal <sup>b</sup>	TS <sup>a</sup>	A	C	Base Metal <sup>b</sup>	TS <sup>a</sup>	A	C
M-23 (as welded)					M-23 (as welded)			
M-35 except B148 and B271	<1/8	(16-1/2)TS	(18-1/2)TS + 1/16		M-35 except B148 and B271	<3	(16-1/2)TS	(18-1/2)TS + 1-1/2
All base metals welded with F-23 consumables	1/8	2-1/16	2-3/8		All base metals welded with F-23 consumables	3	50	57
M-11					M-11			
M-23 (annealed)	<3/8	(6-2/3)TS	(8-2/3)TS + 1/8		M-23 (annealed)	<10	(6-2/3)TS	(8-2/3)TS + 3
M-25	3/8	2-1/2	3-3/8		M-25	10	67	90
M-35, B148, and B271					M-35, B148, and B271			
M-24 (annealed)					M-24 (annealed)			
M-27, M-61, and M-62	≤3/8	8TS	10TS + 1/8		M-27, M-61, and M-62	≤10	8TS	10TS + 3
M-52 and M-53	≤3/8	10TS	12TS + 1/8		M-52 and M-53	≤10	10TS	12TS + 3
M-54	≤3/8	14TS	16TS + 1/8		M-54	≤10	14TS	16TS + 3
All other M-Number metals	<3/8	4TS	6TS + 1/8		All other M-Number metals	<10	4TS	6TS + 3
	3/8	1-1/2	2-3/8			10	40	63

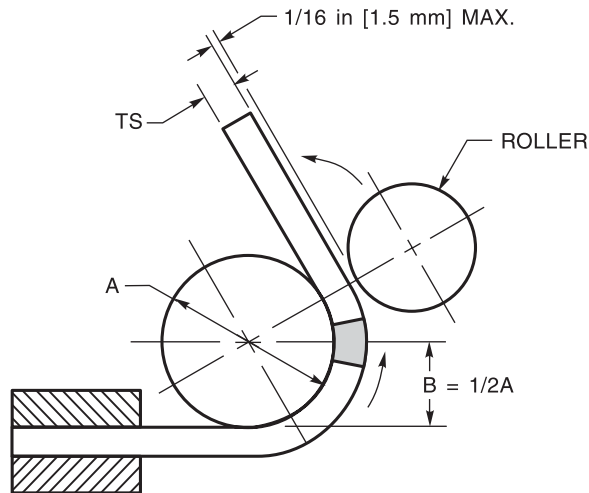
<sup>a</sup> TS = Specimen thickness.

<sup>b</sup> For M-26, M-81, and M-83 materials, two macroetch specimens shall be used in lieu of guided bend testing (see also Figures A.5A and A.5C).

Notes:

- To calculate the maximum bend diameter for any thickness specimen, use the following formula:  $A = (100 TS/E) - TS$   
Where A = bend diameter, E = minimum tensile elongation, and TS = test specimen thickness.
- The shoulders of the test figure shall either be hardened rollers free to rotate or hardened and greased fixed shoulder.

**Figure A.5B—Guided Bend Fixture—Bottom Type**  
**(see 4.9.3, 4.12.2.2, 5.5.3, A5, Figure A.5A, and Figure A.5C)**



INCHES			MILLIMETERS		
Base Metal <sup>b</sup>	TS <sup>a</sup>	A	Base Metal <sup>b</sup>	TS <sup>a</sup>	A
M-23 (as welded)			M-23 (as welded)		
M-35 except B148 and B271	<1/8	(16-1/2)TS	M-35 except B148 and B271	<3	(16-1/2)TS
All base metals welded with F-23 consumables	1/8	2-1/16	All base metals welded with F-23 consumables	3	50
M-11			M-11		
M-23 (annealed)	<3/8	(6-2/3)TS	M-23 (annealed)	<10	(6-2/3)TS
M-25	3/8	2-1/2	M-25	10	67
M-35, B148, and B271			M-35, B148, and B271		
M-24 (annealed)			M-24 (annealed)		
M-27, M-61, and M-62	≤3/8	8TS	M-27, M-61, and M-62	≤10	8TS
M-52 and M-53	≤3/8	10TS	M-52 and M-53	≤10	10TS
M-54	≤3/8	14TS	M-54	≤10	14TS
All other M-Number metals	<3/8	4TS	All other M-Number metals	<10	4TS
	3/8	1-1/2		10	40

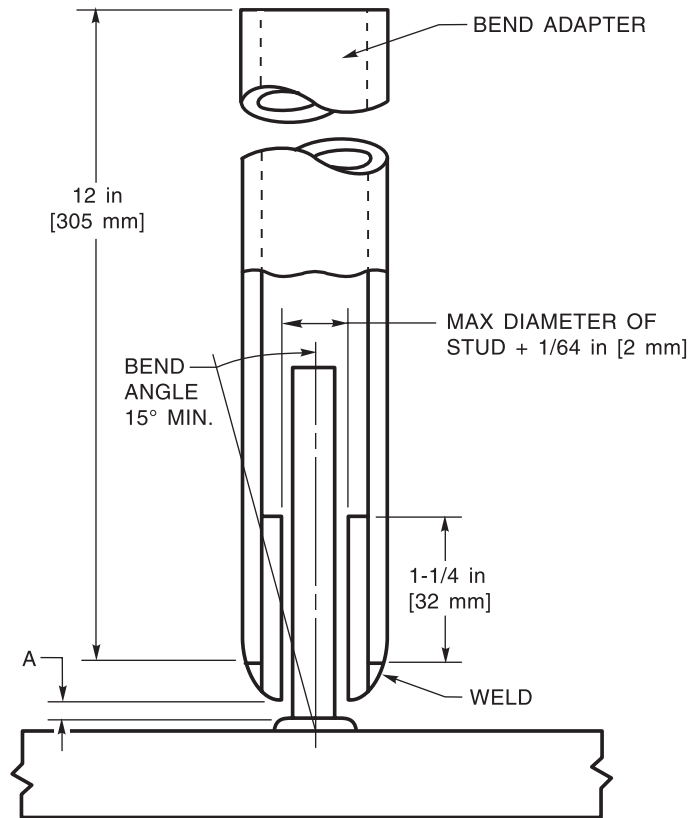
<sup>a</sup> TS = Specimen thickness.

<sup>b</sup> For M-26, M-81, and M-83 materials, two macroetch specimens shall be used in lieu of guided bend testing (see also Figures A.5A and A.5B).

Notes:

- To calculate the maximum bend diameter for any thickness specimen, use the following formula:  $A = (100 TS/E) - TS$   
Where A = bend diameter, E = minimum tensile elongation, and TS = test specimen thickness.
- The shoulders of the test figure shall either be hardened rollers free to rotate or hardened and greased fixed shoulder.

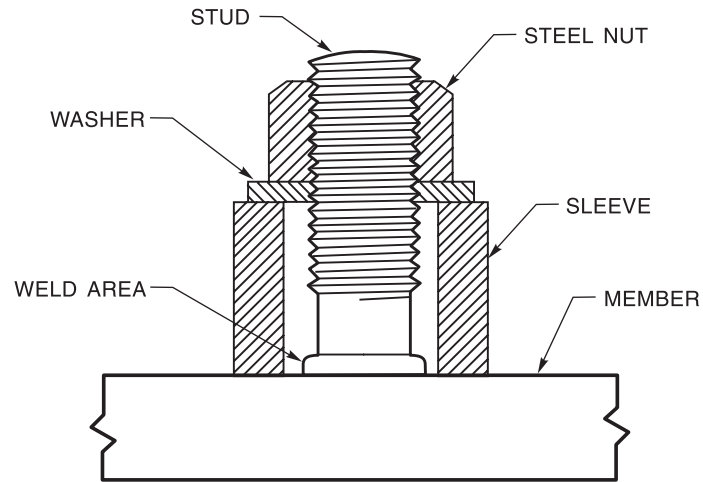
**Figure A.5C—Guided Bend Fixture—Wrap-Around**  
**(see 4.9.3, 4.12.2.2, 5.5.3, A5, Figure A.5A, and Figure A.5B)**



INCHES									
For Stud Diameter	1/8	3/16	1/4	3/8	1/2	5/8	3/4	7/8	1
Use Adapter Gap "A"	1/8	1/8	3/16	7/32	5/16	11/32	15/32	15/32	19/32
MILLIMETERS									
For Stud Diameter	3	5	6	10	13	16	19	22	25
Use Adapter Gap "A"	3	3	5	6	8	9	12	12	15

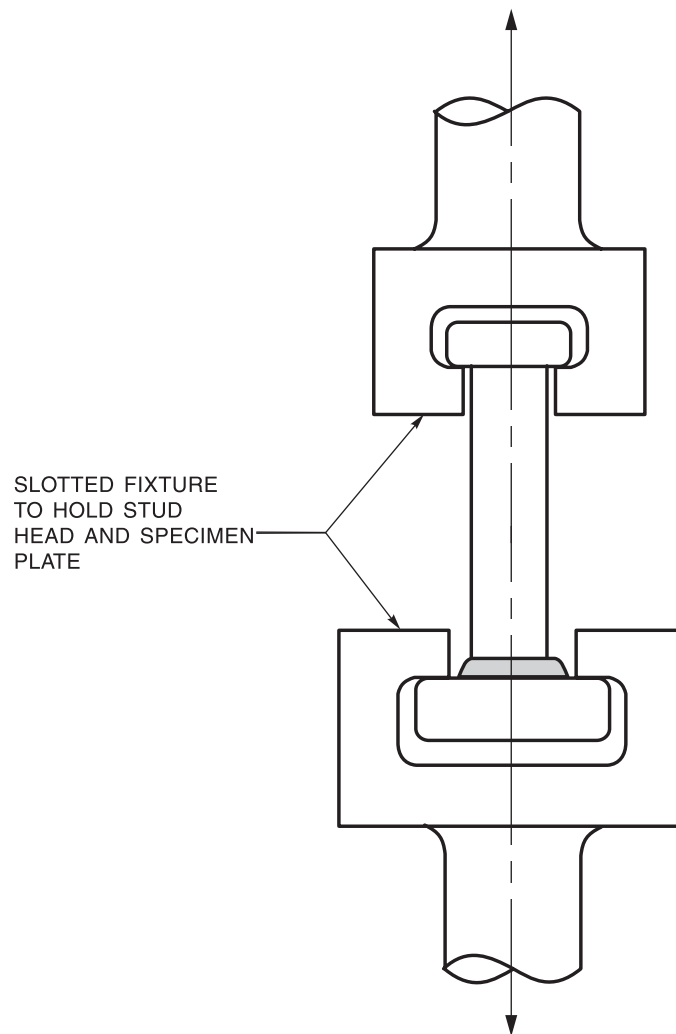
**Figure A.5D—Stud Weld Bend Test Fixture (see 4.11.3 and A5)**





Note: Dimensions are appropriate to the size of the stud. Threads of the stud shall be clean and free of lubricant other than residual cutting oil.

**Figure A.5E—Stud Weld Torque Test Fixture (see 4.11.5 and A5)**



**Figure A.5F—Stud Weld Tension Test Fixture (see 4.11.4 and A5)**

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## **Annex B (Normative)**

### **Filler Metal Grouping**

**(see 3, 4.14.3, 5.4.2, and Table 5.4)**

This annex is part of AWS B2.1/B2.1M:2014, *Specification for Welding Procedure and Performance Qualification*, and includes mandatory elements for use with this standard.

#### **B1. F-Numbers**

The F-Number grouping of electrodes and welding rods given in Table B.1 is based primarily on their usability characteristics, which fundamentally determine the ability to make satisfactory welds with a given filler metal and welding process. This grouping is made to reduce the number of welding procedure and performance qualifications, where this can logically be done. The grouping does not imply that filler metals within a group may be indiscriminately substituted for the filler metal that was used in the qualification test weldment without consideration of the compatibility of the base and filler metals from the standpoint of metallurgical properties, postweld heat treatment, design, service requirements, and mechanical properties. The groupings in Table B.1 follow essentially the F-Number designations established by the *ASME Boiler and Pressure Vessel Code*, Section IX. Filler metals not listed in Table B.1, but assigned an F-Number by ASME Section IX, are considered as listed filler metals.

#### **B2. A-Numbers**

The classification of ferrous weld metal for procedure qualification is given in Table B.2. Those A-Numbers follow essentially the A-Number designations established by the *ASME Boiler and Pressure Vessel Code*, Section IX.

**Table B.1**  
**Grouping of Welding Electrodes and Rods for Qualification (see B1)**

F-No.	AWS Specification	AWS Classification
<b>Steel</b>		
1	A5.1	EXX20, EXX22, EXX24, EXX27, EXX28
1	A5.4	EXXX(X)-26
1	A5.5	EXX20-XX, EXX27-XX
2	A5.1	EXX12, EXX13, EXX14, EXX19
2	A5.5	E(X)XX13-XX
3	A5.1	EXX10, EXX11
3	A5.5	E(X)XX10-XX, E(X)XX11-XX
4	A5.1	EXX15, EXX16, EXX18, EXX18M, EXX48
4	A5.4 other than austenitic and duplex	EXXX(X)-15, EXXX(X)-16, EXXX(X)-17
4	A5.5	E(X)XX15-XX, E(X)XX16-XX, E(X)XX18-XX, E(X)XX18M, E(X)XX18M1, E(X)XX45-P2
5	A5.4 austenitic and duplex	EXXX(X)-15, EXXX(X)-16, EXXX(X)-17
6	A5.2	<u>All Classifications</u>
6	A5.9	All Classifications
6	A5.17	All Classifications
6	A5.18	All Classifications
6	A5.20	All Classifications
6	A5.22	All Classifications
6	A5.23	All Classifications
6	A5.25	All Classifications
6	A5.26	All Classifications
6	A5.28	All Classifications
6	A5.29	All Classifications
6	A5.30	INMs-X, IN5XX, IN3XX(X)
<b>Aluminum and Aluminum Alloys</b>		
21	A5.3	E1100, E3003
21	A5.10	ER1100, R1100, ER1188, R1188
22	A5.10	ER5183, R5183, ER5356, R5356, ER5554, R5554, ER5556, R5556, ER5654, R5654
23	A5.3	E4043
23	A5.10	ER4009, R4009, ER4010, R4011, <u>R4011</u> , ER4043, R4043, ER4047, R4047, ER4145, R4145, ER4643, R4643
24	A5.10	R206.0, R-C355.0, R-A356.0, R357.0, R-A357.0
25	A5.10	ER2319, R2319
<b>Copper and Copper Alloys</b>		
31	A5.6	ECu
31	A5.7	ERCu
32	A5.6	ECuSi
32	A5.7	ERCuSi-A
33	A5.6	ECuSn-A, ECuSn-C
33	A5.7	ERCuSn-A, <u>ERCuSn-C</u>

(Continued)

**Table B.1 (Continued)**  
**Grouping of Welding Electrodes and Rods for Qualification (see B1)**

F-No.	AWS Specification	AWS Classification
<b>Copper and Copper Alloys (Cont'd)</b>		
34	A5.6	ECuNi
34	A5.7	ERCuNi
34	A5.30	IN67
35	A5.8	RBCuZn-A, RBCuZn-B, RBCuZn-C, RBCuZn-D
36	A5.6	ECuAl-A2, ECuAl-B
36	A5.7	ERCuAl-A1, ERCuAl-A2, <u>ERCuAl-A3</u>
37	A5.6	ECuNiAl, ECuMnNiAl
37	A5.7	ERCuNiAl, ErCuMnNiAl
<b>Nickel and Nickel Alloys</b>		
41	A5.11	ENi-1
41	A5.14	ERNi-1
41	A5.30	IN61
42	A5.11	ENiCu-7
42	A5.14	ERNiCu-7, ERNiCu-8
42	A5.30	IN60
43	A5.11	ENiCrFe-1, 2, 3, 4, 7, 9, 10, and 12; ENiCrMo-2, 3, 4, 5, 6, 7, 10, 12, 13, 14, 17, 18, and 19; ENiCrCoMo-1; ENiCr-4; ENiCrWMo-1
43	A5.14	ERNiCr-3, 4, 6, <u>and 7</u> ; ERNiCrFe-5, 6, 7, 7A, 8, 11, 12, <u>13, and 14</u> ; ERNiCrCoMo-1; ERNiCrMo-2, 3, 4, 7, 10, 13, 14, 16, 17, 18, 19, 20, 21, <u>and 22</u> ; ERNiCrFeAl-1; ERNiCrWMo-1
43	A5.30	IN6A, IN62, IN82, IN52
<u>43</u>	<u>A5.34</u>	<u>ENiCr3Tx-y, ENiCrCoMo1Tx-y, ENiCrFe1Tx-y, ENiCrFe2Tx-y, ENiCrFe3Tx-y, ENiCrMo10Tx-y, ENiCrMo2Tx-y, ENiCrMo3Tx-y, ENiCrMo4Tx-y</u>
44	A5.11	ENiMo-1, 3, 7, 8, 9, 10, and 11
44	A5.14	ERNiMo-1, 2, 3, 7, 8, 9, 10, 11, and 12
45	A5.11	ENiCrMo-1, 9, and 11
45	A5.14	ERNiCrMo-1, 8, 9, and 11; ERNiFeCr-1
46	A5.11	ENiCrFeSi-1
46	A5.14	ERNiCrFeSi-1, ERNiCoCrSi-1
<b>Titanium and Titanium Alloys</b>		
51	A5.16	ERTi-1, 2, 3, 7, 11, 13, 14, 15A, 16, 17, 26, 27, 30, 31, 33, and 34
52	A5.16	ERTi-4
53	A5.16	ERTi-9, ERTi-9ELI, ERTi-18, ERTi-28
54	A5.16	ERTi-12
55	A5.16	ERTi-5, 23, 29, 24, 25, <u>and 29</u>
56	A5.16	ERTi-32
<b>Zirconium and Zirconium Alloys</b>		
<u>61</u>	A5.24	ERZr2, ERZr3, ERZr4
<b>Hardfacing Weld Metal Overlay</b>		
71	A5.13	EXXX-X
72	A5.21	RXXX-X, ERXX-X, ERCXX-X

(Continued)

**Table B.1 (Continued)**  
**Grouping of Welding Electrodes and Rods for Qualification (see B1)**

F-No.	AWS Specification	AWS Classification
<b>Magnesium Alloys</b>		
91	A5.19	ER AZ61A, ER AZ92A, ER EZ33A, ER AZ101A, R AZ61A, R AZ92A, R AZ101A, R EZ33A
<b>ASME Has Not Assigned F-Numbers to the Following Electrodes</b>		
<u>N/A</u>	<u>A5.15</u>	<u>ENi-CI</u>
<u>N/A</u>	<u>A5.15</u>	<u>ENi-CI-A</u>
<u>N/A</u>	<u>A5.15</u>	<u>ENiCu-A</u>
<u>N/A</u>	<u>A5.15</u>	<u>ENiCu-B</u>
<u>N/A</u>	<u>A5.15</u>	<u>ENiFe-CI</u>
<u>N/A</u>	<u>A5.15</u>	<u>ENiFe-CI-A</u>
<u>N/A</u>	<u>A5.15</u>	<u>ENiFeMn-CI</u>
<u>N/A</u>	<u>A5.15</u>	<u>ENiFeT3-Cih</u>
<u>N/A</u>	<u>A5.15</u>	<u>ERNi-CI</u>
<u>N/A</u>	<u>A5.15</u>	<u>ERNiFeMn-CI</u>
<u>N/A</u>	<u>A5.15</u>	<u>ES<sub>t</sub></u>
<u>N/A</u>	<u>A5.15</u>	<u>RCI</u>
<u>N/A</u>	<u>A5.15</u>	<u>RCI-A</u>
<u>N/A</u>	<u>A5.15</u>	<u>RCI-B</u>

**Table B.2**  
**Classification of Ferrous Weld Metal for Procedure Qualification (see B2 and Table 5.4)**

A-No.	Type of Weld Metal	Chemical Composition, wt %					
		C	Cr	Mo	Ni	Mn	Si
1	Low-carbon	0.20	<u>0.20</u>	<u>0.30</u>	<u>0.50</u>	1.60	1.00
2	Carbon-Molybdenum	0.15	0.50	0.40–0.65	<u>0.50</u>	1.60	1.00
3	Chromium (0.4% to 2%)-Molybdenum	0.15	<u>0.40–2.00</u>	0.40–0.65	<u>0.50</u>	1.60	1.00
4	Chromium (2% to 4%)-Molybdenum	0.15	<u>2.00–4.00</u>	0.40–1.50	<u>0.50</u>	1.60	2.00
5	Chromium (4% to 10.5%)-Molybdenum	0.15	<u>4.00–10.5</u>	0.40–1.50	<u>0.80</u>	1.20	2.00
6	Chromium, martensitic	0.15	11.00–15.0	0.70	<u>0.80</u>	2.00	1.00
7	Chromium, ferritic	0.15	11.00–30.0	1.00	<u>0.80</u>	1.00	3.00
8	Chromium-Nickel	0.15	14.50–30.0	4.00	<u>7.50–15.00</u>	2.50	1.00
9	Chromium–Nickel	<u>0.30</u>	19.0–30.0	6.00	<u>15.0–37.00</u>	2.50	1.00
10	Nickel <u>to 4%</u>	0.15	<u>0.50</u>	0.55	<u>0.80–4.00</u>	1.70	1.00
11	Manganese-Molybdenum	0.17	<u>0.50</u>	0.25–0.75	0.85	1.25–2.25	1.00
12	Nickel-Chromium-Molybdenum	0.15	1.50	0.25–0.80	1.25–2.80	0.75–2.25	1.00

## Notes:

(1) Single values shown above are maximum.

(2) Only listed elements are used to determine A-numbers.

## **Annex C (Normative)**

### **Base Metal Grouping**

**(see 3, 4.3.12, 4.3.15, and Table 5.3)**

This annex is part of AWS B2.1/B2.1M:2014, *Specification for Welding Procedure and Performance Qualification*, and includes mandatory elements for use with this standard.

#### **C1. Base Metal Specifications**

Table C.1 indexes ASTM, ABS, API, AS, AS/NZS, CSA, AMS, ISO, NACE, and MSS base metals in numerical order to provide ease of reference when determining into what grouping a particular base metal specification falls.

Table C.2 groups base metals for welding procedure and performance qualification on the basis of mechanical properties, chemical composition, and metallurgical compatibility to minimize the number of welding qualification where this can logically be done.

Table C.3 lists base metal specifications for iron castings in accordance with AWS D11.2 groups.

#### **C2. Material Number (M-Number) Groupings**

Base metal has been divided into general categories, e.g., Material Numbers (M-Numbers) 1, 1A, 3, 3A, 4, 4A, etc., and further divided into groups within each general category.

The category grouping does not imply that base metals may be substituted for other base metals within the same Material Number (M-Number) without consideration for weldability.

#### **C3. Iron Castings Specifications**

Base metal specifications for iron castings are divided into D11.2 groups.



**Table C.1**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
AAR	M201	1	1	11.1	A	—	Castings
AAR	M201	1	2	11.1	B	—	Castings
AAR	M201	1	3	11.1	B+	—	Castings
AAR	M201	1	4	11.1	C	—	Castings
AAR	TC128	10C	1	11.1	B	—	Plate
ABS	ABS	1	1	1.1	E	K01801	Plate, Bar, & Shapes
ABS	ABS	1	1	1.1	D	K02101	Plate, Bar, & Shapes
ABS	ABS	1	1	1.1	B	K02102	Plate, Bar, & Shapes
ABS	ABS	1	1	1.1	A	K02300	Plate, Bar, & Shapes
ABS	ABS	1	1	1.2	AH32	K11846	Plate, Bar, & Shapes
ABS	ABS	1	1	1.2	DH32	K11846	Plate, Bar, & Shapes
ABS	ABS	1	1	1.2	EH32	K11846	Plate, Bar, & Shapes
ABS	ABS	1	1	1.2	FH32	K11846	Plate, Bar, & Shapes
ABS	ABS	1	2	1.2	AH36	K11852	Plate, Bar, & Shapes
ABS	ABS	1	2	1.2	DH36	K11852	Plate, Bar, & Shapes
ABS	ABS	1	2	1.2	EH36	K11852	Plate, Bar, & Shapes
ABS	ABS	1	2	1.2	FH36	K11852	Plate, Bar, & Shapes
ABS	ABS	1	2	1.3	AH40	K11857	Plate, Bar, & Shapes
ABS	ABS	1	2	1.3	DH40	K11857	Plate, Bar, & Shapes
ABS	ABS	1	2	1.3	EH40	K11857	Plate, Bar, & Shapes
ABS	ABS	1	2	1.3	FH40	K11857	Plate, Bar, & Shapes
API	2H	1	1	1.2	42	—	Plate
API	2H	1	2	1.2	50	—	Plate
API	2MT1	1	1	1.2	50	—	Plate
API	2W	1	1	1.2	50	—	Plate
API	2W	1	2	1.3	60	—	Plate
API	2Y	1	1	1.2	42	—	Plate
API	2Y	1	1	1.2	50	—	Plate
API	2Y	1	2	1.2	50T	—	Plate
API	2Y	1	2	1.3	60	—	Plate
API	5L	1	1	1.1	A	—	Seamless & Welded Pipe
API	5L	1	1	1.1	A25	—	Seamless & Welded Pipe
API	5L	1	1	1.1	A25, Cl. I	—	Seamless & Welded Pipe & Tube
API	5L	1	1	1.1	A25, Cl. II	—	Seamless & Welded Pipe & Tube
API	5L	1	1	1.1	A25P	—	Seamless & Welded Pipe
API	5L	1	1	11.1	B	—	Seamless & Welded Pipe
API	5L	1	1	1.1	BM	—	Welded Pipe
API	5L	1	1	1.1	BMO	—	Welded Pipe
API	5L	1	1	1.1	BMS	—	Welded Pipe
API	5L	1	1	1.1	BN	—	Seamless & Welded Pipe
API	5L	1	1	1.1	BNO	—	Seamless & Welded Pipe
API	5L	1	1	1.1	BNS	—	Seamless & Welded Pipe

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
API	5L	1	1	1.1	BQ	—	Seamless & Welded Pipe
API	5L	1	1	1.1	BQO	—	Seamless & Welded Pipe
API	5L	1	1	1.1	BQS	—	Seamless & Welded Pipe
API	5L	1	1	1.1	BR	—	Seamless & Welded Pipe
API	5L	1	1	11.1	X42	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X42M	—	Welded Pipe
API	5L	1	1	1.2	X42MO	—	Welded Pipe
API	5L	1	1	1.2	X42MS	—	Welded Pipe
API	5L	1	1	1.2	X42N	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X42NO	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X42NS	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X42Q	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X42QO	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X42QS	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X42R	—	Seamless & Welded Pipe
API	5L	1	1	11.1	X46	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X46M	—	Welded Pipe
API	5L	1	1	1.2	X46MO	—	Welded Pipe
API	5L	1	1	1.2	X46MS	—	Welded Pipe
API	5L	1	1	1.2	X46N	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X46NO	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X46NS	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X46Q	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X46QO	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X46QS	—	Seamless & Welded Pipe
API	5L	1	1	11.1	X52	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X52M	—	Welded Pipe
API	5L	1	1	1.2	X52MO	—	Welded Pipe
API	5L	1	1	1.2	X52MS	—	Welded Pipe
API	5L	1	1	1.2	X52N	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X52NO	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X52NS	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X52Q	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X52QO	—	Seamless & Welded Pipe
API	5L	1	1	1.2	X52QS	—	Seamless & Welded Pipe
API	5L	1	2	11.1	X56	—	Seamless & Welded Pipe
API	5L	1	2	2.1	X56M	—	Welded Pipe
API	5L	1	2	2.1	X56MO	—	Welded Pipe
API	5L	1	2	2.1	X56MS	—	Welded Pipe
API	5L	1	2	1.3	X56N	—	Seamless & Welded Pipe
API	5L	1	2	3.1	X56Q	—	Seamless & Welded Pipe
API	5L	1	2	3.1	X56QO	—	Seamless & Welded Pipe

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
API	5L	1	2	3.1	X56QS	—	Seamless & Welded Pipe
API	5L	1	2	11.1	X60	—	Seamless & Welded Pipe
API	5L	1	2	2.1	X60M	—	Welded Pipe
API	5L	1	2	2.1	X60MO	—	Welded Pipe
API	5L	1	2	2.1	X60MS	—	Welded Pipe
API	5L	1	2	1.3	X60N	—	Seamless & Welded Pipe
API	5L	1	2	3.1	X60Q	—	Seamless & Welded Pipe
API	5L	1	2	3.1	X60QO	—	Seamless & Welded Pipe
API	5L	1	2	3.1	X60QS	—	Seamless & Welded Pipe
API	5L	1	2	11.1	X65	—	Seamless & Welded Pipe
API	5L	1	2	2.1	X65M	—	Welded Pipe
API	5L	1	2	2.1	X65MO	—	Welded Pipe
API	5L	1	2	2.1	X65MS	—	Welded Pipe
API	5L	1	2	3.1	X65Q	—	Seamless & Welded Pipe
API	5L	1	2	3.1	X65QO	—	Seamless & Welded Pipe
API	5L	1	2	3.1	X65QS	—	Seamless & Welded Pipe
API	5L	1	3	11.1	X70	—	Seamless & Welded Pipe
API	5L	1	3	2.2	X70M	—	Welded Pipe
API	5L	1	3	2.2	X70MO	—	Welded Pipe
API	5L	1	3	2.2	X70MS	—	Welded Pipe
API	5L	1	3	3.1	X70Q	—	Seamless & Welded Pipe
API	5L	1	3	3.1	X70QO	—	Seamless & Welded Pipe
API	5L	1	3	3.1	X70QS	—	Seamless & Welded Pipe
API	5L	1	4	2.2	X80M	—	Welded Pipe
API	5L	1	4	2.2	X80MO	—	Welded Pipe
API	5L	1	4	3.1	X80Q	—	Seamless & Welded Pipe
API	5L	1	4	3.1	X80QO	—	Seamless & Welded Pipe
API	5LS	1	1	11.1	X46	—	Spiral Welded Pipe
AS							
ASTM	A945	1	2	1.2	50	—	Plate
AS							
ASTM	A945	1	2	1.3	65	—	Plate
AS	1548	1	2	1.2	5-490	—	Plate
AS	1548	1	1	1.2	7-430	—	Plate
AS	1548	1	1	1.2	7-460	—	Plate
AS	1548	1	2	1.2	7-490	—	Plate
AS	1548	1	1	1.2	PT430	—	Plate
AS	1548	1	1	1.2	PT460	—	Plate
AS	1548	1	2	1.2	PT490	—	Plate
AS/NZS	1594	1	1	1.1	HA1	—	Plate, Sheet, & Strip
AS/NZS	1594	1	1	1.1	HA200	—	Plate, Sheet, & Strip

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
AS/NZS	1594	1	1	1.1	HA250	—	Plate, Sheet, & Strip
AS/NZS	1594	1	1	1.1	HA250/1	—	Plate, Sheet, & Strip
AS/NZS	1594	1	1	1.1	HA3	—	Plate, Sheet, & Strip
AS/NZS	1594	1	1	1.2	HA300	—	Plate, Sheet, & Strip
AS/NZS	1594	1	1	1.2	HA300/1	—	Plate, Sheet, & Strip
AS/NZS	1594	1	1	1.2	HA350	—	Plate, Sheet, & Strip
AS/NZS	1594	1	1	2.1	HA400	—	Plate, Sheet, & Strip
AS/NZS	1594	1	1	1.1	HA4N	—	Plate, Sheet, & Strip
AS/NZS	1594	1	1	1.1	HU250	—	Plate, Sheet, & Strip
AS/NZS	1594	1	1	1.2	HU300	—	Plate, Sheet, & Strip
AS/NZS	1594	1	1	1.2	HU300/1	—	Plate, Sheet, & Strip
AS/NZS	1594	1	1	1.4	HW350	—	Plate, Sheet, & Strip
AS/NZS	1594	1	1	1.2	XF300	—	Plate, Sheet, & Strip
AS/NZS	1594	1	1	2.1	XF400	—	Plate, Sheet, & Strip
AS/NZS	1594	1	3	2.2	XF500	—	Plate, Sheet, & Strip
AS/NZS	3597	11B	—	3.1	700PV	—	Plate
AS/NZS	3678	1	1	1.1	200	—	Plate
AS/NZS	3678	1	1	1.2	250	—	Plate
AS/NZS	3678	1	1	1.2	250L15	—	Plate
AS/NZS	3678	1	2	1.2	300	—	Plate
AS/NZS	3678	1	2	1.2	300L15	—	Plate
AS/NZS	3678	1	2	1.2	350	—	Plate
AS/NZS	3678	1	2	1.2	350L15	—	Plate
AS/NZS	3678	1	2	1.3	400	—	Plate
AS/NZS	3678	1	2	1.3	400L15	—	Plate
AS/NZS	3678	1	2	1.3	450	—	Plate
AS/NZS	3678	1	2	1.3	450L15	—	Plate
AS/NZS	3678	3	1	1.4	WR350	—	Plate
AS/NZS	3678	3	1	1.4	WR350L0	—	Plate
AS/NZS	3679.1	1	1	1.1	250	—	Bar & Sections
AS/NZS	3679.1	1	1	1.1	250L0	—	Bar & Sections
AS/NZS	3679.1	1	1	1.1	250L15	—	Bar & Sections
AS/NZS	3679.1	1	2	1.2	300	—	Bar & Sections
AS/NZS	3679.1	1	2	1.2	300L0	—	Bar & Sections
AS/NZS	3679.1	1	2	1.2	300L15	—	Bar & Sections
AS/NZS	3679.1	1	2	1.2	350	—	Bar & Sections
AS/NZS	3679.1	1	2	1.2	350L0	—	Bar & Sections
AS/NZS	3679.1	1	2	1.2	350L15	—	Bar & Sections
AS/NZS	3679.1	1	2	1.3	400	—	Bar & Sections
AS/NZS	3679.1	1	2	1.3	400L0	—	Bar & Sections
AS/NZS	3679.1	1	2	1.3	400L15	—	Bar & Sections
ASTM	A27	1	1	11.1	60-30	J03000	Castings

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM	A27	1	1	11.1	65-35	J03001	Castings
ASTM	A27	1	2	11.1	70-36	J03501	Castings
ASTM	A27	1	2	1.1	70-40	J02501	Castings
ASTM	A27	1	1	1.1	U-60-30	J03000	Castings
ASTM/ASME	A/SA-31	1	1	11.1	B	K03100	Rivets
ASTM/ASME	A/SA-36	1	1	11.1	—	—	Bar
ASTM/ASME	A/SA-36	1	1	11.1	—	K02595	Plates
ASTM/ASME	A/SA-36	1	1	11.1	—	K02596	Plates
ASTM/ASME	A/SA-36	1	1	11.1	—	K02597	Plates
ASTM/ASME	A/SA-36	1	1	1.1	—	K02598	Plates
ASTM/ASME	A/SA-36	1	1	1.1	—	K02599	Plates
ASTM/ASME	A/SA-36	1	1	11.1	—	K02600	Shapes
ASTM/ASME	A/SA-53	1	1	1.1	E, A	K02504	Resistance Welded Pipe
ASTM/ASME	A/SA-53	1	1	11.1	E, B	K03005	Resistance Welded Pipe
ASTM/ASME	A/SA-53	1	1	11.1	F	K03005	Furnace Welded Pipe
ASTM/ASME	A/SA-53	1	1	1.1	S, A	K02504	Seamless Pipe
ASTM/ASME	A/SA-53	1	1	11.1	S, B	K03005	Seamless Pipe
ASTM/ASME	A/SA-105	1	2	11.1	—	K03504	Flanges & Fittings
ASTM/ASME	A/SA-106	1	1	1.1	A	K02501	Seamless Pipe
ASTM/ASME	A/SA-106	1	1	11.1	B	K03006	Seamless Pipe
ASTM/ASME	A/SA-106	1	2	11.1	C	K03501	Seamless Pipe
ASTM	A108	1	1	1.1	1015 CW	G10150	Bar
ASTM	A108	1	1	1.1	1018 CW	G10180	Bar
ASTM	A108	1	1	1.1	1020 CW	G10200	Bar
ASTM	A108	3	3	4.1	8620 CW	G86200	Bar
ASTM	A131	1	1	1.1	A	—	Plate, Shapes, Bar, & Rivets
ASTM	A131	1	2	1.2	AH32	—	Plate, Shapes, Bar, & Rivets
ASTM	A131	1	2	1.2	AH36	—	Plate, Shapes, Bar, & Rivets
ASTM	A131	1	1	1.1	B	—	Plate, Shapes, Bar, & Rivets
ASTM	A131	1	1	1.1	CS	—	Plate, Shapes, Bar, & Rivets
ASTM	A131	1	1	1.1	D	—	Plate, Shapes, Bar, & Rivets
ASTM	A131	1	2	1.2	DH32	—	Plate, Shapes, Bar, & Rivets
ASTM	A131	1	2	1.2	DH36	—	Plate, Shapes, Bar, & Rivets
ASTM	A131	1	1	1.1	DS	—	Plate, Shapes, Bar, & Rivets
ASTM	A131	1	2	1.1	E	—	Plate, Shapes, Bar, & Rivets
ASTM	A131	1	2	1.2	EH32	—	Plate, Shapes, Bar, & Rivets
ASTM	A131	1	2	1.2	EH36	—	Plate, Shapes, Bar, & Rivets
ASTM/ASME	A/SA-134	1	1	1.1	SA283, A	K01400	Welded Pipe
ASTM/ASME	A/SA-134	1	1	1.1	SA283, B	K01702	Welded Pipe
ASTM/ASME	A/SA-134	1	1	1.1	SA283, C	K02401	Welded Pipe
ASTM/ASME	A/SA-134	1	1	11.1	SA283, D	K02702	Welded Pipe
ASTM/ASME	A/SA-134	1	1	1.1	SA285, A	K01700	Welded Pipe

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-134	1	1	1.1	SA285, B	K02200	Welded Pipe
ASTM/ASME	A/SA-134	1	1	11.1	SA285, C	K02801	Welded Pipe
ASTM/ASME	A/SA-134	1	1	1.1	SA36	K02599	Welded Pipe
ASTM/ASME	A/SA-135	1	1	1.1	A	K02509	E.R.W. Pipe
ASTM/ASME	A/SA-135	1	1	11.1	B	K03018	E.R.W. Pipe
ASTM	A139	1	1	1.1	A	K02508	Welded Pipe
ASTM	A139	1	1	11.1	B	K03003	Welded Pipe
ASTM	A139	1	1	11.1	C	K03004	Welded Pipe
ASTM	A139	1	1	11.1	D	K03010	Welded Pipe
ASTM	A139	1	1	11.1	E	K03012	Welded Pipe
ASTM	A148	4	3	—	90-60	D50600	Castings
ASTM	A161	1	1	—	Low Carbon	K01504	Tube
ASTM	A161	3	1	1.1	T1	K11522	Tube
ASTM	A167	8	1	8.1	302B	S30215	Plate, Sheet, & Strip
ASTM	A167	8	2	8.2	308	S30800	Plate, Sheet, & Strip
ASTM	A167	8	2	8.2	309	S30900	Plate, Sheet, & Strip
ASTM	A167	8	2	8.2	310	S31000	Plate, Sheet, & Strip
ASTM/ASME	A/SA-178	1	1	1.1	A	K01200	E.R.W. Tube
ASTM/ASME	A/SA-178	1	1	11.1	C	K03503	E.R.W. Tube
ASTM/ASME	A/SA-178	1	2	11.1	D	K02709	E.R.W. Tube
ASTM/ASME	A/SA-179	1	1	1.1	—	K01200	Seamless Tube
ASTM/ASME	A/SA-181	1	1	11.1	Cl. 60	K03502	Pipe Flange & Fittings
ASTM/ASME	A/SA-181	1	2	11.1	Cl. 70	K03502	Pipe Flange & Fittings
ASTM/ASME	A/SA-182	8	4	8.2	—	S32053	Forgings
ASTM/ASME	A/SA-182	10H	1	10.1	—	S32202	Forgings
ASTM/ASME	A/SA-182	3	2	1.1	F1	K12822	Forgings
ASTM/ASME	A/SA-182	8	2	8.1	F10	S33100	Forgings
ASTM/ASME	A/SA-182	4	1	5.1	F11, Cl. 1	K11597	Forgings
ASTM/ASME	A/SA-182	4	1	5.1	F11, Cl. 2	K11572	Forgings
ASTM/ASME	A/SA-182	4	1	5.1	F11, Cl. 3	K11572	Forgings
ASTM/ASME	A/SA-182	4	1	5.1	F12, Cl. 1	K11562	Forgings
ASTM/ASME	A/SA-182	4	1	5.1	F12, Cl. 2	K11564	Forgings
ASTM/ASME	A/SA-182	3	2	4.2	F2	K12122	Forgings
ASTM/ASME	A/SA-182	5A	1	5.2	F21	K31545	Forgings
ASTM/ASME	A/SA-182	5A	1	5.2	F22, Cl. 1	K21590	Forgings
ASTM/ASME	A/SA-182	5A	1	5.2	F22, Cl. 3	K21590	Forgings
ASTM/ASME	A/SA-182	5C	1	6.2	F22V	K31835	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F304	S30400	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F304	S30400	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F304H	S30409	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F304H	S30409	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F304L	S30403	Forgings

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-182	8	1	8.1	F304L	S30403	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F304LN	S30453	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F304LN	S30453	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F304N	S30451	Forgings
ASTM/ASME	A/SA-182	8	2	8.2	F310	S31000	Forgings
ASTM/ASME	A/SA-182	8	2	8.2	F310	S31000	Forgings
ASTM/ASME	A/SA-182	8	2	8.2	F310MoLN	S31050	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F316	S31600	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F316	S31600	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F316H	S31609	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F316H	S31609	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F316L	S31603	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F316L	S31603	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F316LN	S31653	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F316LN	S31653	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F316N	S31651	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F317	S31700	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F317	S31700	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F317L	S31703	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F317L	S31703	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F321	S32100	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F321	S32100	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F321H	S32109	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F321H	S32109	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F347	S34700	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F347	S34700	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F347H	S34709	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F347H	S34709	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F348	S34800	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F348	S34800	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F348H	S34809	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F348H	S34809	Forgings
ASTM/ASME	A/SA-182	5C	1	6.2	F3V	K31830	Forgings
ASTM/ASME	A/SA-182	5C	1	6.2	F3VCb	K31390	Forgings
ASTM/ASME	A/SA-182	6	2	7.2	F429	S42900	Forgings
ASTM/ASME	A/SA-182	7	2	7.1	F430	S43000	Forgings
ASTM/ASME	A/SA-182	8	4	8.2	F44	S31254	Forgings
ASTM/ASME	A/SA-182	8	2	8.2	F45	S30815	Forgings
ASTM/ASME	A/SA-182	8	1	8.1	F46	S30600	Forgings
ASTM/ASME	A/SA-182	8	4	8.3	F49	S34565	Forgings
ASTM/ASME	A/SA-182	5B	1	5.3	F5	K41545	Forgings
ASTM/ASME	A/SA-182	10H	1	10.2	F50	S31200	Forgings

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-182	10H	1	10.1	F51	S31803	Forgings
ASTM/ASME	A/SA-182	10H	1	10.2	F53	S32750	Forgings
ASTM/ASME	A/SA-182	10H	1	10.2	F54	S39274	Forgings
ASTM/ASME	A/SA-182	10H	1	10.1	F55	S32760	Forgings
ASTM/ASME	A/SA-182	5B	1	5.3	F5a	K42544	Forgings
ASTM/ASME	A/SA-182	10H	1	10.1	F60	S32205	Forgings
ASTM/ASME	A/SA-182	10H	1	10.2	F61	S32550	Forgings
ASTM/ASME	A/SA-182	6	1	7.2	F6a, Cl. 1	S41000	Forgings
ASTM/ASME	A/SA-182	6	3	7.2	F6a, Cl. 2	S41000	Forgings
ASTM/ASME	A/SA-182	6	3	7.2	F6a, Cl. 3	S41000	Forgings
ASTM/ASME	A/SA-182	6	3	7.2	F6a, Cl. 4	S41000	Forgings
ASTM/ASME	A/SA-182	6	3	7.2	F6b	S41026	Forgings
ASTM/ASME	A/SA-182	6	4	7.2	F6NM	S41500	Forgings
ASTM/ASME	A/SA-182	5B	1	5.4	F9	K90941	Forgings
ASTM/ASME	A/SA-182	15E	1	6.4	F91	K90901	Forgings
ASTM/ASME	A/SA-182	15E	1	6.4	F92	K92460	Forgings
ASTM/ASME	A/SA-182	9A	1	9.1	FR	K22035	Forgings
ASTM/ASME	A/SA-182	8	3	8.3	FXM-11	S21904	Forgings
ASTM/ASME	A/SA-182	8	3	8.3	FXM-19	S20910	Forgings
ASTM/ASME	A/SA-182	10I	1	7.1	FXM-27Cb	S44627	Forgings
ASTM/ASME	A/SA-192	1	1	1.1	—	K01201	Seamless Tube
ASTM	A199	4	1	5.1	T11	K11597	Seamless Tube
ASTM	A199	5A	1	—	T21	K31545	Seamless Tube
ASTM	A199	5A	1	5.2	T22	K21590	Seamless Tube
ASTM	A199	5A	1	—	T4	K31509	Seamless Tube
ASTM	A199	5B	1	5.3	T5	K41545	Seamless Tube
ASTM	A199	5B	1	5.4	T9	K81590	Seamless Tube
ASTM	A199	15E	1	6.4	T91	K90901	Seamless Tube
ASTM	A200	5A	1	—	T21	K31545	Tube
ASTM	A200	5A	1	5.2	T22	K21590	Tube
ASTM	A200	5A	1	—	T4	K31509	Tube
ASTM/ASME	A/SA-202	4	1	4.2	A	K11742	Plate
ASTM/ASME	A/SA-202	4	1	4.2	B	K12542	Plate
ASTM/ASME	A/SA-203	9A	1	9.1	A	K21703	Plate
ASTM/ASME	A/SA-203	9A	1	9.1	B	K22103	Plate
ASTM/ASME	A/SA-203	9B	1	9.2	D	K31718	Plate
ASTM/ASME	A/SA-203	9B	1	9.2	E	K32018	Plate
ASTM/ASME	A/SA-203	9B	1	9.2	F	—	Plate
ASTM/ASME	A/SA-203	9B	1	9.2	F	—	Plate
ASTM/ASME	A/SA-204	3	1	1.1	A	K11820	Plate
ASTM/ASME	A/SA-204	3	2	1.1	B	K12020	Plate
ASTM/ASME	A/SA-204	3	2	1.2	C	K12320	Plate

(Continued)



**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-209	3	1	1.1	T1	K11522	Seamless Tube
ASTM/ASME	A/SA-209	3	1	1.1	T1a	K12023	Seamless Tube
ASTM/ASME	A/SA-209	3	1	1.1	T1b	K11422	Seamless Tube
ASTM/ASME	A/SA-210	1	1	11.1	A-1	K02707	Seamless Tube
ASTM/ASME	A/SA-210	1	2	11.1	C	K03501	Seamless Tube
ASTM	A211	1	1	1.1	A570-30	K02502	Welded Pipe
ASTM	A211	1	1	1.1	A570-33	K02502	Welded Pipe
ASTM	A211	1	1	1.1	A570-40	K02502	Welded Pipe
ASTM/ASME	A/SA-213	8	2	8.2	310	S31000	Seamless Tube
ASTM/ASME	A/SA-213	8	2	8.2	S30815	S30815	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	S32615	S32615	Seamless Tube
ASTM/ASME	A/SA-213	8	4	8.3	S34565	S34565	Seamless Tube
ASTM/ASME	A/SA-213	4	1	5.1	T11	K11597	Seamless Tube
ASTM/ASME	A/SA-213	4	1	5.1	T12	K11562	Seamless Tube
ASTM/ASME	A/SA-213	10B	1	4.1	T17	K12047	Seamless Tube
ASTM/ASME	A/SA-213	3	1	4.2	T2	K11547	Seamless Tube
ASTM/ASME	A/SA-213	5A	1	5.2	T21	K31545	Seamless Tube
ASTM/ASME	A/SA-213	5A	1	5.2	T22	K21590	Seamless Tube
ASTM/ASME	A/SA-213	5B	1	5.3	T5	K41545	Seamless Tube
ASTM/ASME	A/SA-213	5B	1	5.3	T5b	K51545	Seamless Tube
ASTM/ASME	A/SA-213	5B	1	5.3	T5c	K41245	Seamless Tube
ASTM/ASME	A/SA-213	5B	1	5.4	T9	K90941	Seamless Tube
ASTM/ASME	A/SA-213	15E	1	6.4	T91	K90901	Seamless Tube
ASTM/ASME	A/SA-213	15E	1	6.4	T92	K92460	Seamless Tube
ASTM/ASME	A/SA-213	8	3	8.3	TP201	S20100	Seamless Tube
ASTM/ASME	A/SA-213	8	3	8.3	TP202	S20200	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP304	S30400	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP304H	S30409	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP304L	S30403	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP304LN	S30453	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP304N	S30451	Seamless Tube
ASTM/ASME	A/SA-213	8	2	8.2	TP309Cb	S30940	Seamless Tube
ASTM/ASME	A/SA-213	8	2	8.2	TP309H	S30909	Seamless Tube
ASTM/ASME	A/SA-213	8	2	8.2	TP309HCb	S30941	Seamless Tube
ASTM/ASME	A/SA-213	8	2	8.2	TP309S	S30908	Seamless Tube
ASTM/ASME	A/SA-213	8	2	8.2	TP310Cb	S31040	Seamless Tube
ASTM/ASME	A/SA-213	8	2	8.2	TP310H	S31009	Seamless Tube
ASTM/ASME	A/SA-213	8	2	8.2	TP310HCb	S31041	Seamless Tube
ASTM/ASME	A/SA-213	8	3	8.2	TP310HCbN	S31042	Seamless Tube
ASTM/ASME	A/SA-213	8	2	8.2	TP310MoLN	S31050	Seamless Tube
ASTM/ASME	A/SA-213	8	2	8.2	TP310MoLN	S31050	Seamless Tube
ASTM/ASME	A/SA-213	8	2	8.2	TP310S	S31008	Seamless Tube

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-213	8	1	8.1	TP316	S31600	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP316H	S31609	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP316L	S31603	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP316LN	S31653	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP316N	S31651	Seamless Tube
ASTM	A213	8	1	8.1	TP316Ti	S31635	Seamless Tube
ASTM	A213	8	1	8.1	TP317	S31700	Seamless Tube
ASTM	A213	8	1	8.1	TP317L	S31703	Seamless Tube
ASTM/ASME	A/SA-213	8	4	8.1	TP317LM	S31725	Seamless Tube
ASTM/ASME	A/SA-213	8	4	8.1	TP317LMN	S31726	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP321	S32100	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP321H	S32109	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP347	S34700	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP347H	S34709	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP347HFG	S34710	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP347LN	S34751	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP348	S34800	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	TP348H	S34809	Seamless Tube
ASTM/ASME	A/SA-213	8	1	8.1	XM-15	S38100	Seamless Tube
ASTM/ASME	A/SA-213	8	3	8.3	XM-19	S20910	Seamless Tube
ASTM/ASME	A/SA-214	1	1	1.1	—	K01807	E.R.W. Tube
ASTM/ASME	A/SA-216	1	1	1.1	WCA	J02502	Castings
ASTM/ASME	A/SA-216	1	2	1.1	WCB	J03002	Castings
ASTM/ASME	A/SA-216	1	2	1.1	WCC	J02503	Castings
ASTM/ASME	A/SA-217	5B	1	5.4	C12	J82090	Castings
ASTM	A217	15E	1	6.4	C12A	J84090	Castings
ASTM/ASME	A/SA-217	5B	1	5.3	C5	J42045	Castings
ASTM/ASME	A/SA-217	6	3	7.2	CA15	J91150	Castings
ASTM/ASME	A/SA-217	3	1	1.1	WC1	J12524	Castings
ASTM/ASME	A/SA-217	4	1	9.1	WC4	J12082	Castings
ASTM/ASME	A/SA-217	4	1	4.2	WC5	J22000	Castings
ASTM/ASME	A/SA-217	4	1	5.1	WC6	J12072	Castings
ASTM/ASME	A/SA-217	5A	1	5.2	WC9	J21890	Castings
ASTM/ASME	A/SA-225	10A	1	4.1	C	K12524	Plate
ASTM/ASME	A/SA-225	10A	1	2.1	D	K12004	Plate
ASTM/ASME	A/SA-225	10A	1	2.1	D	K12004	Plate
ASTM	A226	1	1	1.1	—	K01201	E.R.W. Tube
ASTM/ASME	A/SA-234	3	1	11.2	WP1	K12821	Piping Fittings
ASTM/ASME	A/SA-234	4	1	5.1	WP11, Cl.1	—	Piping Fittings
ASTM/ASME	A/SA-234	4	1	5.1	WP11, Cl.2	—	Piping Fittings
ASTM/ASME	A/SA-234	4	1	5.1	WP11, Cl.3	—	Piping Fittings
ASTM/ASME	A/SA-234	4	1	5.1	WP12, Cl.1	K12062	Piping Fittings

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-234	4	1	5.1	WP12, Cl. 2	K12062	Piping Fittings
ASTM/ASME	A/SA-234	5A	1	5.2	WP22, Cl. 1	K21590	Piping Fittings
ASTM/ASME	A/SA-234	5A	1	5.2	WP22, Cl. 3	K21590	Piping Fittings
ASTM/ASME	A/SA-234	5B	1	5.3	WP5, Cl. 1	K41545	Piping Fittings
ASTM/ASME	A/SA-234	5B	1	5.3	WP5, Cl. 3	K41545	Piping Fittings
ASTM/ASME	A/SA-234	5B	1	5.4	WP9, Cl. 1	K90941	Piping Fittings
ASTM/ASME	A/SA-234	5B	1	5.4	WP9, Cl. 3	K90941	Piping Fittings
ASTM/ASME	A/SA-234	15E	1	6.4	WP91	K90901	Piping Fittings
ASTM/ASME	A/SA-234	1	1	11.1	WPB	K03006	Piping Fittings
ASTM/ASME	A/SA-234	1	2	11.1	WPC	K03501	Piping Fittings
ASTM/ASME	A/SA-234	9A	1	9.1	WPR	K22035	Piping Fittings
ASTM/ASME	A/SA-240	8	3	8.3	—	S20400	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	45	—	8.2	—	S31277	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10H	1	10.1	—	S32003	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	4	8.2	—	S32053	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10H	1	10.1	—	S32101	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10H	1	10.1	—	S32101	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10H	1	10.1	—	S32202	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	3	8.3	201-1	S20100	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	3	8.3	201-2	S20100	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	3	8.3	201LN	S20153	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	3	8.3	202	S20200	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10H	1	10.1	2205	S32205	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	301	S30100	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	302	S30200	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	304	S30400	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	304H	S30409	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	304L	S30403	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	304LN	S30453	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	304N	S30451	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	305	S30500	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	2	8.2	309Cb	S30940	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	2	8.2	309H	S30909	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	2	8.2	309Hcb	S30941	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	2	8.2	309S	S30908	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	2	8.2	310Cb	S31040	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	2	8.2	310H	S31009	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	2	8.2	310Hcb	S31041	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	2	8.2	310MoLN	S31050	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	2	8.2	310MoLN	S31050	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	2	8.2	310S	S31008	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	316	S31600	Plate, Sheet, & Strip

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-240	8	1	8.1	316Cb	S31640	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	316H	S31609	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	316L	S31603	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	316LN	S31653	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	316N	S31651	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	316Ti	S31635	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	317	S31700	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	317L	S31703	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	321	S32100	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	321H	S32109	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10H	1	10.2	329	S32900	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	347	S34700	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	347H	S34709	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	348	S34800	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	348H	S34809	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	7	1	7.1	405	S40500	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	7	1	7.1	409	S40910	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	7	1	7.1	409	S40920	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	7	1	7.1	409	S40930	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	6	1	7.2	410	S41000	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	7	1	7.2	410S	S41008	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	6	2	7.2	429	S42900	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	7	2	7.1	430	S43000	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	7	2	7.1	439	S43035	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	3	8.1	S21800	S21800	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	S30600	S30600	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	S30601	S30601	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	2	8.2	S30815	S30815	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10H	1	10.2	S31200	S31200	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	4	8.2	S31254	S31254	Sheet & Strip
ASTM/ASME	A/SA-240	8	4	8.2	S31254	S31254	Plate
ASTM/ASME	A/SA-240	10H	1	10.2	S31260	S31260	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	45	—	8.2	S31277	S31277	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	4	8.1	S31725	S31725	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	4	8.1	S31726	S31726	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	S31753	S31753	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10H	1	10.1	S31803	S31803	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10H	1	10.2	S32550	S32550	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	S32615	S32615	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10H	1	10.2	S32750	S32750	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10H	1	10.2	S32760	S32760	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10H	1	10.2	S32906	S32906	Plate, Sheet, & Strip

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-240	10H	1	10.2	S32906	S32906	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10H	1	10.2	S32950	S32950	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	4	8.3	S34565	S34565	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	6	4	7.2	S41500	S41500	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	7	2	7.1	S43932	S43932	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	7	2	7.1	S44400	S44400	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10I	1	7.1	S44635	S44635	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10K	1	7.1	S44660	S44660	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10J	1	7.1	S44700	S44700	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10K	1	7.1	S44800	S44800	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	1	8.1	XM-15	S38100	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	3	8.3	XM-17	S21600	Plate
ASTM/ASME	A/SA-240	8	3	8.3	XM-17	S21600	Sheet & Strip
ASTM/ASME	A/SA-240	8	3	8.3	XM-18	S21603	Plate
ASTM/ASME	A/SA-240	8	3	8.3	XM-18	S21603	Sheet & Strip
ASTM/ASME	A/SA-240	8	3	8.3	XM-19	S20910	Sheet & Strip
ASTM/ASME	A/SA-240	8	3	8.3	XM-19	S20910	Plate
ASTM/ASME	A/SA-240	8	1	8.1	XM-21	S30452	Plate
ASTM/ASME	A/SA-240	8	1	8.1	XM-21	S30452	Sheet & Strip
ASTM/ASME	A/SA-240	10I	1	7.1	XM-27	S44627	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	8	3	8.3	XM-29	S24000	Plate, Sheet, & Strip
ASTM/ASME	A/SA-240	10I	1	7.1	XM-33	S44626	Plate, Sheet, & Strip
ASTM	A242	1	2	1.2	1	K11510	Plate, Bar, & Shapes
ASTM	A242	1	2	1.2	1	K11510	Plate, Bar, & Shapes
ASTM	A242	1	2	1.2	1	K11510	Plate, Bar, & Shapes
ASTM/ASME	A/SA-249	8	4	8.2	—	S32053	Welded Tube
ASTM/ASME	A/SA-249	8	2	8.2	S30815	S30815	Welded Tube
ASTM/ASME	A/SA-249	8	4	8.2	S31254	S31254	Welded Tube
ASTM/ASME	A/SA-249	8	4	8.2	S31254	S31254	Welded Tube
ASTM/ASME	A/SA-249	8	4	8.1	S31725	S31725	Welded Tube
ASTM/ASME	A/SA-249	8	4	8.1	S31726	S31726	Welded Tube
ASTM/ASME	A/SA-249	8	3	8.3	TP 201	S20100	Welded Tube
ASTM/ASME	A/SA-249	8	3	8.3	TP 202	S20200	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP XM-15	S38100	Welded Tube
ASTM/ASME	A/SA-249	8	3	8.3	TP XM-19	S20910	Welded Tube
ASTM/ASME	A/SA-249	8	3	8.3	TP XM-29	S24000	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP304	S30400	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP304H	S30409	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP304L	S30403	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP304LN	S30453	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP304N	S30451	Welded Tube
ASTM/ASME	A/SA-249	8	2	8.2	TP309	S30900	Welded Tube

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-249	8	2	8.2	TP309Cb	S30940	Welded Tube
ASTM/ASME	A/SA-249	8	2	8.2	TP309H	S30909	Welded Tube
ASTM/ASME	A/SA-249	8	2	8.2	TP309HCb	S30941	Welded Tube
ASTM/ASME	A/SA-249	8	2	8.2	TP309S	S30908	Welded Tube
ASTM/ASME	A/SA-249	8	2	8.2	TP310Cb	S31040	Welded Tube
ASTM/ASME	A/SA-249	8	2	8.2	TP310H	S31009	Welded Tube
ASTM/ASME	A/SA-249	8	2	8.2	TP310HCb	S31041	Welded Tube
ASTM/ASME	A/SA-249	8	2	8.2	TP310MoLN	S31050	Welded Tube
ASTM/ASME	A/SA-249	8	2	8.2	TP310MoLN	S31050	Welded Tube
ASTM/ASME	A/SA-249	8	2	8.2	TP310S	S31008	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP316	S31600	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP316H	S31609	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP316L	S31603	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP316LN	S31653	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP316N	S31651	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP317	S31700	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP317L	S31703	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP321	S32100	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP321H	S32109	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP347	S34700	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP347H	S34709	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP348	S34800	Welded Tube
ASTM/ASME	A/SA-249	8	1	8.1	TP348H	S34809	Welded Tube
ASTM/ASME	A/SA-250	3	1	1.1	T1	K11522	E.R.W. Tube
ASTM/ASME	A/SA-250	4	1	5.1	T11	K11597	E.R.W. Tube
ASTM/ASME	A/SA-250	4	1	5.1	T12	K11562	E.R.W. Tube
ASTM/ASME	A/SA-250	3	1	1.1	T1a	K12023	E.R.W. Tube
ASTM/ASME	A/SA-250	3	1	1.1	T1b	K11422	E.R.W. Tube
ASTM/ASME	A/SA-250	3	1	4.2	T2	K11547	E.R.W. Tube
ASTM/ASME	A/SA-250	5A	1	5.2	T22	K21590	E.R.W. Tube
ASTM	A252	1	1	—	1	—	Pipe Piles
ASTM	A252	1	1	—	2	—	Pipe Piles
ASTM	A252	1	1	—	3	—	Pipe Piles
ASTM/ASME	A/SA-266	1	1	11.1	1	K03506	Forgings
ASTM/ASME	A/SA-266	1	2	11.1	2	K03506	Forgings
ASTM/ASME	A/SA-266	1	2	11.2	3	K05001	Forgings
ASTM/ASME	A/SA-266	1	2	11.1	4	K03017	Forgings
ASTM/ASME	A/SA-268	7	2	7.1	18Cr-2Mo	S44400	Seamless & Welded Tube
ASTM/ASME	A/SA-268	10I	1	7.1	25-4-4	S44635	Seamless & Welded Tube
ASTM/ASME	A/SA-268	10K	1	7.1	26-3-3	S44660	Seamless & Welded Tube
ASTM/ASME	A/SA-268	10J	1	7.1	29-4	S44700	Seamless & Welded Tube
ASTM/ASME	A/SA-268	10K	1	7.1	29-4-2	S44800	Seamless & Welded Tube

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-268	7	1	7.1	S40800	S40800	Seamless & Welded Tube
ASTM/ASME	A/SA-268	6	4	7.2	S41500	S41500	Seamless & Welded Tube
ASTM/ASME	A/SA-268	10J	1	7.1	S44735	S44735	Seamless & Welded Tube
ASTM/ASME	A/SA-268	10I	1	7.1	TP 446-1	S44600	Seamless & Welded Tube
ASTM/ASME	A/SA-268	10I	1	7.1	TP 446-2	S44600	Seamless & Welded Tube
ASTM/ASME	A/SA-268	10I	1	7.1	TP XM-27	S44627	Seamless & Welded Tube
ASTM/ASME	A/SA-268	10I	1	7.1	TP XM-33	S44626	Seamless & Welded Tube
ASTM/ASME	A/SA-268	7	1	7.1	TP405	S40500	Seamless & Welded Tube
ASTM/ASME	A/SA-268	7	1	7.1	TP409	S40900	Seamless & Welded Tube
ASTM/ASME	A/SA-268	6	1	7.2	TP410	S41000	Seamless & Welded Tube
ASTM/ASME	A/SA-268	6	2	7.2	TP429	S42900	Seamless & Welded Tube
ASTM/ASME	A/SA-268	7	2	7.1	TP430	S43000	Seamless & Welded Tube
ASTM/ASME	A/SA-268	7	2	7.1	TP430Ti	S43036	Seamless & Welded Tube
ASTM/ASME	A/SA-268	7	2	7.1	TP439	S43035	Seamless & Welded Tube
ASTM	A269	8	1	8.1	TP304	S30400	Seamless & Welded Tube
ASTM	A269	8	1	8.1	TP304L	S30403	Seamless & Welded Tube
ASTM	A269	8	1	8.1	TP304LN	S30453	Seamless & Welded Tube
ASTM	A269	8	1	8.1	TP316	S31600	Seamless & Welded Tube
ASTM	A269	8	1	8.1	TP316L	S31603	Seamless & Welded Tube
ASTM	A269	8	1	8.1	TP316LN	S31653	Seamless & Welded Tube
ASTM	A269	8	1	8.1	TP317	S31700	Seamless & Welded Tube
ASTM	A269	8	1	8.1	TP321	S32100	Seamless & Welded Tube
ASTM	A269	8	1	8.1	TP347	S34700	Seamless & Welded Tube
ASTM	A269	8	1	8.1	TP348	S34800	Seamless & Welded Tube
ASTM	A269	8	3	8.3	TPXM-10	S21900	Seamless & Welded Tube
ASTM	A269	8	3	8.3	TPXM-11	S21904	Seamless & Welded Tube
ASTM	A269	8	3	8.3	TPXM-15	S38100	Seamless & Welded Tube
ASTM	A269	8	3	8.3	TPXM-19	S20910	Seamless & Welded Tube
ASTM	A269	8	3	8.3	TPXM-29	S24000	Seamless & Welded Tube
ASTM	A270	8	1	8.1	TP304	S30400	Seamless & Welded Tube
ASTM	A271	8	1	8.1	TP304	S30400	Seamless Tube
ASTM	A271	8	1	8.1	TP304H	S30409	Seamless Tube
ASTM	A271	8	1	8.1	TP316	S31600	Seamless Tube
ASTM	A271	8	1	8.1	TP316H	S31609	Seamless Tube
ASTM	A271	8	1	8.1	TP321	S32100	Seamless Tube
ASTM	A271	8	1	8.1	TP321H	S32109	Seamless Tube
ASTM	A271	8	1	8.1	TP347	S34700	Seamless Tube
ASTM	A271	8	1	8.1	TP347H	S34709	Seamless Tube
ASTM	A276	10H	1	10.1	—	S32101	Bar
ASTM/ASME	A/SA-276	10H	1	10.1	—	S32550	Bars & Shapes
ASTM/ASME	A/SA-276	10H	1	10.1	S32205	S32205	Bar
ASTM/ASME	A/SA-276	8	1	8.1	TP304	S30400	Bar

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-276	8	1	8.1	TP304L	S30403	Bar
ASTM/ASME	A/SA-276	8	1	8.1	TP316	S31600	Bar
ASTM/ASME	A/SA-276	8	1	8.1	TP316L	S31603	Bar
ASTM/ASME	A/SA-276	6	1	7.2	TP410	S41000	Bar
ASTM/ASME	A/SA-283	1	1	1.1	A	K01400	Plate
ASTM/ASME	A/SA-283	1	1	1.1	B	K01702	Plate
ASTM/ASME	A/SA-283	1	1	1.1	C	K02401	Plate
ASTM/ASME	A/SA-283	1	1	1.1	D	K02702	Plate
ASTM/ASME	A/SA-285	1	1	1.1	A	K01700	Plate
ASTM/ASME	A/SA-285	1	1	1.1	B	K02200	Plate
ASTM/ASME	A/SA-285	1	1	11.1	C	K02801	Plate
ASTM	A297	8	2	8.2	HE	J93403	Castings
ASTM	A297	8	2	8.2	HF	J92603	Castings
ASTM	A297	8	2	8.2	HH	J93503	Castings
ASTM	A297	8	2	8.2	HI	J94003	Castings
ASTM	A297	8	2	8.2	HK	J94224	Castings
ASTM/ASME	A/SA-299	1	2	11.1	A	K02803	Plate
ASTM/ASME	A/SA-299	1	3	11.1	B	K02803	Plate
ASTM/ASME	A/SA-312	8	4	8.2	—	S32053	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	S30600	S30600	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	2	8.2	S30815	S30815	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	4	8.2	S31254	S31254	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	4	8.2	S31254	S31254	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	4	8.1	S31725	S31725	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	4	8.1	S31726	S31726	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	S32615	S32615	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	4	8.3	S34565	S34565	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	3	8.3	TP XM-11	S21904	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP XM-15	S38100	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	3	8.3	TP XM-19	S20910	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	3	8.3	TP XM-29	S24000	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP304	S30400	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP304H	S30409	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP304L	S30403	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP304LN	S30453	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP304N	S30451	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	2	8.2	TP309Cb	S30940	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	2	8.2	TP309H	S30909	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	2	8.2	TP309HCb	S30941	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	2	8.2	TP309S	S30908	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	2	8.2	TP310Cb	S31040	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	2	8.2	TP310H	S31009	Seamless & Welded Pipe

(Continued)



**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-312	8	2	8.2	TP310HCb	S31041	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	2	8.2	TP310MoLN	S31050	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	2	8.2	TP310MoLN	S31050	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	2	8.2	TP310S	S31008	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP316	S31600	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP316H	S31609	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP316L	S31603	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP316LN	S31653	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP316N	S31651	Seamless & Welded Pipe
ASTM	A312	8	1	8.1	TP316Ti	S31635	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP317	S31700	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP317L	S31703	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP321	S32100	Seamless Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP321	S32100	Seamless Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP321H	S32109	Seamless Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP321H	S32109	Seamless Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP347	S34700	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP347H	S34709	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP347LN	S34751	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP348	S34800	Seamless & Welded Pipe
ASTM/ASME	A/SA-312	8	1	8.1	TP348H	S34809	Seamless & Welded Pipe
ASTM/ASME	A/SA-333	1	1	11.1	1	K03008	Seamless & Welded Pipe
ASTM/ASME	A/SA-333	1	3	11.1	10	—	Seamless & Welded Pipe
ASTM/ASME	A/SA-333	9B	1	9.2	3	K31918	Seamless & Welded Pipe
ASTM/ASME	A/SA-333	4	2	4.1	4	K11267	Seamless & Welded Pipe
ASTM/ASME	A/SA-333	1	1	11.1	6	K03006	Seamless & Welded Pipe
ASTM/ASME	A/SA-333	9A	1	9.1	7	K21903	Seamless & Welded Pipe
ASTM/ASME	A/SA-333	11A	1	9.3	8	K81340	Seamless & Welded Pipe
ASTM/ASME	A/SA-333	9A	1	9.1	9	K22035	Seamless & Welded Pipe
ASTM/ASME	A/SA-334	1	1	11.1	1	K03008	Welded Tube
ASTM/ASME	A/SA-334	9B	1	9.2	3	K31918	Welded Tube
ASTM/ASME	A/SA-334	1	1	11.1	6	K03006	Welded Tube
ASTM/ASME	A/SA-334	9A	1	9.1	7	K21903	Welded Tube
ASTM/ASME	A/SA-334	11A	1	9.3	8	K81340	Welded Tube
ASTM/ASME	A/SA-334	9A	1	9.1	9	K22035	Welded Tube
ASTM/ASME	A/SA-335	3	1	1.1	P1	K11522	Seamless Pipe
ASTM/ASME	A/SA-335	4	1	5.1	P11	K11597	Seamless Pipe
ASTM/ASME	A/SA-335	4	1	5.1	P12	K11562	Seamless Pipe
ASTM/ASME	A/SA-335	3	1	—	P15	K11578	Seamless Pipe
ASTM/ASME	A/SA-335	3	1	4.2	P2	K11547	Seamless Pipe
ASTM/ASME	A/SA-335	5A	1	5.2	P21	K31545	Seamless Pipe
ASTM/ASME	A/SA-335	5A	1	5.2	P22	K21590	Seamless Pipe

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-335	5B	1	5.3	P5	K41545	Seamless Pipe
ASTM/ASME	A/SA-335	5B	1	5.3	P5b	K51545	Seamless Pipe
ASTM/ASME	A/SA-335	5B	1	5.3	P5c	K41245	Seamless Pipe
ASTM/ASME	A/SA-335	5B	1	5.4	P9	K90941	Seamless Pipe
ASTM/ASME	A/SA-335	15E	1	6.4	P91	K90901	Seamless Pipe
ASTM/ASME	A/SA-335	15E	1	6.4	P92	K92460	Seamless Pipe
ASTM/ASME	A/SA-336	3	2	1.1	F1	K12520	Forgings
ASTM/ASME	A/SA-336	4	1	5.1	F11, Cl. 1	K11597	Forgings
ASTM/ASME	A/SA-336	4	1	5.1	F11, Cl. 2	K11572	Forgings
ASTM/ASME	A/SA-336	4	1	5.1	F11, Cl. 3	K11572	Forgings
ASTM/ASME	A/SA-336	4	1	5.1	F12	K11564	Forgings
ASTM/ASME	A/SA-336	5A	1	5.2	F21, Cl. 1	K31545	Forgings
ASTM/ASME	A/SA-336	5A	1	5.2	F21, Cl. 3	K31545	Forgings
ASTM/ASME	A/SA-336	5A	1	5.2	F22, Cl. 1	K21590	Forgings
ASTM/ASME	A/SA-336	5A	1	5.2	F22, Cl. 3	K21590	Forgings
ASTM/ASME	A/SA-336	5C	1	6.2	F22V	K31835	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F304	S30400	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F304H	S30409	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F304L	S30403	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F304LN	S30453	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F304N	S30451	Forgings
ASTM/ASME	A/SA-336	8	2	8.2	F310	S31000	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F316	S31600	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F316H	S31609	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F316L	S31603	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F316LN	S31653	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F316N	S31651	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F321	S32100	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F321H	S32109	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F347	S34700	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F347H	S34709	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F348	S34800	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F348H	S34809	Forgings
ASTM/ASME	A/SA-336	5C	1	6.2	F3V	K31830	Forgings
ASTM/ASME	A/SA-336	5C	1	6.2	F3VCb	K31390	Forgings
ASTM/ASME	A/SA-336	8	1	8.1	F46	S30600	Forgings
ASTM/ASME	A/SA-336	5B	1	5.3	F5	K41545	Forgings
ASTM/ASME	A/SA-336	5B	1	5.3	F5A	K42544	Forgings
ASTM/ASME	A/SA-336	6	3	7.2	F6	S41000	Forgings
ASTM/ASME	A/SA-336	5B	1	5.4	F9	K90941	Forgings
ASTM/ASME	A/SA-336	15E	1	6.4	F91	K90901	Forgings
ASTM/ASME	A/SA-336	8	3	8.3	FXM-11	S21904	Forgings

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-336	8	3	8.3	FXM-19	S20910	Forgings
ASTM/ASME	A/SA-336	10I	1	7.1	FXM-27Cb	S44627	Forgings
ASTM/ASME	A/SA-350	1	1	11.1	LF1	K03009	Forgings
ASTM/ASME	A/SA-350	1	2	11.1	LF2	K03011	Forgings
ASTM/ASME	A/SA-350	9B	1	9.2	LF3	K32025	Forgings
ASTM/ASME	A/SA-350	9A	1	9.1	LF5, Cl. 1	K13050	Forgings
ASTM/ASME	A/SA-350	9A	1	9.1	LF5, Cl. 2	K13050	Forgings
ASTM/ASME	A/SA-350	1	1	1.2	LF6, Cl. 1	K12202	Forgings
ASTM/ASME	A/SA-350	1	3	4.1	LF6, Cl. 2	K12202	Forgings
ASTM/ASME	A/SA-350	1	2	1.3	LF6, Cl. 3	K12202	Forgings
ASTM/ASME	A/SA-350	1	2	3.3	LF787, Cl. 2	K20747	Forgings
ASTM/ASME	A/SA-350	1	3	3.3	LF787, Cl. 3	K20747	Forgings
ASTM/ASME	A/SA-350	9A	1	9.1	LF9	K22036	Forgings
ASTM	A351	6	3	7.2	CA15	J91150	Castings
ASTM/ASME	A/SA-351	10H	1	10.2	CD3MWCuN	J93380	Castings
ASTM/ASME	A/SA-351	10H	1	10.2	CD4MCu	J93370	Castings
ASTM/ASME	A/SA-351	8	2	8.2	CE20N	J92802	Castings
ASTM/ASME	A/SA-351	10H	1	10.2	CE8MN	J93345	Castings
ASTM/ASME	A/SA-351	8	1	8.1	CF10	J92590	Castings
ASTM/ASME	A/SA-351	8	1	8.1	CF10M	J92901	Castings
ASTM/ASME	A/SA-351	8	1	8.1	CF10MC	J92971	Castings
ASTM/ASME	A/SA-351	8	1	8.1	CF3	J92500	Castings
ASTM/ASME	A/SA-351	8	1	8.1	CF3A	J92500	Castings
ASTM/ASME	A/SA-351	8	1	8.1	CF3M	J92800	Castings
ASTM/ASME	A/SA-351	8	1	8.1	CF8	J92600	Castings
ASTM/ASME	A/SA-351	8	1	8.1	CF8A	J92600	Castings
ASTM/ASME	A/SA-351	8	1	8.1	CF8C	J92710	Castings
ASTM/ASME	A/SA-351	8	1	8.1	CF8M	J92900	Castings
ASTM/ASME	A/SA-351	8	3	8.3	CG6MMN	J93790	Castings
ASTM/ASME	A/SA-351	8	1	8.1	CG8M	J93000	Castings
ASTM/ASME	A/SA-351	8	2	8.2	CH10	J93401	Castings
ASTM/ASME	A/SA-351	8	2	8.2	CH20	J93402	Castings
ASTM/ASME	A/SA-351	8	2	8.2	CH8	J93400	Castings
ASTM/ASME	A/SA-351	8	2	8.2	CK20	J94202	Castings
ASTM/ASME	A/SA-351	8	4	8.2	CK3MCuN	J93254	Castings
ASTM/ASME	A/SA-351	45	—	8.2	CN3MN	J94651	Castings
ASTM/ASME	A/SA-351	8	2	8.2	HK30	J94203	Castings
ASTM/ASME	A/SA-351	8	2	8.2	HK40	J94204	Castings
ASTM/ASME	A/SA-351	45	—	45	HT30	N08603	Castings
ASTM/ASME	A/SA-352	6	4	7.2	CA6NM	J91540	Castings
ASTM/ASME	A/SA-352	3	1	1.1	LC1	J12522	Castings
ASTM/ASME	A/SA-352	9A	1	9.1	LC2	J22500	Castings

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-352	11A	5	9.2	LC2-1	J42215	Castings
ASTM/ASME	A/SA-352	9B	1	9.3	LC3	J31550	Castings
ASTM/ASME	A/SA-352	9C	1	9.3	LC4	J41500	Castings
ASTM/ASME	A/SA-352	1	1	11.1	LCA	J02504	Castings
ASTM/ASME	A/SA-352	1	1	1.1	LCB	J03003	Castings
ASTM/ASME	A/SA-352	1	2	11.1	LCC	J02505	Castings
ASTM/ASME	A/SA-353	11A	1	9.3	—	K81340	Plate
ASTM	A356	1	2	11.1	1	J03502	Castings
ASTM	A356	5A	1	5.2	10	J22090	Castings
ASTM	A356	15E	1	6.4	12A	J84090	Castings
ASTM	A356	3	1	1.1	2	J12523	Castings
ASTM	A356	4	1	5.1	6	J12073	Castings
ASTM	A356	4	1	6.2	8	J11697	Castings
ASTM	A356	4	1	6.2	9	J21610	Castings
ASTM/ASME	A/SA-358	8	4	8.2	—	S32053	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	1	8.1	304	S30400	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	1	8.1	304H	S30409	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	1	8.1	304L	S30403	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	1	8.1	304LN	S30453	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	1	8.1	304N	S30451	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	2	8.2	309	S30900	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	2	8.2	309Cb	S30940	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	2	8.2	309S	S30908	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	2	8.2	310	S31000	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	2	8.2	310Cb	S31040	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	2	8.2	310S	S31008	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	1	8.1	316	S31600	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	1	8.1	316H	S31609	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	1	8.1	316L	S31603	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	1	8.1	316LN	S31653	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	1	8.1	316N	S31651	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	1	8.1	321	S32100	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	1	8.1	347	S34700	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	1	8.1	348	S34800	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	2	8.2	S30815	S30815	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	4	8.2	S31254	S31254	Fusion Welded Tube
ASTM/ASME	A/SA-358	8	4	8.1	S31725	S31725	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	4	8.1	S31726	S31726	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	3	8.3	XM-19	S20910	Fusion Welded Pipe
ASTM/ASME	A/SA-358	8	3	8.3	XM-29	S24000	Fusion Welded Pipe
ASTM	A366	1	1	1.1	CS	—	Sheet
ASTM/ASME	A/SA-369	3	1	1.1	FP1	K11522	Forged Pipe

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-369	4	1	5.1	FP11	K11597	Forged Pipe
ASTM/ASME	A/SA-369	4	1	5.1	FP12	K11562	Forged Pipe
ASTM/ASME	A/SA-369	3	1	4.2	FP2	K11547	Forged Pipe
ASTM/ASME	A/SA-369	5A	1	5.2	FP21	K31545	Forged Pipe
ASTM/ASME	A/SA-369	5A	1	5.2	FP22	K21590	Forged Pipe
ASTM/ASME	A/SA-369	5B	1	5.3	FP5	K41545	Forged Pipe
ASTM/ASME	A/SA-369	5B	1	5.4	FP9	K90941	Forged Pipe
ASTM/ASME	A/SA-369	15E	1	6.4	FP91	K90901	Forged Pipe
ASTM/ASME	A/SA-369	15E	1	6.4	FP92	K92460	Forged Pipe
ASTM/ASME	A/SA-369	1	1	1.1	FPA	K02501	Forged Pipe
ASTM/ASME	A/SA-369	1	1	1.1	FPB	K03006	Forged Pipe
ASTM/ASME	A/SA-372	1	1	11.1	A	K03002	Forgings
ASTM/ASME	A/SA-372	1	2	11.1	B	K04001	Forgings
ASTM/ASME	A/SA-376	8	1	8.1	16-8-2H	S16800	Seamless Pipe
ASTM/ASME	A/SA-376	8	4	8.1	S31725	S31725	Seamless Pipe
ASTM/ASME	A/SA-376	8	4	8.1	S31726	S31726	Seamless Pipe
ASTM/ASME	A/SA-376	8	4	8.3	S34565	S34565	Seamless Pipe
ASTM/ASME	A/SA-376	8	1	8.1	TP304	S30400	Seamless Pipe
ASTM/ASME	A/SA-376	8	1	8.1	TP304	S30400	Seamless Pipe
ASTM/ASME	A/SA-376	8	1	8.1	TP304H	S30409	Seamless Pipe
ASTM/ASME	A/SA-376	8	1	8.1	TP304LN	S30453	Seamless Pipe
ASTM/ASME	A/SA-376	8	1	8.1	TP304N	S30451	Seamless Pipe
ASTM/ASME	A/SA-376	8	1	8.1	TP316	S31600	Seamless Pipe
ASTM/ASME	A/SA-376	8	1	8.1	TP316H	S31609	Seamless Pipe
ASTM/ASME	A/SA-376	8	1	8.1	TP316LN	S31653	Seamless Pipe
ASTM/ASME	A/SA-376	8	1	8.1	TP316N	S31651	Seamless Pipe
ASTM/ASME	A/SA-376	8	1	8.1	TP321	S32100	Seamless Pipe
ASTM/ASME	A/SA-376	8	1	8.1	TP321	S32100	Seamless Pipe
ASTM/ASME	A/SA-376	8	1	8.1	TP321H	S32109	Seamless Pipe
ASTM/ASME	A/SA-376	8	1	8.1	TP321H	S32109	Seamless Pipe
ASTM/ASME	A/SA-376	8	1	8.1	TP347	S34700	Seamless Pipe
ASTM/ASME	A/SA-376	8	1	8.1	TP347H	S34709	Seamless Pipe
ASTM/ASME	A/SA-376	8	1	8.1	TP348	S34800	Seamless Pipe
ASTM	A381	1	1	11.1	Y35	—	Welded Pipe
ASTM	A381	1	1	11.1	Y42	—	Welded Pipe
ASTM	A381	1	1	11.1	Y46	—	Welded Pipe
ASTM	A381	1	1	11.1	Y48	—	Welded Pipe
ASTM	A381	1	1	11.1	Y50	—	Welded Pipe
ASTM	A381	1	2	11.1	Y52	—	Welded Pipe
ASTM	A381	1	2	11.1	Y56	—	Welded Pipe
ASTM	A381	1	2	11.1	Y60	—	Welded Pipe
ASTM	A381	1	3	11.1	Y65	—	Welded Pipe

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-387	4	1	5.1	11, Cl. 1	K11789	Plate
ASTM/ASME	A/SA-387	4	1	5.1	11, Cl. 2	K11789	Plate
ASTM/ASME	A/SA-387	4	1	5.1	12, Cl. 1	K11757	Plate
ASTM/ASME	A/SA-387	4	1	5.1	12, Cl. 2	K11757	Plate
ASTM/ASME	A/SA-387	3	1	4.2	2, Cl. 1	K12143	Plate
ASTM/ASME	A/SA-387	3	2	4.2	2, Cl. 2	K12143	Plate
ASTM/ASME	A/SA-387	5A	1	5.2	21, Cl. 1	K31545	Plate
ASTM/ASME	A/SA-387	5A	1	5.2	21, Cl. 2	K31545	Plate
ASTM/ASME	A/SA-387	5A	1	5.2	22, Cl. 1	K21590	Plate
ASTM/ASME	A/SA-387	5A	1	5.2	22, Cl. 2	K21590	Plate
ASTM/ASME	A/SA-387	5B	1	5.3	5, Cl. 1	K41545	Plate
ASTM/ASME	A/SA-387	5B	1	5.3	5, Cl. 2	K41545	Plate
ASTM/ASME	A/SA-387	5B	1	5.4	9, Cl. 1	K90941	Plate
ASTM/ASME	A/SA-387	5B	1	5.4	9, Cl. 2	K90941	Plate
ASTM/ASME	A/SA-387	15E	1	5.4	91, Cl. 2	K90901	Plate
ASTM	A389	4	1	6.2	C23	J12080	Castings
ASTM	A389	4	1	6.2	C24	J12092	Castings
ASTM/ASME	A/SA-403	8	4	8.2	—	S31254	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	4	8.2	—	S32053	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	4	8.3	S34565	S34565	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP304	S30400	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP304H	S30409	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP304L	S30403	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP304LN	S30453	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP304N	S30451	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	2	8.2	WP309	S30900	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	2	8.2	WP310	S31000	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	2	8.2	WP310S	S31008	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP316	S31600	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP316H	S31609	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP316L	S31603	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP316LN	S31653	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP316N	S31651	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP317	S31700	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP317L	S31703	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP321	S32100	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP321H	S32109	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP347	S34700	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP347H	S34709	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP348	S34800	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	1	8.1	WP348H	S34809	Wrought Piping Fittings
ASTM/ASME	A/SA-403	8	3	8.3	WPXM-19	S20910	Wrought Piping Fittings

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM	A405	4	1	6.2	P24	K11591	Seamless Pipe
ASTM/ASME	A/SA-409	8	4	8.2	—	S32053	Welded Pipe
ASTM/ASME	A/SA-409	8	2	8.2	S30815	S30815	Welded Pipe
ASTM/ASME	A/SA-409	8	4	8.2	S31254	S31254	Welded Pipe
ASTM/ASME	A/SA-409	8	4	8.1	S31725	S31725	Welded Pipe
ASTM/ASME	A/SA-409	8	4	8.1	S31726	S31726	Welded Pipe
ASTM/ASME	A/SA-409	8	4	8.3	S34565	S34565	Welded Pipe
ASTM/ASME	A/SA-409	8	1	8.1	TP304	S30400	Welded Pipe
ASTM/ASME	A/SA-409	8	1	8.1	TP304L	S30403	Welded Pipe
ASTM/ASME	A/SA-409	8	2	8.2	TP309Cb	S30940	Welded Pipe
ASTM/ASME	A/SA-409	8	2	8.2	TP309S	S30908	Welded Pipe
ASTM/ASME	A/SA-409	8	2	8.2	TP310Cb	S31040	Welded Pipe
ASTM/ASME	A/SA-409	8	2	8.2	TP310S	S31008	Welded Pipe
ASTM/ASME	A/SA-409	8	1	8.1	TP316	S31600	Welded Pipe
ASTM/ASME	A/SA-409	8	1	8.1	TP316L	S31603	Welded Pipe
ASTM/ASME	A/SA-409	8	1	8.1	TP317	S31700	Welded Pipe
ASTM/ASME	A/SA-409	8	1	8.1	TP321	S32100	Welded Pipe
ASTM/ASME	A/SA-409	8	1	8.1	TP347	S34700	Welded Pipe
ASTM/ASME	A/SA-409	8	1	8.1	TP348	S34800	Welded Pipe
ASTM/ASME	A/SA-414	1	1	1.1	A	K01501	Sheet
ASTM/ASME	A/SA-414	1	1	1.1	B	K02201	Sheet
ASTM/ASME	A/SA-414	1	1	1.1	C	K02503	Sheet
ASTM/ASME	A/SA-414	1	1	1.1	D	K02505	Sheet
ASTM/ASME	A/SA-414	1	1	11.1	E	K02704	Sheet
ASTM/ASME	A/SA-414	1	2	11.1	F	K03102	Sheet
ASTM/ASME	A/SA-414	1	2	11.1	G	K03103	Sheet
ASTM/ASME	A/SA-420	9B	1	9.2	WPL3	K31918	Piping Fittings
ASTM/ASME	A/SA-420	1	1	11.1	WPL6	K03006	Piping Fittings
ASTM/ASME	A/SA-420	11A	1	9.3	WPL8	K81340	Piping Fittings
ASTM/ASME	A/SA-420	9A	1	9.1	WPL9	K22035	Piping Fittings
ASTM/ASME	A/SA-423	4	2	5.1	1	K11535	Seamless & Welded Tube
ASTM/ASME	A/SA-423	4	2	5.1	2	K11540	Seamless & Welded Tube
ASTM/ASME	A/SA-426	3	1	1.1	CP1	J12521	Centrifugal Cast Pipe
ASTM/ASME	A/SA-426	4	1	5.1	CP11	J12072	Centrifugal Cast Pipe
ASTM/ASME	A/SA-426	4	1	5.1	CP12	J11562	Centrifugal Cast Pipe
ASTM/ASME	A/SA-426	3	1	1.1	CP15	J11522	Centrifugal Cast Pipe
ASTM/ASME	A/SA-426	3	1	4.2	CP2	J11547	Centrifugal Cast Pipe
ASTM/ASME	A/SA-426	5A	1	5.2	CP21	J31545	Centrifugal Cast Pipe
ASTM/ASME	A/SA-426	5A	1	5.2	CP22	J21890	Centrifugal Cast Pipe
ASTM/ASME	A/SA-426	5B	1	5.3	CP5	J42045	Centrifugal Cast Pipe
ASTM/ASME	A/SA-426	5B	1	5.3	CP5b	J51545	Centrifugal Cast Pipe
ASTM/ASME	A/SA-426	5B	1	5.4	CP9	J82090	Centrifugal Cast Pipe

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-426	6	3	7.2	CPCA15	J91150	Centrifugal Cast Pipe
ASTM	A430	8	1	8.1	FP16-8-2H	S16800	Forged Pipe
ASTM	A430	8	1	8.1	FP304	S30400	Forged Pipe
ASTM	A430	8	1	8.1	FP304H	S30409	Forged Pipe
ASTM	A430	8	1	8.1	FP304N	S30451	Forged Pipe
ASTM	A430	8	1	8.1	FP316	S31600	Forged Pipe
ASTM	A430	8	1	8.1	FP316H	S31609	Forged Pipe
ASTM	A430	8	1	8.1	FP316N	S31651	Forged Pipe
ASTM	A430	8	1	8.1	FP321	S32100	Forged Pipe
ASTM	A430	8	1	8.1	FP321H	S32109	Forged Pipe
ASTM	A430	8	1	8.1	FP347	S34700	Forged Pipe
ASTM	A430	8	1	8.1	FP347H	S34709	Forged Pipe
ASTM	A441	1	2	—	—	K12211	Plate & Bar
ASTM	A441	1	2	—	—	K12211	Plate & Bar
ASTM	A441	1	2	—	—	K12211	Plate & Bar
ASTM	A441	1	2	—	—	K12211	Plate & Bar
ASTM	A441	1	2	—	Group 1	—	Shapes
ASTM	A441	1	2	—	Group 2	—	Shapes
ASTM	A441	1	2	—	Group 3	—	Shapes
ASTM	A441	1	2	—	Group 4	—	Shapes
ASTM	A441	1	2	—	Group 5	—	Shapes
ASTM/ASME	A/SA-451	8	2	8.2	CPE20N	J92802	Centrifugal Cast Pipe
ASTM/ASME	A/SA-451	8	1	8.1	CPF10MC	J92971	Centrifugal Cast Pipe
ASTM/ASME	A/SA-451	8	1	8.1	CPF3	J92500	Centrifugal Cast Pipe
ASTM/ASME	A/SA-451	8	1	8.1	CPF3A	J92500	Centrifugal Cast Pipe
ASTM/ASME	A/SA-451	8	1	8.1	CPF3M	J92800	Centrifugal Cast Pipe
ASTM/ASME	A/SA-451	8	1	8.1	CPF8	J92600	Centrifugal Cast Pipe
ASTM/ASME	A/SA-451	8	1	8.1	CPF8A	J92600	Centrifugal Cast Pipe
ASTM/ASME	A/SA-451	8	1	8.1	CPF8C	J92710	Centrifugal Cast Pipe
ASTM/ASME	A/SA-451	8	1	8.1	CPF8M	J92900	Centrifugal Cast Pipe
ASTM/ASME	A/SA-451	8	2	8.2	CPH10	J93402	Centrifugal Cast Pipe
ASTM/ASME	A/SA-451	8	2	8.2	CPH20	J93402	Centrifugal Cast Pipe
ASTM/ASME	A/SA-451	8	2	8.2	CPH8	J93400	Centrifugal Cast Pipe
ASTM/ASME	A/SA-451	8	2	8.2	CPK20	J94202	Centrifugal Cast Pipe
ASTM	A452	8	1	8.1	TP304H	S30409	Centrifugal Cast Pipe
ASTM	A452	8	1	8.1	TP316H	S31609	Centrifugal Cast Pipe
ASTM	A452	8	1	8.1	TP347H	S34709	Centrifugal Cast Pipe
ASTM/ASME	A/SA-455	1	2	11.2	—	K03300	Plate
ASTM/ASME	A/SA-455	1	2	11.2	—	K03300	Plate
ASTM/ASME	A/SA-455	1	2	11.2	—	K03300	Plate
ASTM	A473	8	3	8.3	201	S20100	Forgings
ASTM	A473	8	3	8.3	202	S20200	Forgings

(Continued)



**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM	A473	8	1	8.1	302	S30200	Forgings
ASTM	A473	8	1	8.1	302B	S30215	Forgings
ASTM	A473	8	1	8.1	303	S30300	Forgings
ASTM	A473	8	1	8.1	303Se	S30323	Forgings
ASTM	A473	8	1	8.1	304	S30400	Forgings
ASTM	A473	8	1	8.1	304	S30400	Forgings
ASTM	A473	8	1	8.1	304L	S30403	Forgings
ASTM	A473	8	1	8.1	305	S30500	Forgings
ASTM	A473	8	2	8.2	308	S30800	Forgings
ASTM	A473	8	2	8.2	309	S30900	Forgings
ASTM	A473	8	2	8.2	309S	S30908	Forgings
ASTM	A473	8	2	8.2	310	S31000	Forgings
ASTM	A473	8	2	8.2	310S	S31008	Forgings
ASTM	A473	8	2	8.2	314	S31400	Forgings
ASTM	A473	8	1	8.1	316	S31600	Forgings
ASTM	A473	8	1	8.1	316	S31600	Forgings
ASTM	A473	8	1	8.1	316L	S31603	Forgings
ASTM	A473	8	1	8.1	317	S31700	Forgings
ASTM	A473	8	1	8.1	321	S32100	Forgings
ASTM	A473	8	1	8.1	347	S34700	Forgings
ASTM	A473	8	1	8.1	348	S34800	Forgings
ASTM	A473	6	1	7.1	403	S40300	Forgings
ASTM	A473	7	1	7.1	405	S40500	Forgings
ASTM	A473	6	1	7.2	410	S41000	Forgings
ASTM	A473	6	4	7.2	414	S41400	Forgings
ASTM	A473	6	2	7.2	420	S42000	Forgings
ASTM	A473	6	2	7.2	429	S42900	Forgings
ASTM	A473	7	2	7.1	430	S43000	Forgings
ASTM	A473	8	2	8.2	S30815	S30815	Forgings
ASTM	A473	8	3	8.3	XM-10	S21900	Forgings
ASTM	A473	8	3	8.3	XM-11	S21904	Forgings
ASTM/ASME	A/SA-479	10H	1	10.1	—	S31803	Bars & Shapes
ASTM/ASME	A/SA-479	8	4	8.2	—	S32053	Bars & Shapes
ASTM/ASME	A/SA-479	10H	1	10.1	—	S32101	Bars & Shapes
ASTM/ASME	A/SA-479	10H	1	10.1	—	S32202	Bars & Shapes
ASTM/ASME	A/SA-479	10H	1	10.1	2205	S32205	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	302	S30200	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	304	S30400	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	304H	S30409	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	304L	S30403	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	304LN	S30453	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	304N	S30451	Bars & Shapes

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-479	8	2	8.2	309Cb	S30940	Bars & Shapes
ASTM/ASME	A/SA-479	8	2	8.2	309S	S30908	Bars & Shapes
ASTM/ASME	A/SA-479	8	2	8.2	310Cb	S31040	Bars & Shapes
ASTM/ASME	A/SA-479	8	2	8.2	310S	S31008	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	316	S31600	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	316Cb	S31640	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	316H	S31609	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	316L	S31603	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	316LN	S31653	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	316N	S31651	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	316Ti	S31635	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	321	S32100	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	321H	S32109	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	347	S34700	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	347H	S34709	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	348	S34800	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	348H	S34809	Bars & Shapes
ASTM/ASME	A/SA-479	6	1	7.1	403	S40300	Bars & Shapes
ASTM/ASME	A/SA-479	7	1	7.1	405	S40500	Bars & Shapes
ASTM/ASME	A/SA-479	6	1	7.2	410	S41000	Bars & Shapes
ASTM/ASME	A/SA-479	6	4	7.2	414	S41400	Bars & Shapes
ASTM/ASME	A/SA-479	7	2	7.1	430	S43000	Bars & Shapes
ASTM/ASME	A/SA-479	7	2	7.1	439	S43035	Bars & Shapes
ASTM/ASME	A/SA-479	8	3	8.1	S21800	S21800	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	S30600	S30600	Bars & Shapes
ASTM/ASME	A/SA-479	8	2	8.2	S30815	S30815	Bars & Shapes
ASTM/ASME	A/SA-479	8	4	8.2	S31254	S31254	Bars & Shapes
ASTM/ASME	A/SA-479	8	4	8.1	S31725	S31725	Bars & Shapes
ASTM/ASME	A/SA-479	8	4	8.1	S31726	S31726	Bars & Shapes
ASTM/ASME	A/SA-479	10H	1	10.2	S32550	S32550	Bars & Shapes
ASTM/ASME	A/SA-479	8	1	8.1	S32615	S32615	Bars & Shapes
ASTM/ASME	A/SA-479	10H	1	10.2	S32750	S32750	Bars & Shapes
ASTM	A479	10H	1	10.2	S32906	S32906	Bars & Shapes
ASTM/ASME	A/SA-479	8	4	8.3	S34565	S34565	Bars & Shapes
ASTM/ASME	A/SA-479	6	4	7.2	S41500	S41500	Bars & Shapes
ASTM/ASME	A/SA-479	7	2	7.1	S44400	S44400	Bars & Shapes
ASTM/ASME	A/SA-479	10J	1	7.1	S44700	S44700	Bars & Shapes
ASTM/ASME	A/SA-479	10K	1	7.1	S44800	S44800	Bars & Shapes
ASTM/ASME	A/SA-479	8	3	8.3	XM-11	S21904	Bars & Shapes
ASTM/ASME	A/SA-479	8	3	8.3	XM-17	S21600	Bars & Shapes
ASTM/ASME	A/SA-479	8	3	8.3	XM-18	S21603	Bars & Shapes
ASTM/ASME	A/SA-479	8	3	8.3	XM-19	S20910	Bars & Shapes

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-479	10I	1	7.1	XM-27	S44627	Bars & Shapes
ASTM/ASME	A/SA-479	8	3	8.3	XM-29	S24000	Bars & Shapes
ASTM/ASME	A/SA-479	6	1	7.2	XM-30	S41040	Bars & Shapes
ASTM/ASME	A/SA-487	10A	1	2.1	1, Cl. A	J13002	Castings
ASTM/ASME	A/SA-487	10A	1	2.1	1, Cl. B	J13002	Castings
ASTM/ASME	A/SA-487	1	2	1.1	16, Cl. A	J31200	Castings
ASTM/ASME	A/SA-487	3	3	2.1	2, Cl. A	J13005	Castings
ASTM/ASME	A/SA-487	3	3	2.1	2, Cl. B	J13005	Castings
ASTM/ASME	A/SA-487	3	3	3.1	4, Cl. A	J13047	Castings
ASTM/ASME	A/SA-487	11A	3	3.1	4, Cl. B	J13047	Castings
ASTM/ASME	A/SA-487	3	3	3.1	4, Cl. C	J13047	Castings
ASTM/ASME	A/SA-487	11A	3	3.1	4, Cl. E	J13047	Castings
ASTM/ASME	A/SA-487	5C	1	5.2	8, Cl. A	J22091	Castings
ASTM/ASME	A/SA-487	5C	4	5.2	8, Cl. B	J22091	Castings
ASTM/ASME	A/SA-487	5C	4	5.2	8, Cl. C	J22091	Castings
ASTM/ASME	A/SA-487	6	3	7.2	CA15, Cl. B	J91171	Castings
ASTM/ASME	A/SA-487	6	3	7.2	CA15, Cl. C	J91150	Castings
ASTM/ASME	A/SA-487	6	3	7.2	CA15, Cl. D	J91171	Castings
ASTM/ASME	A/SA-487	6	3	7.2	CA15M, Cl. A	J91151	Castings
ASTM/ASME	A/SA-487	6	4	7.2	CA6NM, Cl. A	J91540	Castings
ASTM/ASME	A/SA-487	6	4	7.2	CA6NM, Cl. B	J91540	Castings
ASTM	A500	1	1	11.1	A	K03000	Seamless & Welded Tube
ASTM	A500	1	1	11.1	B	K03000	Seamless & Welded Tube
ASTM	A500	1	1	1.2	C	K02705	Seamless & Welded Tube
ASTM	A500	1	1	11.1	D	K03000	Seamless & Welded Tube
ASTM	A501	1	1	11.1	A	K03000	Seamless & Welded Tube
ASTM	A501	1	1	1.2	B	K03000	Seamless & Welded Tube
ASTM/ASME	A/SA-508	1	2	11.1	1	K13502	Forgings
ASTM/ASME	A/SA-508	1	2	11.1	1A	K13502	Forgings
ASTM/ASME	A/SA-508	3	3	3.1	2, Cl. 1	K12766	Forgings
ASTM/ASME	A/SA-508	3	3	3.1	2, Cl. 2	K12766	Forgings
ASTM/ASME	A/SA-508	5C	1	5.2	22, Cl. 3	K21590	Forgings
ASTM/ASME	A/SA-508	3	3	3.1	3, Cl. 1	K12042	Forgings
ASTM/ASME	A/SA-508	3	3	3.1	3, Cl. 2	K12042	Forgings
ASTM/ASME	A/SA-508	5C	1	6.2	3V	K31830	Forgings
ASTM/ASME	A/SA-508	5C	1	6.2	3VCb	K31390	Forgings
ASTM/ASME	A/SA-508	11A	5	3.1	4N, Cl. 1	K22375	Forgings
ASTM/ASME	A/SA-508	11B	10	3.1	4N, Cl. 2	K22375	Forgings
ASTM/ASME	A/SA-508	3	3	3.1	4N, Cl. 3	K22375	Forgings
ASTM/ASME	A/SA-508	11A	5	3.1	5, Cl. 1	K42365	Forgings
ASTM/ASME	A/SA-508	11B	10	3.1	5, Cl. 2	K42365	Forgings
ASTM	A511	8	1	8.1	MT 302	S30200	Seamless Tube

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM	A511	8	1	8.1	MT 304	S30400	Seamless Tube
ASTM	A511	8	1	8.1	MT 304L	S30403	Seamless Tube
ASTM	A511	8	2	8.2	MT 309S	S30908	Seamless Tube
ASTM	A511	8	2	8.2	MT 310S	S31008	Seamless Tube
ASTM	A511	8	1	8.1	MT 316	S31600	Seamless Tube
ASTM	A511	8	1	8.1	MT 316L	S31603	Seamless Tube
ASTM	A511	8	1	8.1	MT 317	S31700	Seamless Tube
ASTM	A511	8	1	8.1	MT 321	S32100	Seamless Tube
ASTM	A511	8	1	8.1	MT 347	S34700	Seamless Tube
ASTM	A512	1	1	1.1	1008	G10080	Tube
ASTM	A512	1	1	1.1	1010	G10100	Tube
ASTM	A512	1	1	1.1	1012	G10120	Tube
ASTM	A512	1	1	1.1	1015	G10150	Tube
ASTM	A512	1	1	—	1016	G10160	Tube
ASTM	A512	1	1	1.1	1018	G10180	Tube
ASTM	A512	1	1	—	1019	G10190	Tube
ASTM	A512	1	1	1.1	1020	G10200	Tube
ASTM	A512	1	1	—	1021	G10210	Tube
ASTM	A512	1	2	11.1	1025	G10250	Tube
ASTM	A512	1	1	11.1	1026	G10260	Tube
ASTM	A512	1	2	11.1	1030	G10300	Tube
ASTM	A512	1	1	—	1110	G11100	Tube
ASTM	A512	1	1	—	1115	G11150	Tube
ASTM	A512	1	1	—	1117	G11170	Tube
ASTM	A512	1	1	1.1	MT 1010	G10100	Tube
ASTM	A512	1	1	1.1	MT 1015	G10150	Tube
ASTM	A512	1	1	1.1	MT 1020	G10200	Tube
ASTM	A512	1	1	1.1	MTX 1015	—	Tube
ASTM	A512	1	1	1.1	MTX 1020	—	Tube
ASTM/ASME	A/SA-513	1	1	1.1	1008	G10080	Tube
ASTM/ASME	A/SA-513	1	1	1.1	1010	G10100	Tube
ASTM/ASME	A/SA-513	1	1	1.1	1015	G10150	Tube
ASTM	A513	1	1	1.1	1015 CW	G10150	Tube
ASTM/ASME	A/SA-513	1	1	—	1017	G10170	Tube
ASTM/ASME	A/SA-513	1	1	1.1	1018	G10180	Tube
ASTM/ASME	A/SA-513	1	1	—	1019	G10190	Tube
ASTM/ASME	A/SA-513	1	1	1.1	1020	G10200	Tube
ASTM	A513	1	2	1.1	1020 CW	G10200	Tube
ASTM/ASME	A/SA-513	1	1	1.1	1021	G10210	Tube
ASTM/ASME	A/SA-513	1	1	1.1	1022	G10220	Tube
ASTM/ASME	A/SA-513	1	1	—	1023	G10230	Tube
ASTM/ASME	A/SA-513	1	1	—	1024	G10240	Tube

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-513	1	2	11.1	1025	G10250	Tube
ASTM	A513	1	2	1.2	1025 CW	G10250	Tube
ASTM/ASME	A/SA-513	1	1	11.1	1026	G10260	Tube
ASTM	A513	1	3	11.1	1026 CW	G10260	Tube
ASTM/ASME	A/SA-513	1	2	11.1	1030	G10300	Tube
ASTM/ASME	A/SA-513	1	1	1.1	MT 1010	G10100	Tube
ASTM/ASME	A/SA-513	1	1	1.1	MT 1015	G10150	Tube
ASTM/ASME	A/SA-513	1	1	1.1	MT 1020	G10200	Tube
ASTM/ASME	A/SA-513	1	1	—	MTX 1015	—	Tube
ASTM/ASME	A/SA-513	1	1	—	MTX 1020	—	Tube
ASTM	A514	11B	1	3.1	A	K11856	Plate
ASTM	A514	11B	4	3.1	B	K11630	Plate
ASTM	A514	11B	6	3.1	C	K11511	Plate
ASTM	A514	11B	6	3.1	C	K11511	Plate
ASTM	A514	11B	2	3.1	E	K21604	Plate
ASTM	A514	11B	2	3.1	E	K21604	Plate
ASTM	A514	11B	3	3.1	F	K11576	Plate
ASTM	A514	11B	3	3.1	H	K11646	Plate
ASTM	A514	11B	6	3.1	J	K11625	Plate
ASTM	A514	11B	6	3.1	J	K11625	Plate
ASTM	A514	11B	6	3.1	K	K11523	Plate
ASTM	A514	11B	6	3.1	K	K11523	Plate
ASTM	A514	11B	10	3.1	M	K11683	Plate
ASTM	A514	11B	10	3.1	M	K11683	Plate
ASTM	A514	11B	10	3.1	M	K11683	Plate
ASTM	A514	11B	8	3.1	P	K21650	Plate
ASTM	A514	11B	8	3.1	P	K21650	Plate
ASTM	A514	11B	9	3.1	Q	—	Plate
ASTM	A514	11B	9	3.1	Q	—	Plate
ASTM	A514	11B	12	3.1	R	—	Plate
ASTM	A514	11B	12	3.1	R	—	Plate
ASTM	A514	11B	6	3.1	S	—	Plate
ASTM	A514	11B	6	3.1	T	—	Plate
ASTM	A514	11B	6	3.1	T	—	Plate
ASTM	A515	1	1	1.1	55	K02001	Plate
ASTM/ASME	A/SA-515	1	1	11.1	60	—	Plate
ASTM/ASME	A/SA-515	1	1	1.1	60	K02401	Plate
ASTM/ASME	A/SA-515	1	1	11.1	65	K02800	Plate
ASTM/ASME	A/SA-515	1	2	11.1	70	K03101	Plate
ASTM/ASME	A/SA-516	1	1	1.1	55	K01800	Plate
ASTM/ASME	A/SA-516	1	1	1.1	60	K02100	Plate
ASTM/ASME	A/SA-516	1	1	1.1	65	K02403	Plate

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-516	1	2	11.1	70	K02700	Plate
ASTM/ASME	A/SA-517	11B	1	3.1	A	K11856	Plate
ASTM/ASME	A/SA-517	11B	4	3.1	B	K11630	Plate
ASTM	A517	11B	14	3.1	C	K11511	Plate
ASTM/ASME	A/SA-517	11B	2	3.1	E	K21604	Plate
ASTM/ASME	A/SA-517	11B	2	3.1	E	K21604	Plate
ASTM/ASME	A/SA-517	11B	3	3.1	F	K11576	Plate
ASTM/ASME	A/SA-517	11B	3	3.1	H	K11646	Plate
ASTM	A517	11B	6	3.1	J	K11625	Plate
ASTM	A517	11B	6	3.1	K	K11523	Plate
ASTM	A517	11B	10	3.1	M	K11683	Plate
ASTM/ASME	A/SA-517	11B	8	3.1	P	K21650	Plate
ASTM/ASME	A/SA-517	11B	8	3.1	P	K21650	Plate
ASTM/ASME	A/SA-517	11B	9	3.1	Q	—	Plate
ASTM/ASME	A/SA-517	11B	9	3.1	Q	—	Plate
ASTM/ASME	A/SA-517	11B	6	3.1	S	—	Plate
ASTM	A517	11B	6	3.1	T	—	Plate
ASTM	A519	1	1	1.1	1008	G10080	Tube
ASTM	A519	1	1	1.1	1012	G10120	Tube
ASTM	A519	1	1	1.1	1015	G10150	Tube
ASTM	A519	1	1	—	1016	G10160	Tube
ASTM	A519	1	1	—	1017	G10170	Tube
ASTM	A519	1	1	1.1	1018	G10180	Tube
ASTM	A519	1	2	1.1	1018 CW	G10180	Tube
ASTM	A519	1	1	1.1	1018 HR	G10180	Tube
ASTM	A519	1	1	—	1019	G10190	Tube
ASTM	A519	1	1	1.1	1020	G10200	Tube
ASTM	A519	1	2	1.1	1020 CW	G10200	Tube
ASTM	A519	1	1	1.1	1020 HR	G10200	Tube
ASTM	A519	1	1	—	1021	G10210	Tube
ASTM	A519	1	1	1.1	1022	G10220	Tube
ASTM	A519	1	2	1.1	1022 CW	G10220	Tube
ASTM	A519	1	1	1.1	1022 HR	G10220	Tube
ASTM	A519	1	2	11.1	1025	G10250	Tube
ASTM	A519	1	2	1.2	1025 CW	G10250	Tube
ASTM	A519	1	1	1.1	1025 HR	G10250	Tube
ASTM	A519	1	1	—	1026	G10260	Tube
ASTM	A519	1	2	11.1	1026 CW	G10260	Tube
ASTM	A519	1	1	11.1	1026 HR	G10260	Tube
ASTM	A519	1	2	—	1030	G10300	Tube
ASTM	A519	11B	9	—	4130	G41300	Tube
ASTM	A519	11B	9	—	8630	G86300	Tube

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM	A519	1	1	1.1	MT 1010	G10100	Tube
ASTM	A519	1	1	1.1	MT 1015	G10150	Tube
ASTM	A519	1	1	1.1	MT 1020	G10200	Tube
ASTM	A519	1	1	—	MTX 1015	—	Tube
ASTM	A519	1	1	—	MTX 1020	—	Tube
ASTM	A521	1	1	—	CC	—	Die Forging
ASTM	A521	1	1	—	CC1	—	Die Forging
ASTM	A521	1	2	—	CE	—	Die Forging
ASTM/ASME	A/SA-522	11A	1	9.3	I	K81340	Forgings
ASTM/ASME	A/SA-522	11A	1	9.3	II	K71340	Forgings
ASTM	A523	1	1	1.1	A	K02504	Pipe
ASTM	A523	1	1	11.1	B	K03005	Pipe
ASTM/ASME	A/SA-524	1	1	1.1	I	K02104	Seamless Pipe
ASTM/ASME	A/SA-524	1	1	1.1	II	K02104	Seamless Pipe
ASTM	A526	1	1	—	II	—	Galvanized Sheet
ASTM	A527	1	1	—	II	—	Galvanized Sheet
ASTM	A529	1	1	11.1	42	K02703	Plate, Bar, & Shapes
ASTM	A529	1	2	11.1	50	—	Plate, Bar, & Shapes
ASTM	A529	1	2	11.1	55	—	Plate, Bar, & Shapes
ASTM/ASME	A/SA-533	3	3	3.1	A, Cl. 1	K12521	Plate
ASTM/ASME	A/SA-533	3	3	3.1	A, Cl. 2	K12521	Plate
ASTM/ASME	A/SA-533	11A	4	3.1	A, Cl. 3	K12521	Plate
ASTM/ASME	A/SA-533	3	3	3.1	B, Cl. 1	K12539	Plate
ASTM/ASME	A/SA-533	3	3	3.1	B, Cl. 2	K12539	Plate
ASTM/ASME	A/SA-533	11A	4	3.2	B, Cl. 3	K12539	Plate
ASTM/ASME	A/SA-533	3	3	3.1	C, Cl. 1	K12554	Plate
ASTM/ASME	A/SA-533	3	3	3.1	C, Cl. 2	K12554	Plate
ASTM/ASME	A/SA-533	11A	4	3.2	C, Cl. 3	K12554	Plate
ASTM/ASME	A/SA-533	3	3	3.1	D, Cl. 1	K12529	Plate
ASTM/ASME	A/SA-533	3	3	3.1	D, Cl. 2	K12529	Plate
ASTM/ASME	A/SA-533	11A	4	3.1	D, Cl. 3	K12529	Plate
ASTM/ASME	A/SA-533	3	3	3.1	E, Cl. 1	K12554	Plate
ASTM/ASME	A/SA-533	3	3	3.1	E, Cl. 2	K12554	Plate
ASTM/ASME	A/SA-537	1	2	1.2	Cl. 1	K12437	Plate
ASTM/ASME	A/SA-537	1	2	1.2	Cl. 1	K12437	Plate
ASTM/ASME	A/SA-537	1	3	1.2	Cl. 2	K12437	Plate
ASTM/ASME	A/SA-537	1	3	1.2	Cl. 2	K12437	Plate
ASTM/ASME	A/SA-537	1	3	1.2	Cl. 2	K12437	Plate
ASTM/ASME	A/SA-537	1	3	1.2	Cl. 3	K12437	Plate
ASTM/ASME	A/SA-537	1	3	1.2	Cl. 3	K12437	Plate
ASTM/ASME	A/SA-537	1	3	1.2	Cl. 3	K12437	Plate
ASTM	A539	1	1	—	—	K01506	Coiled Tube

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-541	1	2	11.1	1	K03506	Forgings
ASTM/ASME	A/SA-541	4	1	5.2	11, Cl. 4	K11572	Forgings
ASTM/ASME	A/SA-541	1	2	11.1	1A	K03020	Forgings
ASTM/ASME	A/SA-541	3	3	4.2	2, Cl.1	K12765	Forgings
ASTM/ASME	A/SA-541	3	3	4.2	2, Cl.2	K12765	Forgings
ASTM/ASME	A/SA-541	5C	1	5.2	22, Cl. 3	K21390	Forgings
ASTM/ASME	A/SA-541	5C	4	5.2	22, Cl. 4	K21390	Forgings
ASTM/ASME	A/SA-541	5C	5	5.2	22, Cl. 5	K21390	Forgings
ASTM/ASME	A/SA-541	5C	1	5.2	22V	K31835	Forgings
ASTM/ASME	A/SA-541	3	3	4.1	3, Cl. 1	K12045	Forgings
ASTM/ASME	A/SA-541	3	3	4.1	3, Cl. 2	K12045	Forgings
ASTM/ASME	A/SA-541	5C	1	6.2	3V	K31830	Forgings
ASTM/ASME	A/SA-541	5C	1	6.2	3VCb	K31390	Forgings
ASTM/ASME	A/SA-542	5C	4	5.2	A, Cl. 1	K21590	Plate
ASTM/ASME	A/SA-542	5C	5	5.2	A, Cl. 2	K21590	Plate
ASTM/ASME	A/SA-542	5C	3	5.2	A, Cl. 3	K21590	Plate
ASTM/ASME	A/SA-542	5C	1	5.2	A, Cl. 4	K21590	Plate
ASTM/ASME	A/SA-542	5C	1	5.2	A, Cl. 4a	K21590	Plate
ASTM/ASME	A/SA-542	5C	4	5.2	B, Cl. 1	K21590	Plate
ASTM/ASME	A/SA-542	5C	5	5.2	B, Cl. 2	K21590	Plate
ASTM/ASME	A/SA-542	5C	3	5.2	B, Cl. 3	K21590	Plate
ASTM/ASME	A/SA-542	5C	1	5.2	B, Cl. 4	K21590	Plate
ASTM/ASME	A/SA-542	5C	1	5.2	B, Cl. 4a	K21590	Plate
ASTM/ASME	A/SA-542	5C	4	6.2	C, Cl. 1	K31830	Plate
ASTM/ASME	A/SA-542	5C	5	6.2	C, Cl. 2	K31830	Plate
ASTM/ASME	A/SA-542	5C	3	6.2	C, Cl. 3	K31830	Plate
ASTM/ASME	A/SA-542	5C	1	6.2	C, Cl. 4	K31830	Plate
ASTM/ASME	A/SA-542	5C	1	6.2	C, Cl. 4a	K31830	Plate
ASTM/ASME	A/SA-542	5C	1	6.3	D, Cl. 4a	K31835	Plate
ASTM/ASME	A/SA-542	5C	1	6.2	E, Cl. 4a	K31390	Plate
ASTM/ASME	A/SA-543	11A	5	3.1	B Cl. 1	K42339	Plate
ASTM/ASME	A/SA-543	11B	10	3.1	B Cl. 2	K42339	Plate
ASTM/ASME	A/SA-543	3	3	3.1	B Cl. 3	K42339	Plate
ASTM/ASME	A/SA-543	11A	5	3.1	C Cl. 1	—	Plate
ASTM/ASME	A/SA-543	11B	10	3.1	C Cl. 2	—	Plate
ASTM/ASME	A/SA-543	3	3	3.1	C Cl. 3	—	Plate
ASTM/ASME	A/SA-553	11A	1	9.3	I	K81340	Plate
ASTM/ASME	A/SA-553	11A	1	9.3	II	K71340	Plate
ASTM	A554	8	1	8.1	MT 302	S30200	Welded Tube
ASTM	A554	8	1	8.1	MT 304	S30400	Welded Tube
ASTM	A554	8	1	8.1	MT 304L	S30403	Welded Tube
ASTM	A554	8	2	8.2	MT 309S	S30908	Welded Tube

(Continued)



**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM	A554	8	2	8.2	MT 309S-Cb	S30940	Welded Tube
ASTM	A554	8	2	8.2	MT 310S	S31008	Welded Tube
ASTM	A554	8	1	8.1	MT 316	S31600	Welded Tube
ASTM	A554	8	1	8.1	MT 316L	S31603	Welded Tube
ASTM	A554	8	1	8.1	MT 317	S31700	Welded Tube
ASTM	A554	8	1	8.1	MT 321	S32100	Welded Tube
ASTM	A554	8	1	8.1	MT 347	S34700	Welded Tube
ASTM/ASME	A/SA-556	1	1	1.1	A2	K01807	Seamless Tube
ASTM/ASME	A/SA-556	1	1	11.1	B2	K02707	Seamless Tube
ASTM/ASME	A/SA-556	1	2	11.1	C2	K03006	Seamless Tube
ASTM/ASME	A/SA-557	1	1	1.1	A2	K01807	E.R.W. Tube
ASTM/ASME	A/SA-557	1	1	11.1	B2	K03007	E.R.W. Tube
ASTM/ASME	A/SA-557	1	2	11.1	C2	K03505	E.R.W. Tube
ASTM/ASME	A/SA-562	1	1	1.1	—	K11224	Plate
ASTM	A569	1	1	1.1	30	K02502	Sheet & Strip
ASTM	A569	1	1	1.1	33	K02502	Sheet & Strip
ASTM	A569	1	1	1.1	36	K02502	Sheet & Strip
ASTM	A569	1	1	1.1	40	K02502	Sheet & Strip
ASTM	A569	1	1	1.2	45	K02502	Sheet & Strip
ASTM	A569	1	1	1.2	50	K02502	Sheet & Strip
ASTM	A570	1	1	1.1	30	K02502	Sheet & Strip
ASTM	A570	1	1	1.1	33	K02502	Sheet & Strip
ASTM	A570	1	1	1.1	36	K02502	Sheet & Strip
ASTM	A570	1	1	1.1	40	K02502	Sheet & Strip
ASTM	A570	1	1	1.2	45	K02502	Sheet & Strip
ASTM	A570	1	1	1.2	50	K02502	Sheet & Strip
ASTM	A570	1	1	1.3	55	K02502	Sheet & Strip
ASTM/ASME	A/SA-572	1	1	1.2	42	—	Plate & Shapes
ASTM/ASME	A/SA-572	1	1	1.2	50	—	Plate & Shapes
ASTM	A572	1	2	1.3	55	—	Plate, Sheet, Bar, & Shapes
ASTM/ASME	A/SA-572	1	2	11.1	60	—	Plate & Shapes
ASTM	A572	1	3	11.1	65	—	Plate, Sheet, Bar, & Shapes
ASTM	A573	1	1	11.1	58	—	Plate
ASTM	A573	1	1	11.1	65	—	Plate
ASTM	A573	1	2	11.1	70	—	Plate
ASTM	A575	1	1	1.1	M1008	—	Bar
ASTM	A575	1	1	1.1	M1010	—	Bar
ASTM	A575	1	1	1.1	M1012	—	Bar
ASTM	A575	1	1	1.1	M1015	—	Bar
ASTM	A575	1	1	1.1	M1017	—	Bar
ASTM	A575	1	1	11.1	M1020	—	Bar
ASTM	A575	1	1	11.1	M1023	—	Bar

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM	A575	1	1	11.1	M1025	—	Bar
ASTM	A576	1	1	1.1	G10080	—	Bar
ASTM	A576	1	1	1.1	G10100	—	Bar
ASTM	A576	1	1	1.1	G10120	—	Bar
ASTM	A576	1	1	1.1	G10150	—	Bar
ASTM	A576	1	1	1.1	G10160	—	Bar
ASTM	A576	1	1	1.1	G10170	—	Bar
ASTM	A576	1	1	1.1	G10180	—	Bar
ASTM	A576	1	1	1.1	G10190	—	Bar
ASTM	A576	1	1	1.1	G10200	—	Bar
ASTM	A576	1	1	11.1	G10210	—	Bar
ASTM	A576	1	1	11.1	G10220	—	Bar
ASTM	A576	1	1	11.1	G10230	—	Bar
ASTM	A576	1	1	11.1	G10250	—	Bar
ASTM/ASME	A/SA-587	1	1	1.1	—	K11500	E.R.W. Pipe
ASTM/ASME	A/SA-587	1	1	1.1	A2	K01807	E.R.W. Tube
ASTM/ASME	A/SA-587	1	1	—	B2	K03007	E.R.W. Tube
ASTM	A588	3	1	1.4	A	K11430	Shapes
ASTM	A588	3	1	1.4	A	K11430	Plate & Bar
ASTM	A588	3	1	1.4	A	K11430	Plate & Bar
ASTM	A588	3	1	1.4	A	K11430	Plate & Bar
ASTM	A588	3	1	1.4	B	K12043	Plate & Bar
ASTM	A588	3	1	1.4	B	K12043	Plate & Bar
ASTM	A588	3	1	1.4	B	K12043	Shapes
ASTM	A588	3	1	1.4	B	K12043	Plate & Bar
ASTM	A588	3	1	1.4	C	K11538	Plate & Bar
ASTM	A588	3	1	1.4	C	K11538	Plate & Bar
ASTM	A588	3	1	1.4	C	K11538	Shapes
ASTM	A588	3	1	1.4	C	K11538	Plate & Bar
ASTM	A588	3	1	1.4	K	—	Shapes
ASTM	A588	3	1	1.4	K	—	Plate & Bar
ASTM	A588	3	1	1.4	K	—	Plate & Bar
ASTM	A588	3	1	1.4	K	—	Plate & Bar
ASTM/ASME	A/SA-592	11B	1	3.1	A	K11856	Forgings
ASTM/ASME	A/SA-592	11B	2	3.1	E	K11695	Forgings
ASTM/ASME	A/SA-592	11B	2	3.1	E	K11695	Forgings
ASTM/ASME	A/SA-592	11B	3	3.1	F	K11576	Forgings
ASTM/ASME	A/SA-592	11B	3	3.1	F	K11576	Forgings
ASTM	A595	1	2	11.1	A	K02004	Welded Tube
ASTM	A595	1	2	11.1	B	K02005	Welded Tube
ASTM	A595	3	1	11.1	C	K11526	Welded Tube
ASTM	A606	1	2	1.4	2, CR, AR	—	Sheet & Strip

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM	A606	1	2	1.4	2, HR, A	—	Sheet & Strip
ASTM	A606	1	2	1.4	2, HR, AR	—	Sheet & Strip
ASTM	A606	1	2	1.4	2, HR, N	—	Sheet & Strip
ASTM	A606	1	2	1.4	4, CR, AR	—	Sheet & Strip
ASTM	A606	1	2	1.4	4, HR, A	—	Sheet & Strip
ASTM	A606	1	2	1.4	4, HR, AR	—	Sheet & Strip
ASTM	A606	1	2	1.4	4, HR, N	—	Sheet & Strip
ASTM	A607	1	1	—	45	—	Sheet & Strip
ASTM	A607	1	1	—	50	—	Sheet & Strip
ASTM	A607	1	2	—	55	—	Sheet & Strip
ASTM	A607	1	3	—	60	—	Sheet & Strip
ASTM	A607	1	3	—	65	—	Sheet & Strip
ASTM	A607	1	3	—	70	—	Sheet & Strip
ASTM	A611	1	1	—	A	G10170	Sheet & Strip
ASTM	A611	1	1	—	B	G10170	Sheet & Strip
ASTM	A611	1	1	—	C	G10170	Sheet & Strip
ASTM	A611	1	1	1.1	D	G10120	Sheet & Strip
ASTM	A611	1	3	—	E	G10170	Sheet & Strip
ASTM/ASME	A/SA-612	10C	1	1.3	—	K02900	Plate
ASTM/ASME	A/SA-612	10C	1	1.3	—	K02900	Plate
ASTM	A615	1A	4	—	40	—	Rebar
ASTM	A615	1A	4	—	60	—	Rebar
ASTM	A618	1	2	1.2	Ia	—	Tube
ASTM	A618	1	2	1.2	Ia	—	Tube
ASTM	A618	1	2	1.2	Ib	—	Seamless & Welded Tube
ASTM	A618	1	2	1.2	Ib	K02601	Tube
ASTM	A618	1	2	1.2	Ib	K02601	Tube
ASTM	A618	1	2	1.2	II	K12609	Tube
ASTM	A618	1	2	1.2	II	K12609	Tube
ASTM	A618	1	1	1.2	III	K12700	Tube
ASTM	A620	1	1	1.1	A	K00040	Sheet
ASTM	A620	1	1	1.1	B	K00040	Sheet
ASTM	A633	1	1	1.1	A	K01802	Plate & Shapes
ASTM	A633	1	2	1.1	C	K12000	Plate & Shapes
ASTM	A633	1	1	1.1	C	K12000	Plate & Shapes
ASTM	A633	1	1	1.1	D	K12037	Plate & Shapes
ASTM	A633	1	2	1.1	D	K12037	Plate & Shapes
ASTM	A633	1	3	4.1	E	K12202	Plate & Shapes
ASTM/ASME	A/SA-645	11A	2	9.2	A	K41583	Plate
ASTM	A653	1	1	—	33	—	Galvanized Sheet
ASTM	A653	1	1	—	37	—	Galvanized Sheet
ASTM	A653	1	1	—	40	—	Galvanized Sheet

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM	A653	1	1	—	80	—	Galvanized Sheet
ASTM/ASME	A/SA-656	1	1	1.2	50	K11804	Plate
ASTM/ASME	A/SA-656	1	1	1.3	60	K11804	Plate
ASTM/ASME	A/SA-656	1	2	1.3	70	K11804	Plate
ASTM/ASME	A/SA-656	1	3	1.3	80	K11804	Plate
ASTM/ASME	A/SA-656	1	1	1.2	T3, 50	—	Plate
ASTM/ASME	A/SA-656	1	2	1.3	T3, 60	—	Plate
ASTM/ASME	A/SA-656	1	3	2.2	T3, 70	—	Plate
ASTM/ASME	A/SA-656	1	4	2.2	T3, 80	—	Plate
ASTM/ASME	A/SA-656	1	1	1.2	T7, 50	—	Plate
ASTM/ASME	A/SA-656	1	2	1.3	T7, 60	—	Plate
ASTM/ASME	A/SA-656	1	3	2.2	T7, 70	—	Plate
ASTM/ASME	A/SA-656	1	4	2.2	T7, 80	—	Plate
ASTM	A659	1	1	1.1	1015	G10150	Sheet & Strip
ASTM	A659	1	1	—	1016	G10160	Sheet & Strip
ASTM	A659	1	1	—	1017	G10170	Sheet & Strip
ASTM	A659	1	1	1.1	1018	G10180	Sheet & Strip
ASTM	A659	1	1	1.1	1020	G10200	Sheet & Strip
ASTM	A659	1	1	—	1021	G10210	Sheet & Strip
ASTM	A659	1	1	—	1023	G10230	Sheet & Strip
ASTM/ASME	A/SA-660	1	1	11.1	WCA	J02504	Centrifugal Cast Pipe
ASTM/ASME	A/SA-660	1	2	1.1	WCB	J03003	Centrifugal Cast Pipe
ASTM/ASME	A/SA-660	1	2	11.1	WCC	J02505	Centrifugal Cast Pipe
ASTM/ASME	A/SA-662	1	1	1.1	A	K01701	Plate
ASTM/ASME	A/SA-662	1	1	1.1	B	K02203	Plate
ASTM/ASME	A/SA-662	1	2	1.1	C	K02007	Plate
ASTM	A663	1	1	—	—	—	Bar
ASTM	A663	1	1	—	45	—	Bars & Shapes
ASTM	A663	1	1	—	50	—	Bars & Shapes
ASTM	A663	1	1	—	55	—	Bars & Shapes
ASTM	A663	1	1	—	60	—	Bars & Shapes
ASTM	A663	1	1	—	65	—	Bars & Shapes
ASTM	A663	1	2	—	70	—	Bars & Shapes
ASTM	A663	1	2	—	75	—	Bars & Shapes
ASTM	A663	1	3	—	80	—	Bars & Shapes
ASTM/ASME	A/SA-666	8	3	8.3	201-1	S20100	Plate, Sheet, & Strip
ASTM/ASME	A/SA-666	8	3	8.3	201-2	S20100	Plate, Sheet, & Strip
ASTM/ASME	A/SA-666	8	1	8.1	302	S30200	Plate, Sheet, & Strip
ASTM/ASME	A/SA-666	8	1	8.1	304	S30400	Plate, Sheet, & Strip
ASTM/ASME	A/SA-666	8	1	8.1	304L	S30403	Plate, Sheet, & Strip
ASTM/ASME	A/SA-666	8	1	8.1	304LN	S30453	Plate, Sheet, & Strip
ASTM/ASME	A/SA-666	8	1	8.1	304N	S30451	Plate, Sheet, & Strip

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-666	8	1	8.1	316	S31600	Plate, Sheet, & Strip
ASTM/ASME	A/SA-666	8	1	8.1	316L	S31603	Plate, Sheet, & Strip
ASTM/ASME	A/SA-666	8	1	8.1	316N	S31651	Plate, Sheet, & Strip
ASTM/ASME	A/SA-666	8	3	8.3	XM-11	S21904	Plate, Sheet, & Strip
ASTM	A668	1	1	1.1	B	G10200	Forgings
ASTM	A668	1	2	11.1	C	G10250	Forgings
ASTM	A668	1	2	11.1	D	G10300	Forgings
ASTM	A668	1	3	11.1	F	—	Forgings
ASTM	A668	1	3	11.1	F	—	Forgings
ASTM	A668	1	3	11.1	F	—	Forgings
ASTM/ASME	A/SA-671	1	1	11.1	CA55	K02801	Fusion Welded Pipe
ASTM/ASME	A/SA-671	1	1	1.1	CB60	K02401	Fusion Welded Pipe
ASTM/ASME	A/SA-671	1	1	11.1	CB65	K02800	Fusion Welded Pipe
ASTM/ASME	A/SA-671	1	2	11.1	CB70	K03101	Fusion Welded Pipe
ASTM/ASME	A/SA-671	1	1	1.1	CC60	K02100	Fusion Welded Pipe
ASTM/ASME	A/SA-671	1	1	1.1	CC65	K02403	Fusion Welded Pipe
ASTM/ASME	A/SA-671	1	2	11.1	CC70	K02700	Fusion Welded Pipe
ASTM/ASME	A/SA-671	1	2	1.2	CD70	K12437	Fusion Welded Pipe
ASTM/ASME	A/SA-671	1	3	1.2	CD80	K12437	Fusion Welded Pipe
ASTM/ASME	A/SA-671	1	1	11.1	CE55	K02202	Fusion Welded Pipe
ASTM/ASME	A/SA-671	1	1	11.1	CE60	K02402	Fusion Welded Pipe
ASTM/ASME	A/SA-671	1	2	11.1	CK75	K02803	Fusion Welded Pipe
ASTM/ASME	A/SA-672	1	1	1.1	A45	K01700	Fusion Welded Pipe
ASTM/ASME	A/SA-672	1	1	1.1	A50	K02200	Fusion Welded Pipe
ASTM/ASME	A/SA-672	1	1	11.1	A55	K02801	Fusion Welded Pipe
ASTM/ASME	A/SA-672	1	1	1.1	B55	K02001	Fusion Welded Pipe
ASTM/ASME	A/SA-672	1	1	1.1	B60	K02401	Fusion Welded Pipe
ASTM/ASME	A/SA-672	1	1	11.1	B65	K02800	Fusion Welded Pipe
ASTM/ASME	A/SA-672	1	2	11.1	B70	K03101	Fusion Welded Pipe
ASTM/ASME	A/SA-672	1	1	1.1	C55	K01800	Fusion Welded Pipe
ASTM/ASME	A/SA-672	1	1	1.1	C60	K02100	Fusion Welded Pipe
ASTM/ASME	A/SA-672	1	1	1.1	C65	K02403	Fusion Welded Pipe
ASTM/ASME	A/SA-672	1	2	11.1	C70	K02700	Fusion Welded Pipe
ASTM/ASME	A/SA-672	1	2	1.2	D70	K12437	Fusion Welded Pipe
ASTM/ASME	A/SA-672	1	3	1.2	D80	K12437	Fusion Welded Pipe
ASTM/ASME	A/SA-672	1	1	11.1	E55	K02202	Fusion Welded Pipe
ASTM/ASME	A/SA-672	1	1	11.1	E60	K02402	Fusion Welded Pipe
ASTM/ASME	A/SA-672	3	2	1.1	H75	K12021	Fusion Welded Pipe
ASTM/ASME	A/SA-672	3	3	1.2	H80	K12022	Fusion Welded Pipe
ASTM/ASME	A/SA-672	11A	4	3.2	J100	K12521	Fusion Welded Pipe
ASTM/ASME	A/SA-672	3	3	3.1	J80	—	Fusion Welded Pipe
ASTM/ASME	A/SA-672	3	3	3.1	J90	—	Fusion Welded Pipe

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-672	3	1	1.1	L65	K11820	Fusion Welded Pipe
ASTM/ASME	A/SA-672	3	2	1.2	L70	K12020	Fusion Welded Pipe
ASTM/ASME	A/SA-672	3	2	1.2	L75	K12320	Fusion Welded Pipe
ASTM/ASME	A/SA-672	1	2	11.1	N75	K02803	Fusion Welded Pipe
ASTM/ASME	A/SA-675	1	1	11.1	45	—	Bar
ASTM/ASME	A/SA-675	1	1	11.1	50	—	Bar
ASTM/ASME	A/SA-675	1	1	11.1	55	—	Bar
ASTM/ASME	A/SA-675	1	1	11.1	60	—	Bar
ASTM/ASME	A/SA-675	1	1	11.1	65	—	Bar
ASTM/ASME	A/SA-675	1	2	11.1	70	—	Bar
ASTM/ASME	A/SA-675	1	3	—	80	—	Bar
ASTM/ASME	A/SA-675	1	4	—	90	—	Bar
ASTM	A678	1	2	1.2	A	K01600	Plate
ASTM	A678	1	3	1.3	B	K02002	Plate
ASTM	A678	1	3	1.3	C	K02204	Plate
ASTM	A678	1	4	1.3	C	K02204	Plate
ASTM	A678	1	4	1.3	C	K02204	Plate
ASTM	A678	1	4	1.3	D	K12202	Plate
ASTM/ASME	A/SA-688	8	1	8.1	TP304	S30400	Welded Tube
ASTM/ASME	A/SA-688	8	1	8.1	TP304L	S30403	Welded Tube
ASTM/ASME	A/SA-688	8	1	8.1	TP304LN	S30453	Welded Tube
ASTM/ASME	A/SA-688	8	1	8.1	TP304N	S30451	Welded Tube
ASTM/ASME	A/SA-688	8	1	8.1	TP316	S31600	Welded Tube
ASTM/ASME	A/SA-688	8	1	8.1	TP316L	S31603	Welded Tube
ASTM/ASME	A/SA-688	8	1	8.1	TP316LN	S31653	Welded Tube
ASTM/ASME	A/SA-688	8	1	8.1	TP316N	S31651	Welded Tube
ASTM/ASME	A/SA-688	8	3	8.3	XM-29	S24000	Welded Tube
ASTM	A690	1	2	1.4	—	K12249	Marine Piling—Plate & Bar
ASTM/ASME	A/SA-691	3	1	4.2	0.5Cr, Cl. 1	K12143	Fusion Welded Pipe
ASTM/ASME	A/SA-691	3	2	4.2	0.5Cr, Cl. 2	K12143	Fusion Welded Pipe
ASTM/ASME	A/SA-691	4	1	5.1	1.25CR, Cl. 1	K11789	Fusion Welded Pipe
ASTM/ASME	A/SA-691	4	1	5.1	1.25CR, Cl. 2	K11789	Fusion Welded Pipe
ASTM/ASME	A/SA-691	4	1	5.1	1CR, Cl. 1	K11757	Fusion Welded Pipe
ASTM/ASME	A/SA-691	4	1	5.1	1CR, Cl. 2	K11757	Fusion Welded Pipe
ASTM/ASME	A/SA-691	5A	1	5.2	2.25CR, Cl. 1	K21590	Fusion Welded Pipe
ASTM/ASME	A/SA-691	5A	1	5.2	2.25CR, Cl. 2	K21590	Fusion Welded Pipe
ASTM/ASME	A/SA-691	5A	1	5.2	3CR, Cl. 1	K31545	Fusion Welded Pipe
ASTM/ASME	A/SA-691	5A	1	5.2	3CR, Cl. 2	K31545	Fusion Welded Pipe
ASTM/ASME	A/SA-691	5B	1	5.3	5CR, Cl. 1	K41545	Fusion Welded Pipe
ASTM/ASME	A/SA-691	5B	1	5.3	5CR, Cl. 2	K41545	Fusion Welded Pipe
ASTM/ASME	A/SA-691	15E	1	6.4	91	K91560	Fusion Welded Pipe
ASTM/ASME	A/SA-691	3	1	1.1	CM-65	K11820	Fusion Welded Pipe

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-691	3	2	1.2	CM-70	K12020	Fusion Welded Pipe
ASTM/ASME	A/SA-691	3	2	1.2	CM-75	K12320	Fusion Welded Pipe
ASTM/ASME	A/SA-691	1	2	11.1	CMS-75	K02803	Fusion Welded Pipe
ASTM/ASME	A/SA-691	1	2	1.2	CMSH-70	K12437	Fusion Welded Pipe
ASTM/ASME	A/SA-691	1	2	1.2	CMSH-70	K12437	Fusion Welded Pipe
ASTM/ASME	A/SA-691	1	3	1.2	CMSH-80	K12437	Fusion Welded Pipe
ASTM/ASME	A/SA-691	1	3	1.2	CMSH-80	K12437	Fusion Welded Pipe
ASTM	A694	1	1	11.1	F42	K03014	Forgings
ASTM	A694	1	1	11.1	F46	K03014	Forgings
ASTM	A694	1	1	11.1	F48	K03014	Forgings
ASTM	A694	1	1	11.1	F50	K03014	Forgings
ASTM	A694	1	1	11.1	F52	K03014	Forgings
ASTM	A694	1	2	11.1	F56	K03014	Forgings
ASTM	A694	1	2	11.1	F60	K03014	Forgings
ASTM	A694	1	2	11.1	F65	K03014	Forgings
ASTM	A694	1	3	11.1	F70	K03014	Forgings
ASTM/ASME	A/SA-695	1	1	11.1	B, 35	K03504	Bar
ASTM/ASME	A/SA-695	1	2	11.1	B, 40	K03504	Bar
ASTM/ASME	A/SA-696	1	1	11.1	B	K03200	Bar
ASTM/ASME	A/SA-696	1	2	11.1	C	K03200	Bar
ASTM	A706	1A	4	1.3	60	—	Rebar
ASTM	A707	1	1	1.2	L1, Cl. 1	K02302	Forgings
ASTM	A707	1	1	1.2	L1, Cl. 2	K02302	Forgings
ASTM	A707	1	1	11.1	L2, Cl. 1	K03301	Forgings
ASTM	A707	1	1	11.1	L2, Cl. 2	K03301	Forgings
ASTM	A707	1	2	11.1	L2, Cl. 3	K03301	Forgings
ASTM	A707	1	1	1.2	L3, Cl. 1	K12510	Forgings
ASTM	A707	1	1	1.2	L3, Cl. 2	K12510	Forgings
ASTM	A707	1	2	1.3	L3, Cl. 3	K12510	Forgings
ASTM	A707	1	1	—	L4, Cl. 1	K12089	Forgings
ASTM	A707	1	1	—	L4, Cl. 2	K12089	Forgings
ASTM	A707	1	2	—	L4, Cl. 3	K12089	Forgings
ASTM	A707	1	1	—	L5, Cl. 1	K20934	Forgings
ASTM	A707	1	1	—	L5, Cl. 2	K20934	Forgings
ASTM	A707	1	2	—	L5, Cl. 3	K20934	Forgings
ASTM	A707	1	4	—	L5, Cl. 4	K20934	Forgings
ASTM	A707	3	1	—	L6, Cl. 1	K02902	Forgings
ASTM	A707	3	1	—	L6, Cl. 2	K02902	Forgings
ASTM	A707	3	2	—	L6, Cl. 3	K02902	Forgings
ASTM	A707	3	4	—	L6, Cl. 4	K02902	Forgings
ASTM	A707	9B	1	—	L7, Cl. 1	K32218	Forgings
ASTM	A707	9B	1	—	L7, Cl. 2	K32218	Forgings

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM	A707	9B	1	—	L8, Cl. 1	K42247	Forgings
ASTM	A707	9B	1	—	L8, Cl. 2	K42247	Forgings
ASTM	A707	9B	1	—	L8, Cl. 3	K42247	Forgings
ASTM	A707	9B	1	—	L8, Cl. 4	K42247	Forgings
ASTM	A709	1	1	11.1	36	—	Plate, Bar, & Shapes
ASTM	A709	1	1	1.2	50	—	Plate, Bar, & Shapes
ASTM	A709	1	1	1.2	50S	—	Plate, Bar, & Shapes
ASTM	A709	1	2	1.4	50W, A	—	Plate, Bar, & Shapes
ASTM	A709	1	2	1.4	50W, B	—	Plate, Bar, & Shapes
ASTM	A709	1	2	1.4	HPS 50W	—	Plate, Bar, & Shapes
ASTM	A709	11B	11	1.4	HPS 70W	—	Plate, Bar, & Shapes
ASTM	A710	12C	1	3.3	A, Cl. 1	K20747	Plate
ASTM	A710	12A	1	3.3	A, Cl. 2	K20747	Plate
ASTM	A710	12A	1	3.3	A, Cl. 2	K20747	Plate
ASTM	A710	12B	1	3.3	A, Cl. 3	K20747	Plate
ASTM	A710	12B	1	3.3	A, Cl. 3	K20747	Plate
ASTM	A714	9A	1	9.1	V	K22035	Seamless & Welded Pipe
ASTM	A714	9A	1	9.1	V, E	K22035	Seamless & Welded Pipe
ASTM/ASME	A/SA-724	1	4	3.1	A	K11831	Plate
ASTM/ASME	A/SA-724	1	4	3.1	B	K12031	Plate
ASTM/ASME	A/SA-724	1	4	1.1	C	K12037	Plate
ASTM/ASME	A/SA-727	1	1	11.1	—	K02506	Forgings
ASTM/ASME	A/SA-731	7	2	7.1	18Cr-2Mo	S44400	Seamless & Welded Pipe
ASTM/ASME	A/SA-731	6	4	7.2	S41500	S41500	Seamless & Welded Pipe
ASTM/ASME	A/SA-731	10K	1	7.1	S44660	S44660	Seamless & Welded Pipe
ASTM/ASME	A/SA-731	10J	1	7.1	S44700	S44700	Seamless & Welded Pipe
ASTM/ASME	A/SA-731	10K	1	7.1	S44800	S44800	Seamless & Welded Pipe
ASTM/ASME	A/SA-731	7	2	7.1	TP439	S43035	Seamless & Welded Pipe
ASTM/ASME	A/SA-731	10I	1	7.1	TPXM-27	S44627	Seamless & Welded Pipe
ASTM/ASME	A/SA-731	10I	1	7.1	TPXM-33	S44626	Seamless & Welded Pipe
ASTM	A734	11A	2	3.1	A	K21205	Plate
ASTM/ASME	A/SA-737	1	2	11.1	B	K12001	Plate
ASTM/ASME	A/SA-737	1	3	4.1	C	K12202	Plate
ASTM/ASME	A/SA-738	1	2	11.1	A	K12447	Plate
ASTM/ASME	A/SA-738	1	3	11.1	B	K12007	Plate
ASTM/ASME	A/SA-738	1	3	11.1	C	K02008	Plate
ASTM/ASME	A/SA-738	1	3	11.1	C	K02008	Plate
ASTM/ASME	A/SA-738	1	3	11.1	C	K02008	Plate
ASTM/ASME	A/SA-739	4	1	5.1	B11	K11797	Bar
ASTM/ASME	A/SA-739	5A	1	5.2	B22	K21390	Bar
ASTM	A743	6	3	7.2	CA15	J91150	Castings
ASTM	A743	6	3	7.2	CA15M	J91151	Castings

(Continued)



**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM	A743	6	4	7.2	CA40	J91153	Castings
ASTM	A743	6	4	7.2	CA6NM	J91540	Castings
ASTM	A743	6	4	7.2	CB6	J91804	Castings
ASTM	A743	7	1	7.1	CC50	J92615	Castings
ASTM	A743	8	2	8.2	CE30	J93423	Castings
ASTM	A743	8	1	8.1	CF10SMnN	J92972	Castings
ASTM	A743	8	1	8.2	CF16F	J92701	Castings
ASTM	A743	8	2	8.2	CF20	J92602	Castings
ASTM	A743	8	1	8.1	CF3	J92500	Castings
ASTM	A743	8	1	8.1	CF3M	J92800	Castings
ASTM	A743	8	1	8.2	CF3MN	J92804	Castings
ASTM	A743	8	1	8.1	CF8	J92600	Castings
ASTM	A743	8	1	8.1	CF8C	J92710	Castings
ASTM	A743	8	1	8.1	CF8M	J92900	Castings
ASTM	A743	8	2	8.2	CG12	J93001	Castings
ASTM	A743	8	1	8.2	CG3M	J92999	Castings
ASTM	A743	8	1	8.1	CG8M	J93000	Castings
ASTM	A743	8	2	8.2	CH10	J93401	Castings
ASTM	A743	8	2	8.2	CH20	J93402	Castings
ASTM	A743	8	4	8.2	CK3MCuN	J93254	Castings
ASTM	A743	8	2	8.2	CN3M	J94652	Castings
ASTM/ASME	A/SA-765	1	1	11.1	I	K03046	Forgings
ASTM/ASME	A/SA-765	1	2	11.1	II	K03047	Forgings
ASTM/ASME	A/SA-765	9B	1	9.2	III	K32026	Forgings
ASTM/ASME	A/SA-765	1	3	1.1	IV	K02009	Forgings
ASTM	A774	8	1	8.1	304L	S30403	Wrought Piping Fittings
ASTM	A774	8	1	8.1	316L	S31603	Wrought Piping Fittings
ASTM	A774	8	1	8.1	321	S32100	Wrought Piping Fittings
ASTM	A774	8	1	8.1	347	S34700	Wrought Piping Fittings
ASTM	A774	8	1	8.1	F317L	S31703	Wrought Piping Fittings
ASTM	A778	8	1	8.1	304L	S30403	Welded Unannealed Tube
ASTM	A778	8	1	8.1	316L	S31603	Welded Unannealed Tube
ASTM	A778	8	1	8.1	321	S32100	Welded Unannealed Tube
ASTM	A778	8	1	8.1	347	S34700	Welded Unannealed Tube
ASTM	A778	8	1	8.1	F317L	S31703	Welded Unannealed Tube
ASTM	A782	11B	4	—	1	—	Plate
ASTM	A782	11B	4	—	1	—	Plate
ASTM	A782	11B	4	—	1	—	Plate
ASTM/ASME	A/SA-789	10H	1	10.1	—	S32003	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.1	—	S32101	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.1	—	S32101	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.1	—	S32202	Seamless & Welded Tube

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-789	10H	1	10.2	S31200	S31200	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.2	S31260	S31260	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.1	S31500	S31500	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.1	S31803	S31803	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.1	S32205	S32205	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.1	S32304	S32304	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.1	S32304	S32304	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.2	S32550	S32550	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.2	S32750	S32750	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.2	S32760	S32760	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.2	S32900	S32900	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.2	S32906	S32906	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.2	S32906	S32906	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.2	S32950	S32950	Seamless & Welded Tube
ASTM/ASME	A/SA-789	10H	1	10.2	S39274	S39274	Seamless & Welded Tube
ASTM/ASME	A/SA-790	10H	1	10.1	—	S32003	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.1	—	S32101	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.1	—	S32101	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.1	—	S32202	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.2	S31200	S31200	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.2	S31260	S31260	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.1	S31500	S31500	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.1	S31803	S31803	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.1	S32205	S32205	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.1	S32304	S32304	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.2	S32550	S32550	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.2	S32750	S32750	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.2	S32760	S32760	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.2	S32900	S32900	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.2	S32906	S32906	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.2	S32906	S32906	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.2	S32950	S32950	Seamless & Welded Pipe
ASTM/ASME	A/SA-790	10H	1	10.2	S39274	S39274	Seamless & Welded Pipe
ASTM	A795	1	1	—	E, A	—	Resistance Welded Pipe
ASTM	A795	1	1	—	E, B	—	Resistance Welded Pipe
ASTM	A795	1	1	—	F	—	Furnace Welded Pipe
ASTM	A795	1	1	—	S, A	—	Seamless Pipe
ASTM	A795	1	1	—	S, B	—	Seamless Pipe
ASTM/ASME	A/SA-803	10K	1	7.1	26-3-3	S44660	Welded Tube
ASTM/ASME	A/SA-803	7	2	7.1	TP439	S43035	Welded Tube
ASTM	A808	1	1	1.4	—	K11852	Plate
ASTM/ASME	A/SA-813	8	4	8.2	—	S32053	Welded Pipe

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-813	8	2	8.2	S30815	S30815	Welded Pipe
ASTM/ASME	A/SA-813	8	4	8.2	S31254	S31254	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP304	S30400	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP304H	S30409	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP304L	S30403	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP304LN	S30453	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP304N	S30451	Welded Pipe
ASTM/ASME	A/SA-813	8	2	8.2	TP309Cb	S30940	Welded Pipe
ASTM/ASME	A/SA-813	8	2	8.2	TP309S	S30908	Welded Pipe
ASTM/ASME	A/SA-813	8	2	8.2	TP310Cb	S31040	Welded Pipe
ASTM/ASME	A/SA-813	8	2	8.2	TP310S	S31008	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP316	S31600	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP316H	S31609	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP316L	S31603	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP316LN	S31653	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP316N	S31651	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP317	S31700	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP317L	S31703	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP321	S32100	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP321H	S32109	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP347	S34700	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP347H	S34709	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP348	S34800	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TP348H	S34809	Welded Pipe
ASTM/ASME	A/SA-813	8	3	8.3	TPXM-11	S21904	Welded Pipe
ASTM/ASME	A/SA-813	8	1	8.1	TPXM-15	S38100	Welded Pipe
ASTM/ASME	A/SA-813	8	3	8.3	TPXM-19	S20910	Welded Pipe
ASTM/ASME	A/SA-813	8	3	8.3	TPXM-29	S24000	Welded Pipe
ASTM/ASME	A/SA-814	8	4	8.2	—	S32053	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	2	8.2	S30815	S30815	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	4	8.2	S31254	S31254	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP304	S30400	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP304H	S30409	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP304L	S30403	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP304LN	S30453	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP304N	S30451	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	2	8.2	TP309Cb	S30940	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	2	8.2	TP309S	S30908	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	2	8.2	TP310Cb	S31040	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	2	8.2	TP310S	S31008	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP316	S31600	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP316H	S31609	Cold Worked Welded Pipe

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-814	8	1	8.1	TP316L	S31603	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP316LN	S31653	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP316N	S31651	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP317	S31700	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP317L	S31703	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP321	S32100	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP321H	S32109	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP347	S34700	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP347H	S34709	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP348	S34800	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TP348H	S34809	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	3	8.3	TPXM-11	S21904	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	1	8.1	TPXM-15	S38100	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	3	8.3	TPXM-19	S20910	Cold Worked Welded Pipe
ASTM/ASME	A/SA-814	8	3	8.3	TPXM-29	S24000	Cold Worked Welded Pipe
ASTM/ASME	A/SA-815	10H	1	10.1	—	S32101	Fittings
ASTM/ASME	A/SA-815	10H	1	10.1	—	S32202	Fittings
ASTM/ASME	A/SA-815	10H	1	10.1	S31803	S31803	Fittings
ASTM/ASME	A/SA-815	10H	1	10.1	S32205	S32205	Fittings
ASTM/ASME	A/SA-815	10H	1	10.2	S32550	S32550	Fittings
ASTM/ASME	A/SA-815	10H	1	10.2	S32750	S32750	Fittings
ASTM/ASME	A/SA-815	10H	1	10.2	S32760	S32760	Fittings
ASTM/ASME	A/SA-815	6	4	7.2	S41500	S41500	Fittings
ASTM	A830	1	1	1.1	1006	G10060	Plate
ASTM	A830	1	1	1.1	1008	G10080	Plate
ASTM	A830	1	1	1.1	1009	G10090	Plate
ASTM	A830	1	1	1.1	1010	G10100	Plate
ASTM	A830	1	1	1.1	1012	G10120	Plate
ASTM	A830	1	1	1.1	1015	G10150	Plate
ASTM	A830	1	1	1.1	1016	G10160	Plate
ASTM	A830	1	1	1.1	1017	G10170	Plate
ASTM	A830	1	1	1.1	1018	G10180	Plate
ASTM	A830	1	1	1.1	1019	G10190	Plate
ASTM	A830	1	1	1.1	1020	G10200	Plate
ASTM	A830	1	1	1.1	1021	G10210	Plate
ASTM	A830	1	1	1.1	1022	G10220	Plate
ASTM	A830	1	1	11.1	1023	G10230	Plate
ASTM	A830	1	2	11.1	1025	G10250	Plate
ASTM/ASME	A/SA-832	5C	1	6.2	21V	K31830	Plate
ASTM/ASME	A/SA-832	5C	1	6.2	22V	K31835	Plate
ASTM/ASME	A/SA-832	5C	1	6.2	23V	—	Plate
ASTM/ASME	A/SA-836	1	1	1.1	—	—	Forgings

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-841	1	2	1.2	A, Cl. 1	—	Plate
ASTM/ASME	A/SA-841	1	2	1.2	A, Cl. 1	—	Plate
ASTM/ASME	A/SA-841	1	3	1.3	B, Cl. 2	—	Plate
ASTM/ASME	A/SA-841	1	3	1.3	B, Cl. 2	—	Plate
ASTM	A844	11A	1	9.3	—	K81340	Plate
ASTM	A852	11B	11	4.2	—	K12043	Plate
ASTM	A857	1	1	1.1	25	—	Sheet & Strip
ASTM	A857	1	1	1.1	30	—	Sheet & Strip
ASTM	A857	1	1	1.1	33	—	Sheet & Strip
ASTM	A857	1	1	1.1	36	—	Sheet & Strip
ASTM/ASME	A/SA-859	11C	1	3.3	A, Cl. 1	K20747	Forgings
ASTM/ASME	A/SA-859	11C	1	3.3	A, Cl. 2	K20747	Forgings
ASTM	A871	3	2	4.2	60	—	Plate
ASTM	A871	3	3	4.2	65	—	Plate
ASTM	A890	10H	1	10.2	1A	J93370	Castings
ASTM	A890	10H	1	10.2	1B	J93372	Castings
ASTM	A890	10H	1	10.2	1C	J93373	Castings
ASTM	A890	10H	1	10.2	2A	J93345	Castings
ASTM	A890	10H	1	10.2	3A	J93371	Castings
ASTM	A890	10H	1	10.1	4A	J92205	Castings
ASTM	A890	10H	1	10.2	5A	J93404	Castings
ASTM	A890	10H	1	10.2	6A	J93380	Castings
ASTM	A913	1	2	1.2	50	—	Shapes
ASTM	A913	1	3	3.1	60	—	Shapes
ASTM	A913	1	3	3.1	65	—	Shapes
ASTM	A913	1	3	3.1	70	—	Shapes
ASTM	A928	10H	1	10.2	—	S32760	Welded Pipe
ASTM	A928	10H	1	10.1	2205	S32205	Welded Pipe
ASTM	A928	10H	1	10.2	255	S32550	Welded Pipe
ASTM	A935	1	1	1.2	45, Cl. 1	—	Sheet & Strip
ASTM	A935	1	1	1.2	45, Cl. 2	—	Sheet & Strip
ASTM	A935	1	1	1.2	50, Cl. 1	—	Sheet & Strip
ASTM	A935	1	1	1.2	50, Cl. 2	—	Sheet & Strip
ASTM	A935	1	2	1.3	55, Cl. 1	—	Sheet & Strip
ASTM	A935	1	1	1.3	55, Cl. 2	—	Sheet & Strip
ASTM	A935	1	2	11.1	60, Cl. 1	—	Sheet & Strip
ASTM	A935	1	2	1.3	60, Cl. 2	—	Sheet & Strip
ASTM	A935	1	3	11.1	65, Cl. 1	—	Sheet & Strip
ASTM	A935	1	2	1.3	65, Cl. 2	—	Sheet & Strip
ASTM	A935	1	3	11.1	70, Cl. 1	—	Sheet & Strip
ASTM	A935	1	3	1.3	70, Cl. 2	—	Sheet & Strip
ASTM/ASME	A/SA-965	8	1	8.1	F304	S30400	Forgings

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM/ASME	A/SA-965	8	1	8.1	F304H	S30409	Forgings
ASTM/ASME	A/SA-965	8	1	8.1	F304L	S30403	Forgings
ASTM/ASME	A/SA-965	8	1	8.1	F304LN	S30453	Forgings
ASTM/ASME	A/SA-965	8	1	8.1	F304N	S30451	Forgings
ASTM/ASME	A/SA-965	8	2	8.2	F310	S31000	Forgings
ASTM/ASME	A/SA-965	8	1	8.1	F316	S31600	Forgings
ASTM/ASME	A/SA-965	8	1	8.1	F316H	S31609	Forgings
ASTM/ASME	A/SA-965	8	1	8.1	F316L	S31603	Forgings
ASTM/ASME	A/SA-965	8	1	8.1	F316LN	S31653	Forgings
ASTM/ASME	A/SA-965	8	1	8.1	F316N	S31651	Forgings
ASTM/ASME	A/SA-965	8	1	8.1	F321	S32100	Forgings
ASTM/ASME	A/SA-965	8	1	8.1	F321H	S32109	Forgings
ASTM/ASME	A/SA-965	8	1	8.1	F347	S34700	Forgings
ASTM/ASME	A/SA-965	8	1	8.1	F347H	S34709	Forgings
ASTM/ASME	A/SA-965	8	1	8.1	F348	S34800	Forgings
ASTM/ASME	A/SA-965	8	1	8.1	F348H	S34809	Forgings
ASTM/ASME	A/SA-965	8	1	8.1	F46	S30600	Forgings
ASTM/ASME	A/SA-965	8	3	8.3	FXM-11	S21904	Forgings
ASTM/ASME	A/SA-965	8	3	8.3	FXM-19	S20910	Forgings
ASTM	A984	1	1	1.1	35	—	Pipe
ASTM	A984	1	2	1.2	50	—	Pipe
ASTM	A984	1	2	1.3	60	—	Pipe
ASTM	A984	1	3	—	70	—	Pipe
ASTM	A984	1	4	—	80	—	Pipe
ASTM	A992	1	1	1.1	—	—	Shapes
ASTM	A992	1	1	1.2	—	—	Plate & Shapes
ASTM/ASME	A/SA-995	10H	1	10.2	1B	J93372	Castings
ASTM/ASME	A/SA-995	10H	1	10.2	2A	J93345	Castings
ASTM/ASME	A/SA-995	10H	1	10.2	3A	J93371	Castings
ASTM/ASME	A/SA-995	10H	1	10.1	4A	J92205	Castings
ASTM/ASME	A/SA-995	10H	1	10.2	5A	J93404	Castings
ASTM/ASME	A/SA-995	10H	1	10.2	6A	J93380	Castings
ASTM/ASME	A/SA-1008	1	1	1.1	CS, A	—	Sheet
ASTM/ASME	A/SA-1008	1	1	1.1	CS, B	—	Sheet
ASTM	A1008	1	1	1.1	CS, C	—	Sheet
ASTM	A1008	1	1	1.1	DS, A	—	Sheet
ASTM/ASME	A/SA-1008	1	1	1.1	DS, B	—	Sheet
ASTM	A1008	1	1	1.2	HSLAS 45, Cl. 1	—	Sheet
ASTM	A1008	1	1	1.2	HSLAS 45, Cl. 2	—	Sheet
ASTM	A1008	1	1	1.2	HSLAS 50, Cl. 1	—	Sheet
ASTM	A1008	1	1	1.2	HSLAS 50, Cl. 2	—	Sheet
ASTM	A1008	1	2	1.3	HSLAS 55, Cl. 1	—	Sheet

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM	A1008	1	1	1.3	HSLAS 55, Cl. 2	—	Sheet
ASTM	A1008	1	2	11.1	HSLAS 60, Cl. 1	—	Sheet
ASTM	A1008	1	2	1.3	HSLAS 60, Cl. 2	—	Sheet
ASTM	A1008	1	3	11.1	HSLAS 65, Cl. 1	—	Sheet
ASTM	A1008	1	2	1.3	HSLAS 65, Cl. 2	—	Sheet
ASTM	A1008	1	3	11.1	HSLAS 70, Cl. 1	—	Sheet
ASTM	A1008	1	3	1.3	HSLAS 70, Cl. 2	—	Sheet
ASTM	A1008	1	1	1.2	HSLAS-F 50	—	Sheet
ASTM	A1008	1	2	1.3	HSLAS-F 60	—	Sheet
ASTM	A1008	1	3	1.3	HSLAS-F 70	—	Sheet
ASTM	A1008	1	4	1.3	HSLAS-F 80	—	Sheet
ASTM	A1008	1	1	1.1	SS 25	—	Sheet
ASTM	A1008	1	1	1.1	SS 30	—	Sheet
ASTM	A1008	1	1	1.1	SS 33, 1	—	Sheet
ASTM	A1008	1	1	1.1	SS 33, 2	—	Sheet
ASTM	A1008	1	1	1.1	SS 40, 1	—	Sheet
ASTM	A1008	1	1	1.1	SS 40, 2	—	Sheet
ASTM	A1008	1	3	1.3	SS 80	—	Sheet
ASTM/ASME	A/SA-1010	7	1	7.2	40	S41003	Plate, Sheet, & Strip
ASTM/ASME	A/SA-1010	7	1	7.2	50	S41003	Plate, Sheet, & Strip
ASTM	A1011	1	1	1.1	CS, A	—	Sheet & Strip
ASTM/ASME	A/SA-1011	1	1	1.1	CS, B	—	Sheet & Strip
ASTM	A1011	1	1	1.1	CS, C	—	Sheet & Strip
ASTM	A1011	1	1	1.1	CS, D	—	Sheet & Strip
ASTM	A1011	1	1	1.1	DS, A	—	Sheet & Strip
ASTM/ASME	A/SA-1011	1	1	1.1	DS, B	—	Sheet & Strip
ASTM	A1011	1	1	1.2	HSLAS 45, Cl. 1	—	Sheet & Strip
ASTM	A1011	1	1	1.2	HSLAS 45, Cl. 2	—	Sheet & Strip
ASTM	A1011	1	1	1.2	HSLAS 50, Cl. 1	—	Sheet & Strip
ASTM	A1011	1	1	1.2	HSLAS 50, Cl. 2	—	Sheet & Strip
ASTM	A1011	1	2	1.3	HSLAS 55, Cl. 1	—	Sheet & Strip
ASTM	A1011	1	1	1.3	HSLAS 5,5 Cl. 2	—	Sheet & Strip
ASTM	A1011	1	2	11.1	HSLAS 60, Cl. 1	—	Sheet & Strip
ASTM	A1011	1	2	1.3	HSLAS 60, Cl. 2	—	Sheet & Strip
ASTM	A1011	1	3	11.1	HSLAS 65, Cl. 1	—	Sheet & Strip
ASTM	A1011	1	2	1.3	HSLAS 65, Cl. 2	—	Sheet & Strip
ASTM	A1011	1	3	11.1	HSLAS 70, Cl. 1	—	Sheet & Strip
ASTM	A1011	1	3	1.3	HSLAS 70, Cl. 2	—	Sheet & Strip
ASTM	A1011	1	1	1.2	HSLAS-F 50	—	Sheet & Strip
ASTM	A1011	1	2	1.3	HSLAS-F 60	—	Sheet & Strip
ASTM	A1011	1	3	1.3	HSLAS-F 70	—	Sheet & Strip
ASTM	A1011	1	4	1.3	HSLAS-F 80	—	Sheet & Strip

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
ASTM	A1011	1	1	1.1	SS 30	—	Sheet & Strip
ASTM	A1011	1	1	1.1	SS 33	—	Sheet & Strip
ASTM	A1011	1	1	1.1	SS 36, 1	—	Sheet & Strip
ASTM	A1011	1	1	1.1	SS 36, 2	—	Sheet & Strip
ASTM	A1011	1	1	1.1	SS 40	—	Sheet & Strip
ASTM	A1011	1	1	1.2	SS 45, 1	—	Sheet & Strip
ASTM	A1011	1	1	1.2	SS 45, 2	—	Sheet & Strip
ASTM	A1011	1	1	1.2	SS 50	—	Sheet & Strip
ASTM	A1011	1	2	1.3	SS 55	—	Sheet & Strip
ASTM	A1011	1	2	1.3	SS 60	—	Sheet & Strip
ASTM	A1011	1	3	1.3	SS 70	—	Sheet & Strip
ASTM	A1011	1	4	1.3	SS 80	—	Sheet & Strip
ASTM	A1018	1	1	1.2	HSLAS 45, Cl. 1	—	Sheet & Strip
ASTM	A1018	1	1	1.2	HSLAS 45, Cl. 2	—	Sheet & Strip
ASTM	A1018	1	1	1.2	HSLAS 50, Cl. 1	—	Sheet & Strip
ASTM	A1018	1	1	1.2	HSLAS 50, Cl. 2	—	Sheet & Strip
ASTM	A1018	1	2	1.3	HSLAS 55, Cl. 1	—	Sheet & Strip
ASTM	A1018	1	1	1.3	HSLAS 5,5 Cl. 2	—	Sheet & Strip
ASTM	A1018	1	2	11.1	HSLAS 60, Cl. 1	—	Sheet & Strip
ASTM	A1018	1	2	1.3	HSLAS 60, Cl. 2	—	Sheet & Strip
ASTM	A1018	1	2	11.1	HSLAS 65, Cl. 1	—	Sheet & Strip
ASTM	A1018	1	2	1.3	HSLAS 65, Cl. 2	—	Sheet & Strip
ASTM	A1018	1	3	11.1	HSLAS 70, Cl. 1	—	Sheet & Strip
ASTM	A1018	1	3	1.3	HSLAS 70, Cl. 2	—	Sheet & Strip
ASTM	A1018	1	1	1.2	HSLAS-F 50	—	Sheet & Strip
ASTM	A1018	1	3	1.3	HSLAS-F 60	—	Sheet & Strip
ASTM	A1018	1	3	1.3	HSLAS-F 70	—	Sheet & Strip
ASTM	A1018	1	4	1.3	HSLAS-F 80	—	Sheet & Strip
ASTM	A1018	1	1	1.1	SS 30	—	Sheet & Strip
ASTM	A1018	1	1	1.1	SS 33	—	Sheet & Strip
ASTM	A1018	1	1	1.1	SS 36, 1	—	Sheet & Strip
ASTM	A1018	1	1	1.1	SS 36, 2	—	Sheet & Strip
ASTM	A1018	1	1	1.1	SS 40	—	Sheet & Strip
CSA	G30.18	1A	4	—	300R	—	Rebar
CSA	G30.18	1A	4	—	400R	—	Rebar
CSA	G30.18	1A	4	11.1	400W	—	Rebar
CSA	G30.18	1A	4	—	500R	—	Rebar
CSA	G30.18	1A	4	11.1	500W	—	Rebar
CSA	G40.21	1	1	1.1	260W	—	Plate, Bar, & Shapes
CSA	G40.21	1	1	1.1	260WT	—	Plate, Bar, & Shapes
CSA	G40.21	1	1	1.2	300W	—	Plate, Bar, & Shapes
CSA	G40.21	1	1	1.2	300WT	—	Plate, Bar, & Shapes

(Continued)



**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
CSA	G40.21	1	2	1.4	350A	—	HSLA Plate, Bar, & Shapes
CSA	G40.21	1	2	1.4	350AT	—	HSLA Plate, Bar, & Shapes
CSA	G40.21	1	2	1.4	350R	—	HSLA Plate, Bar, & Shapes
CSA	G40.21	1	1	1.2	350W	—	Plate, Bar, & Shapes
CSA	G40.21	1	2	1.2	350WT	—	Plate, Bar, & Shapes
CSA	G40.21	1	2	1.3	380W	—	Plate, Bar, & Shapes
CSA	G40.21	1	2	1.3	380WT	—	Plate, Bar, & Shapes
CSA	G40.21	1	2	1.4	400A	—	HSLA Plate, Bar, & Shapes
CSA	G40.21	1	2	1.4	400AT	—	HSLA Plate, Bar, & Shapes
CSA	G40.21	1	2	1.3	400W	—	HSLA Plate, Bar, & Shapes
CSA	G40.21	1	2	1.3	400WT	—	HSLA Plate, Bar, & Shapes
CSA	G40.21	1	3	1.4	480A	—	HSLA Plate, Bar, & Shapes
CSA	G40.21	1	3	1.4	480AT	—	HSLA Plate, Bar, & Shapes
CSA	G40.21	1	3	11.1	480W	—	HSLA Plate, Bar, & Shapes
CSA	G40.21	1	3	11.1	480WT	—	HSLA Plate, Bar, & Shapes
CSA	G40.21	1	4	1.4	550A	—	Plate, Bar, & Shapes
CSA	G40.21	1	4	1.4	550AT	—	Plate, Bar, & Shapes
CSA	G40.21	1	4	1.3	550W	—	Plate, Bar, & Shapes
CSA	G40.21	1	4	1.3	550WT	—	Plate, Bar, & Shapes
CSA	Z245.1	1	1	11.1	172	—	Pipe
CSA	Z245.1	1	1	11.1	207	—	Pipe
CSA	Z245.1	1	1	11.1	241	—	Pipe
CSA	Z245.1	1	1	11.1	290	—	Pipe
CSA	Z245.1	1	2	11.1	317	—	Pipe
CSA	Z245.1	1	2	11.1	359	—	Pipe
CSA	Z245.1	1	2	11.1	386	—	Pipe
CSA	Z245.1	1	3	11.1	414	—	Pipe
CSA	Z245.1	1	3	11.1	448	—	Pipe
CSA	Z245.1	1	3	11.1	483	—	Pipe
CSA	Z245.1	1	4	11.1	550	—	Pipe
CSA	Z245.11	1	1	11.1	207	—	Fittings
CSA	Z245.11	1	1	11.1	241	—	Fittings
CSA	Z245.11	1	1	11.1	290	—	Fittings
CSA	Z245.11	1	2	11.1	317	—	Fittings
CSA	Z245.11	1	2	11.1	359	—	Fittings
CSA	Z245.11	1	2	11.1	386	—	Fittings
CSA	Z245.11	1	3	11.1	414	—	Fittings
CSA	Z245.11	1	3	11.1	448	—	Fittings
CSA	Z245.11	1	3	11.1	483	—	Fittings
CSA	Z245.11	1	4	11.1	550	—	Fittings
CSA	Z245.12	1	1	11.1	248	—	Flanges
CSA	Z245.12	1	1	11.1	290	—	Flanges

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Ferrous Alloys**

Standard	Base Metal Specification	Material Number	Group Number	ISO 15608 Group	Type, Grade, or Alloy Designation	UNS Number	Product Form
<b>Steel and Steel Alloys</b>							
CSA	Z245.12	1	2	11.1	317	—	Flanges
CSA	Z245.12	1	2	11.1	359	—	Flanges
CSA	Z245.12	1	2	11.1	386	—	Flanges
CSA	Z245.12	1	3	11.1	414	—	Flanges
CSA	Z245.12	1	3	11.1	448	—	Flanges
CSA	Z245.12	1	3	11.1	483	—	Flanges
MSS	SP-75	1	1	11.1	WPHY-42	—	Seamless & Welded Fittings
MSS	SP-75	1	1	11.1	WPHY-46	—	Seamless & Welded Fittings
MSS	SP-75	1	1	11.1	WPHY-52	—	Seamless & Welded Fittings
MSS	SP-75	1	2	11.1	WPHY-56	—	Seamless & Welded Fittings
MSS	SP-75	1	2	11.1	WPHY-60	—	Seamless & Welded Fittings
MSS	SP-75	1	2	11.1	WPHY-65	—	Seamless & Welded Fittings
MSS	SP-75	1	3	11.1	WPHY-70	—	Seamless & Welded Fittings

**Table C.1**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
AMS	4914	—	53	R58153	54	Sheet
AMS	4915	—	54	R54810	52	Plate
AMS	4915	—	54	R54810	52	Plate
AMS	4915	—	54	R54810	52	Plate
AMS	4915	—	54	R54810	52	Plate
AMS	4915	—	54	R54810	52	Sheet & Strip
AMS	4919	—	54	R54620	52	Sheet
AMS	4973	—	54	R54810	52	Forgings
AMS	4973	—	54	R54810	52	Forgings
AMS	4975	—	54	R54620	52	Bar
AMS	4976	—	54	R54620	52	Forgings
AMS	5711	—	44	N06635	43	Sheet
ASTM	B21	—	32	C46400	32.2	Rod & Bar
ASTM	B21	—	32	C46400	32.2	Rod & Bar
ASTM	B21	—	32	C46400	32.2	Rod & Bar
ASTM	B21	—	32	C46400	32.2	Shapes
ASTM/ASME	B/SB-26	208.0	26	A02080	25	Castings
ASTM/ASME	B/SB-26	222.0, O	26	A02220	—	Castings
ASTM/ASME	B/SB-26	222.0, T61	26	A02220	—	Castings
ASTM/ASME	B/SB-26	319.0, F	26	A03190	25	Castings
ASTM/ASME	B/SB-26	319.0, T5	26	A03190	25	Castings
ASTM/ASME	B/SB-26	319.0, T6	26	A03190	25	Castings
ASTM/ASME	B/SB-26	328.0, F	26	A03280	25	Castings
ASTM/ASME	B/SB-26	328.0, T6	26	A03280	25	Castings
ASTM/ASME	B/SB-26	356.0, F	26	A03560	24.2	Castings
ASTM/ASME	B/SB-26	356.0, T51	26	A03560	24.2	Castings
ASTM/ASME	B/SB-26	356.0, T6	26	A03560	24.2	Castings
ASTM/ASME	B/SB-26	356.0, T7	26	A03560	24.2	Castings
ASTM/ASME	B/SB-26	356.0, T71	26	A03560	24.2	Castings
ASTM/ASME	B/SB-26	443.0	26	A04430	24.1	Castings
ASTM/ASME	B/SB-26	512.0	26	A05120	23.1	Castings
ASTM/ASME	B/SB-26	514.0	26	A05140	23.1	Castings
ASTM/ASME	B/SB-26	535.0	26	A05350	—	Castings
ASTM/ASME	B/SB-26	705.0, T5	26	A07050	23.2	Castings
ASTM/ASME	B/SB-26	710.0, T5	26	A07100	23.2	Castings
ASTM/ASME	B/SB-26	A356.0, T6	26	A13560	24.2	Castings
ASTM/ASME	B/SB-26	A356.0, T61	26	A13560	24.2	Castings
ASTM/ASME	B/SB-26	B443.0	26	A24430	24.1	Castings
ASTM/ASME	B/SB-42	—	31	C10200	31	Seamless Pipe
ASTM/ASME	B/SB-42	—	31	C10300	31	Seamless Pipe
ASTM/ASME	B/SB-42	—	31	C10800	31	Seamless Pipe
ASTM/ASME	B/SB-42	—	31	C12000	31	Seamless Pipe
ASTM/ASME	B/SB-42	—	31	C12200	31	Seamless Pipe
ASTM/ASME	B/SB-43	—	32	C23000	32.1	Seamless Pipe

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM	B68	—	31	C10200	31	Tube
ASTM	B68	—	31	C10300	31	Tube
ASTM	B68	—	31	C10800	31	Tube
ASTM	B68	—	31	C12000	31	Tube
ASTM	B68	—	31	C12200	31	Tube
ASTM/ASME	B/SB-75	—	31	C10100	31	Seamless Tube
ASTM/ASME	B/SB-75	—	31	C10200	31	Seamless Tube
ASTM/ASME	B/SB-75	—	31	C10300	31	Seamless Tube
ASTM/ASME	B/SB-75	—	31	C10800	31	Seamless Tube
ASTM/ASME	B/SB-75	—	31	C12000	31	Seamless Tube
ASTM/ASME	B/SB-75	—	31	C12200	31	Seamless Tube
ASTM/ASME	B/SB-75	—	31	C14200	31	Seamless Tube
ASTM	B80	AZ91C, F	83	M11914	—	Castings
ASTM	B80	AZ92A, F	83	M11920	—	Castings
ASTM	B80	K1A	83	M18010	—	Castings
ASTM	B88	—	31	C10200	31	Tube
ASTM	B88	—	31	C12000	31	Tube
ASTM	B88	—	31	C12200	31	Tube
ASTM	B90	AZ31B	81	M11311	—	Plate & Sheet
ASTM	B90	AZ31C	81	M11312	—	Sheet
ASTM	B90	AZ31C	81	M11312	—	Plate & Sheet
ASTM	B90	HK31A	81	M13310	—	Plate
ASTM	B90	HK31A	81	M13310	—	Plate & Sheet
ASTM	B90	HK31A	81	M13310	—	Plate
ASTM	B90	ZE10A	81	M16100	—	Sheet
ASTM	B90	ZE10A	81	M16100	—	Plate
ASTM	B90	ZE10A	81	M16100	—	Sheet
ASTM	B91	AZ31B	81	M11311	—	Forgings
ASTM	B91	AZ61A	81	M11610	—	Forgings
ASTM/ASME	B/SB-96	—	33	C65100	37	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-96	—	33	C65400	37	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-96	—	33	C65500	37	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-98	—	33	C65100	37	Rod, Bar, & Shapes
ASTM/ASME	B/SB-98	—	33	C65500	37	Rod, Bar, & Shapes
ASTM/ASME	B/SB-98	—	33	C66100	37	Rod, Bar, & Shapes
ASTM	B107	AZ31B	81	M11311	—	Bar, Rods, Profiles, & Wire
ASTM	B107	AZ31B	81	M11311	—	Bar, Rods, Profiles, & Wire
ASTM	B107	AZ31B	81	M11311	—	Bar, Rods, Profiles, & Wire
ASTM	B107	AZ31B	81	M11311	—	Bar, Rods, Profiles, & Wire
ASTM	B107	AZ31B	81	M11311	—	Hollow Profiles
ASTM	B107	AZ31B	81	M11311	—	Tube
ASTM	B107	AZ31B	81	M11311	—	Tube
ASTM	B107	AZ31C	81	M11312	—	Tube
ASTM	B107	AZ31C	81	M11312	—	Bar, Rods, Profiles, & Wire

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM	B107	AZ31C	81	M11312	—	Bar, Rods, Profiles, & Wire
ASTM	B107	AZ31C	81	M11312	—	Bar, Rods, Profiles, & Wire
ASTM	B107	AZ31C	81	M11312	—	Bar, Rods, Profiles, & Wire
ASTM	B107	AZ31C	81	M11312	—	Tube
ASTM	B107	AZ31C	81	M11312	—	Hollow Profiles
ASTM	B107	AZ61A	81	M11610	—	Hollow Profiles
ASTM	B107	AZ61A	81	M11610	—	Bar, Rods, Profiles, & Wire
ASTM	B107	AZ61A	81	M11610	—	Bar, Rods, Profiles, & Wire
ASTM	B107	AZ61A	81	M11610	—	Tube
ASTM	B107	AZ61A	81	M11610	—	Bar, Rods, Profiles, & Wire
ASTM	B107	M1A	81	M15100	—	Tube
ASTM	B107	M1A	81	M15100	—	Bar, Rods, Profiles, & Wire
ASTM	B107	M1A	81	M15100	—	Bar, Rods, Profiles, & Wire
ASTM	B107	M1A	81	M15100	—	Bar, Rods, Profiles, & Wire
ASTM	B107	M1A	81	M15100	—	Hollow Profiles
ASTM/ASME	B/SB-108	308.0	26	A03080	25	Castings
ASTM/ASME	B/SB-108	319.0	26	A03190	25	Castings
ASTM/ASME	B/SB-108	333.0, F	26	A03330	25	Castings
ASTM/ASME	B/SB-108	333.0, T5	26	A03330	25	Castings
ASTM/ASME	B/SB-108	333.0, T6	26	A03330	25	Castings
ASTM/ASME	B/SB-108	333.0, T7	26	A03330	25	Castings
ASTM/ASME	B/SB-108	356.0, F	26	A03560	24.2	Castings
ASTM/ASME	B/SB-108	356.0, T6	26	A03560	24.2	Castings
ASTM/ASME	B/SB-108	356.0, T71	26	A03560	24.2	Castings
ASTM/ASME	B/SB-108	443.0	26	A04430	24.1	Castings
ASTM/ASME	B/SB-108	513.0	26	A05130	23.2	Castings
ASTM/ASME	B/SB-108	535.0	26	A05350	—	Castings
ASTM/ASME	B/SB-108	A356.0	26	A13560	24.2	Castings
ASTM/ASME	B/SB-108	A444.0	26	A14440	24.1	Castings
ASTM/ASME	B/SB-108	B443.0	26	A24430	24.1	Castings
ASTM/ASME	B/SB-111	—	31	C10100	31	Seamless Tube
ASTM/ASME	B/SB-111	—	31	C10200	31	Seamless Tube
ASTM/ASME	B/SB-111	—	31	C10300	31	Seamless Tube
ASTM/ASME	B/SB-111	—	31	C10800	31	Seamless Tube
ASTM/ASME	B/SB-111	—	31	C12000	31	Seamless Tube
ASTM/ASME	B/SB-111	—	31	C12200	31	Seamless Tube
ASTM/ASME	B/SB-111	—	31	C14200	31	Seamless Tube
ASTM/ASME	B/SB-111	—	31	C19200	31	Seamless Tube
ASTM/ASME	B/SB-111	—	32	C23000	32.1	Seamless Tube
ASTM/ASME	B/SB-111	—	32	C28000	32.1	Seamless Tube
ASTM/ASME	B/SB-111	—	32	C44300	32.2	Seamless Tube
ASTM/ASME	B/SB-111	—	32	C44400	32.2	Seamless Tube
ASTM/ASME	B/SB-111	—	32	C44500	32.2	Seamless Tube
ASTM/ASME	B/SB-111	—	35	C60800	35	Seamless Tube

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-111	—	35	C61300	35	Seamless Tube
ASTM/ASME	B/SB-111	—	35	C61400	35	Seamless Tube
ASTM/ASME	B/SB-111	—	32	C68700	32.2	Seamless Tube
ASTM/ASME	B/SB-111	—	34	C70400	34	Seamless Tube
ASTM/ASME	B/SB-111	—	34	C70600	34	Seamless Tube
ASTM/ASME	B/SB-111	—	34	C71000	34	Seamless Tube
ASTM/ASME	B/SB-111	—	34	C71500	34	Seamless Tube
ASTM/ASME	B/SB-111	—	34	C71640	34	Seamless Tube
ASTM/ASME	B/SB-111	—	34	C72200	34	Seamless Tube
ASTM/ASME	B/SB-127	—	42	N04400	42	Plate, Sheet, & Strip
ASTM/ASME	B/SB-135	—	32	C22000	32.1	Seamless Tube
ASTM/ASME	B/SB-135	—	32	C23000	32.1	Seamless Tube
ASTM/ASME	B/SB-148	—	35	C95200	35	Castings
ASTM/ASME	B/SB-148	—	35	C95300	35	Castings
ASTM/ASME	B/SB-148	—	35	C95400	35	Castings
ASTM/ASME	B/SB-148	—	35	C95410	35	Castings
ASTM/ASME	B/SB-148	—	35	C95500	35	Castings
ASTM/ASME	B/SB-148	—	35	C95600	35	Castings
ASTM/ASME	B/SB-148	—	35	C95700	35	Castings
ASTM/ASME	B/SB-148	—	35	C95800	35	Castings
ASTM/ASME	B/SB-150	—	35	C61300	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C61300	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C61300	35	Bar & Rod (Hex & Oct)
ASTM/ASME	B/SB-150	—	35	C61300	35	Bar & Rod (Hex & Oct)
ASTM/ASME	B/SB-150	—	35	C61300	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C61300	35	Bar & Rod (Hex & Oct)
ASTM/ASME	B/SB-150	—	35	C61300	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C61400	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C61400	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C61400	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C61400	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C61900	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C61900	35	Shapes
ASTM/ASME	B/SB-150	—	35	C61900	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C61900	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C61900	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C61900	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C61900	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C62300	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C62300	35	Shapes
ASTM/ASME	B/SB-150	—	35	C62300	35	Bar & Rod (Hex & Oct)
ASTM/ASME	B/SB-150	—	35	C62300	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C62300	35	Bar & Rod (Hex & Oct)
ASTM/ASME	B/SB-150	—	35	C62300	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C62300	35	Rod (Round)

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-150	—	35	C62300	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C62300	35	Bar & Rod (Hex & Oct)
ASTM/ASME	B/SB-150	—	35	C62400	35	Shapes
ASTM/ASME	B/SB-150	—	35	C62400	35	Bar & Rod (Hex & Oct)
ASTM/ASME	B/SB-150	—	35	C62400	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C62400	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C62400	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C62400	35	Rod (Round)
ASTM/ASME	B/SB-150	—	35	C63000	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C63000	35	Shapes
ASTM/ASME	B/SB-150	—	35	C63000	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C63000	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C63000	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C63020	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C63020	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C63020	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C63200	35	Bar, Rod, & Shapes
ASTM/ASME	B/SB-150	—	35	C64200	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C64200	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C64200	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C64200	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C64200	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C64200	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C64200	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C64200	35	Bar & Rod
ASTM/ASME	B/SB-150	—	35	C64200	35	Shapes
ASTM/ASME	B/SB-151	—	34	C70600	34	Rod & Bar
ASTM/ASME	B/SB-151	—	34	C71500	34	Sq Bar & Rod (Rnd, Hex, Oct)
ASTM/ASME	B/SB-151	—	34	C71500	34	Sq Bar & Rod (Rnd, Hex, Oct)
ASTM/ASME	B/SB-151	—	34	C71500	34	Sq Bar & Rod (Rnd, Hex, Oct)
ASTM/ASME	B/SB-151	—	34	C71500	34	Bar (Rect.) & Shapes
ASTM/ASME	B/SB-152	—	31	C10100	31	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-152	—	31	C10200	31	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-152	—	31	C10300	31	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-152	—	31	C10400	31	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-152	—	31	C10500	31	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-152	—	31	C10700	31	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-152	—	31	C10800	31	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-152	—	31	C11000	31	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-152	—	31	C12000	31	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-152	—	31	C12200	31	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-152	—	31	C12300	31	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-152	—	31	C14200	31	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-152	—	31	C14420	31	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-160	—	41	N02200	41	Rod & Bar
ASTM/ASME	B/SB-160	—	41	N02201	41	Rod & Bar

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-161	—	41	N02200	41	Seamless Pipe & Tube
ASTM/ASME	B/SB-161	—	41	N02201	41	Seamless Pipe & Tube
ASTM/ASME	B/SB-162	—	41	N02200	41	Plate, Sheet, & Strip
ASTM/ASME	B/SB-162	—	41	N02201	41	Plate, Sheet, & Strip
ASTM/ASME	B/SB-163	—	41	N02200	41	Seamless Tube
ASTM/ASME	B/SB-163	—	41	N02201	41	Seamless Tube
ASTM/ASME	B/SB-163	—	42	N04400	42	Seamless Tube
ASTM/ASME	B/SB-163	—	43	N06025	43	Seamless Tube
ASTM/ASME	B/SB-163	—	46	N06045	45	Seamless Tube
ASTM/ASME	B/SB-163	—	43	N06600	43	Seamless Tube
ASTM/ASME	B/SB-163	—	43	N06601	43	Seamless Tube
ASTM/ASME	B/SB-163	—	43	N06690	43	Seamless Tube
ASTM/ASME	B/SB-163	—	45	N08120	45	Seamless Tube
ASTM/ASME	B/SB-163	—	45	N08800	45	Seamless Tube
ASTM/ASME	B/SB-163	—	45	N08801	45	Seamless Tube
ASTM/ASME	B/SB-163	—	45	N08810	45	Seamless Tube
ASTM/ASME	B/SB-163	—	45	N08811	45	Seamless Tube
ASTM/ASME	B/SB-163	—	45	N08825	45	Seamless Tube
ASTM/ASME	B/SB-164	—	42	N04400	42	Rod, Bar, & Wire
ASTM/ASME	B/SB-164	—	42	N04405	42	Rod, Bar, & Wire
ASTM/ASME	B/SB-165	—	42	N04400	42	Seamless Pipe & Tube
ASTM/ASME	B/SB-166	—	43	N06025	43	Rod, Bar, & Wire
ASTM/ASME	B/SB-166	—	46	N06045	45	Rod, Bar, & Wire
ASTM/ASME	B/SB-166	—	43	N06600	43	Rod, Bar, & Wire
ASTM/ASME	B/SB-166	—	43	N06601	43	Rod, Bar, & Wire
ASTM/ASME	B/SB-166	—	43	N06617	46	Rod, Bar, & Wire
ASTM/ASME	B/SB-166	—	43	N06690	43	Rod, Bar, & Wire
ASTM/ASME	B/SB-167	—	43	N06025	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-167	—	46	N06045	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-167	—	43	N06600	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-167	—	43	N06601	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-167	—	43	N06617	46	Seamless Pipe & Tube
ASTM/ASME	B/SB-167	—	43	N06690	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-168	—	43	N06025	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-168	—	46	N06045	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-168	—	43	N06600	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-168	—	43	N06601	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-168	—	43	N06617	46	Plate, Sheet, & Strip
ASTM/ASME	B/SB-168	—	43	N06690	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-169	—	35	C61300	35	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-169	—	35	C61300	35	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-169	—	35	C61300	35	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-169	—	35	C61400	35	Plate, Sheet, Strip, & Bar
ASTM/ASME	B/SB-169	—	35	C61400	35	Plate, Sheet, Strip, & Bar

(Continued)



**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-169	—	35	C61400	35	Plate, Sheet, Strip, & Bar
ASTM	B170	1	31	C10100	31	Shapes
ASTM	B170	2	31	C10200	31	Shapes
ASTM/ASME	B/SB-171	—	32	C44300	32.2	Plate & Sheet
ASTM/ASME	B/SB-171	—	32	C44400	32.2	Plate & Sheet
ASTM/ASME	B/SB-171	—	32	C44500	32.2	Plate & Sheet
ASTM/ASME	B/SB-171	—	32	C46400	32.2	Plate & Sheet
ASTM/ASME	B/SB-171	—	32	C46500	32.2	Plate & Sheet
ASTM/ASME	B/SB-171	—	35	C61300	35	Plate & Sheet
ASTM/ASME	B/SB-171	—	35	C61300	35	Plate & Sheet
ASTM/ASME	B/SB-171	—	35	C61300	35	Plate & Sheet
ASTM/ASME	B/SB-171	—	35	C61400	35	Plate & Sheet
ASTM/ASME	B/SB-171	—	35	C61400	35	Plate & Sheet
ASTM/ASME	B/SB-171	—	35	C63000	35	Plate & Sheet
ASTM/ASME	B/SB-171	—	35	C63000	35	Plate & Sheet
ASTM/ASME	B/SB-171	—	35	C63000	35	Plate & Sheet
ASTM/ASME	B/SB-171	—	35	C63200	35	Plate & Sheet
ASTM/ASME	B/SB-171	—	35	C63200	35	Plate & Sheet
ASTM/ASME	B/SB-171	—	35	C63200	35	Plate & Sheet
ASTM/ASME	B/SB-171	—	35	C63200	35	Plate & Sheet
ASTM/ASME	B/SB-171	—	34	C70600	34	Plate & Sheet
ASTM/ASME	B/SB-171	—	34	C71500	34	Plate & Sheet
ASTM/ASME	B/SB-171	—	34	C71500	34	Plate & Sheet
ASTM/ASME	B/SB-171	—	34	C72200	34	Plate & Sheet
ASTM	A182	F904L	45	N08904	8.2	Forgings
ASTM/ASME	B/SB-187	—	31	C10100	31	Rod & Bar
ASTM/ASME	B/SB-187	—	31	C10200	31	Rod & Bar
ASTM/ASME	B/SB-187	—	31	C10300	31	Rod & Bar
ASTM/ASME	B/SB-187	—	31	C10400	31	Rod & Bar
ASTM/ASME	B/SB-187	—	31	C10700	31	Rod & Bar
ASTM/ASME	B/SB-187	—	31	C10940	31	Rod & Bar
ASTM/ASME	B/SB-187	—	31	C11000	31	Rod & Bar
ASTM/ASME	B/SB-187	—	31	C14420	31	Rod & Bar
ASTM	B199	AM100A	83	M10100	—	Castings
ASTM	B199	AZ91C, F	83	M11914	—	Castings
ASTM	B199	AZ92A, F	83	M11920	—	Castings
ASTM/ASME	B/SB-209	1060	21	A91060	21	Plate & Sheet
ASTM/ASME	B/SB-209	1100	21	A91100	21	Plate & Sheet
ASTM/ASME	B/SB-209	2014	24	A92014	26	Plate & Sheet
ASTM/ASME	B/SB-209	2219	24	A92219	26	Plate & Sheet
ASTM/ASME	B/SB-209	3003	21	A93003	22.1	Plate & Sheet
ASTM/ASME	B/SB-209	3004	22	A93004	22.2	Plate & Sheet
ASTM/ASME	B/SB-209	3005	22	A93005	22.2	Plate & Sheet
ASTM/ASME	B/SB-209	3105	22	A93105	22.2	Plate & Sheet
ASTM/ASME	B/SB-209	5005	22	A95005	22.2	Plate & Sheet

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-209	5010	22	A95010	22.2	Plate & Sheet
ASTM/ASME	B/SB-209	5050	21	A95050	22.2	Plate & Sheet
ASTM/ASME	B/SB-209	5052	22	A95052	22.3	Plate & Sheet
ASTM/ASME	B/SB-209	5083	25	A95083	22.4	Plate & Sheet
ASTM/ASME	B/SB-209	5083	25	A95083	22.4	Plate & Sheet
ASTM/ASME	B/SB-209	5083	25	A95083	22.4	Plate & Sheet
ASTM/ASME	B/SB-209	5083	25	A95083	22.4	Plate & Sheet
ASTM/ASME	B/SB-209	5083	25	A95083	22.4	Plate & Sheet
ASTM/ASME	B/SB-209	5083	25	A95083	22.4	Plate & Sheet
ASTM/ASME	B/SB-209	5086	25	A95086	22.4	Plate & Sheet
ASTM/ASME	B/SB-209	5154	22	A95154	22.4	Plate & Sheet
ASTM/ASME	B/SB-209	5252	22	A95252	22.3	Plate & Sheet
ASTM/ASME	B/SB-209	5254	22	A95254	22.4	Plate & Sheet
ASTM/ASME	B/SB-209	5454	22	A95454	22.3	Plate & Sheet
ASTM/ASME	B/SB-209	5456	25	A95456	22.4	Plate & Sheet
ASTM/ASME	B/SB-209	5456	25	A95456	22.4	Plate & Sheet
ASTM/ASME	B/SB-209	5456	25	A95456	22.4	Plate & Sheet
ASTM/ASME	B/SB-209	5456	25	A95456	22.4	Plate & Sheet
ASTM/ASME	B/SB-209	5456	25	A95456	22.4	Plate & Sheet
ASTM/ASME	B/SB-209	5456	25	A95456	22.4	Plate & Sheet
ASTM/ASME	B/SB-209	5457	22	A95457	22.2	Plate & Sheet
ASTM/ASME	B/SB-209	5652	22	A95652	22.3	Plate & Sheet
ASTM/ASME	B/SB-209	6061	23	A96061	23.1	Plate & Sheet
ASTM/ASME	B/SB-209	Alclad 2014	24	A82014	—	Plate & Sheet
ASTM/ASME	B/SB-209	Alclad 2219	24	A82219	—	Plate & Sheet
ASTM/ASME	B/SB-209	Alclad 3003	21	—	—	Plate & Sheet
ASTM/ASME	B/SB-209	Alclad 3003	21	—	—	Plate & Sheet
ASTM/ASME	B/SB-209	Alclad 3003	21	A83003	—	Plate & Sheet
ASTM/ASME	B/SB-209	Alclad 3003	21	A83003	—	Plate & Sheet
ASTM/ASME	B/SB-209	Alclad 3004	22	—	—	Plate & Sheet
ASTM/ASME	B/SB-209	Alclad 3004	22	—	—	Plate & Sheet
ASTM/ASME	B/SB-209	Alclad 3004	22	—	—	Plate & Sheet
ASTM/ASME	B/SB-209	Alclad 3004	22	—	—	Plate & Sheet
ASTM/ASME	B/SB-209	Alclad 6061	23	—	—	Plate & Sheet
ASTM/ASME	B/SB-209	Alclad 6061	23	A86061	—	Plate & Sheet
ASTM/ASME	B/SB-209	Alclad 6061	23	A86061	—	Plate & Sheet
ASTM/ASME	B/SB-210	1060	21	A91060	21	Seamless Tube
ASTM	B210	1100	21	A91100	21	Seamless Tube
ASTM	B210	2014	24	A92014	26	Seamless Tube
ASTM/ASME	B/SB-210	3003	21	A93003	22.1	Seamless Tube
ASTM	B210	3102	21	A93102	22.1	Seamless Tube
ASTM	B210	3303	21	A93303	—	Seamless Tube
ASTM	B210	5005	22	A95005	22.2	Seamless Tube
ASTM	B210	5050	21	A95050	22.2	Seamless Tube
ASTM/ASME	B/SB-210	5052	22	A95052	22.3	Seamless Tube
ASTM	B210	5083	25	A95083	22.4	Seamless Tube

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM	B210	5086	25	A95086	22.4	Seamless Tube
ASTM/ASME	B/SB-210	5154	22	A95154	22.4	Seamless Tube
ASTM	B210	5456	25	A95456	22.4	Seamless Tube
ASTM/ASME	B/SB-210	6061	23	A96061	23.1	Seamless Tube
ASTM/ASME	B/SB-210	6063	23	A96063	23.1	Seamless Tube
ASTM/ASME	B/SB-210	Alclad 3003	21	—	—	Seamless Tube
ASTM	B210	Alclad 3003	21	A83003	—	Seamless Tube
ASTM	B210	Alclad 3102	21	—	—	Seamless Tube
ASTM	B210	Alclad 3303	21	—	—	Seamless Tube
ASTM/ASME	B/SB-211	1060	21	A91060	21	Bar, Rod, & Wire
ASTM/ASME	B/SB-211	1100	21	A91100	21	Bar, Rod, & Wire
ASTM/ASME	B/SB-211	2014	24	A92014	26	Bar, Rod, & Wire
ASTM/ASME	B/SB-211	2219	24	A92219	26	Bar, Rod, & Wire
ASTM/ASME	B/SB-211	3003	21	A93003	22.1	Bar, Rod, & Wire
ASTM/ASME	B/SB-211	5052	22	A95052	22.3	Bar, Rod, & Wire
ASTM/ASME	B/SB-211	5056	25	A95056	22.4	Bar, Rod, & Wire
ASTM/ASME	B/SB-211	5154	22	A95154	22.4	Bar, Rod, & Wire
ASTM/ASME	B/SB-211	6061	23	A96061	23.1	Bar, Rod, & Wire
ASTM/ASME	B/SB-211	Alclad 5056	25	—	—	Bar, Rod, & Wire
ASTM/ASME	B/SB-221	1060	21	A91060	21	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	1100	21	A91100	21	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	2014	24	A92014	26	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	2219	24	A92219	26	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	3003	21	A93003	22.1	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	3004	22	A93004	22.2	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	3102	21	A93102	22.1	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	5052	22	A95052	22.3	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	5083	25	A95083	22.4	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	5086	25	A95086	22.4	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	5154	22	A95154	22.4	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	5454	22	A95454	22.3	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	5456	25	A95456	22.4	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	6005	23	A96005	23.1	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	6005A	23	A96005	23.1	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	6061	23	A96061	23.1	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	6063	23	A96063	23.1	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	6105	23	A96105	23.1	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	6162	23	A96162	23.1	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	6351	23	A96351	23.1	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	6463	23	A96463	23.1	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	7005	27	A97005	23.2	Bar, Rod, & Shapes
ASTM/ASME	B/SB-221	Alclad 3003	21	A83003	—	Bar, Rod, & Shapes
ASTM	B230	1350	21	A91350	21	Wire
ASTM/ASME	B/SB-234	1060	21	A91060	21	Seamless Tube

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-234	3003	21	A93003	22.1	Seamless Tube
ASTM/ASME	B/SB-234	5052	22	A95052	22.3	Seamless Tube
ASTM/ASME	B/SB-234	5454	22	A95454	22.3	Seamless Tube
ASTM/ASME	B/SB-234	6061	23	A96061	23.1	Seamless Tube
ASTM/ASME	B/SB-234	Alclad 3003	21	—	—	Seamless Tube
ASTM/ASME	B/SB-234	Alclad 3003	21	A83003	—	Seamless Tube
ASTM	B236	1350	21	A91350	21	Bar
ASTM	A240	—	45	N08367	8.2	Sheet & Strip
ASTM	A240	—	45	N08367	8.2	Plate
ASTM	A240	904L	45	N08904	8.2	Plate, Sheet, & Strip
ASTM/ASME	B/SB-241	1060	21	A91060	21	Seamless Pipe & Tube
ASTM/ASME	B/SB-241	1100	21	A91100	21	Seamless Pipe & Tube
ASTM/ASME	B/SB-241	2014	24	A92014	26	Seamless Pipe & Tube
ASTM/ASME	B/SB-241	2219	24	A92219	26	Seamless Pipe & Tube
ASTM/ASME	B/SB-241	3003	21	A93003	22.1	Seamless Pipe & Tube
ASTM/ASME	B/SB-241	5052	22	A95052	22.3	Seamless Pipe & Tube
ASTM/ASME	B/SB-241	5083	25	A95083	22.4	Seamless Pipe & Tube
ASTM/ASME	B/SB-241	5086	25	A95086	22.4	Seamless Pipe & Tube
ASTM/ASME	B/SB-241	5454	22	A95454	22.3	Seamless Pipe & Tube
ASTM/ASME	B/SB-241	5456	25	A95456	22.4	Seamless Pipe & Tube
ASTM/ASME	B/SB-241	6061	23	A96061	23.1	Seamless Pipe & Tube
ASTM/ASME	B/SB-241	6063	23	A96063	23.1	Seamless Pipe & Tube
ASTM/ASME	B/SB-241	6162	23	A96162	23.1	Seamless Pipe & Tube
ASTM/ASME	B/SB-241	6351	23	A96351	23.1	Seamless Pipe & Tube
ASTM/ASME	B/SB-241	Alclad 3003	21	—	—	Seamless Pipe & Tube
ASTM/ASME	B/SB-241	Alclad 3003	21	A83003	—	Seamless Pipe & Tube
ASTM/ASME	B/SB-247	1100	21	A91100	21	Forgings
ASTM/ASME	B/SB-247	2014	24	A92014	26	Forgings
ASTM/ASME	B/SB-247	2219	24	A92219	26	Forgings
ASTM/ASME	B/SB-247	3003	21	A93003	22.1	Forgings
ASTM/ASME	B/SB-247	5083	25	A95083	22.4	Forgings
ASTM/ASME	B/SB-247	6061	23	A96061	23.1	Forgings
ASTM/ASME	B/SB-247	6151	23	A96151	23.1	Forgings
ASTM	A249	—	45	N08367	8.2	Welded Tube
ASTM	A249	—	45	N08367	8.2	Welded Tube
ASTM/ASME	A/SA-249	—	45	N08904	8.2	Welded Tube
ASTM/ASME	B/SB-265	1	51	R50250	51	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	11	51	R52250	51	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	12	52	R53400	52	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	13	51	R53413	52	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	14	52	R53414	52	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	15	52	R53415	52	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	16	51	R52402	51	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	16H	51	R52402	51	Plate, Sheet, & Strip

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-265	17	51	R52252	51	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	18	53	R56322	53	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	19	53	R58640	54	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	2	51	R50400	51	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	20	53	R58645	54	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	21	53	R58210	54	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	24	54	R56405	53	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	25	54	R56403	53	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	26	51	R52404	51	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	26H	51	R52404	51	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	27	51	R52254	51	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	28	53	R56323	53	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	29	54	R56404	53	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	2H	51	R50400	51	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	3	52	R50550	52	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	30	51	R53530	52	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	31	52	R53532	52	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	32	53	R55111	52	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	33	51	R53442	54	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	34	52	R53445	54	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	35	54	R56340	53	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	4	53	R50700	51.4	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	5	54	R56400	53	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	6	54	R54520	52	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	7	51	R52400	51	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	7H	51	R52400	51	Plate, Sheet, & Strip
ASTM/ASME	B/SB-265	9	53	R56320	53	Plate, Sheet, & Strip
ASTM/ASME	B/SB-271	—	35	C95200	35	Castings
ASTM/ASME	B/SB-271	—	35	C95300	35	Castings
ASTM/ASME	B/SB-271	—	35	C95400	35	Castings
ASTM/ASME	B/SB-271	—	35	C95410	35	Castings
ASTM/ASME	B/SB-271	—	35	C95500	35	Castings
ASTM	B280	102	31	C10200	31	Seamless Tube
ASTM	B280	120	31	C12000	31	Seamless Tube
ASTM	B280	122	31	C12200	31	Seamless Tube
ASTM/ASME	B/SB-283	—	35	C64200	35	Forgings
ASTM/ASME	B/SB-283	—	35	C64200	35	Forgings
ASTM/ASME	B/SB-283	—	33	C65500	31	Forgings
ASTM	B302	—	31	C12000	31	Pipe
ASTM	B302	—	31	C12200	31	Pipe
ASTM/ASME	B/SB-308	6061	23	A96061	23.1	Shapes
ASTM	A312	—	45	N08904	8.2	Seamless & Welded Pipe
ASTM	A312	N08367	45	N08367	8.2	Seamless & Welded Pipe
ASTM	A312	N08367	45	N08367	8.2	Seamless & Welded Pipe

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM	B313	1100	21	A91100	21	Welded Tube
ASTM	B313	3003	21	A93003	22.1	Welded Tube
ASTM	B313	3004	22	A93004	22.2	Welded Tube
ASTM	B313	3005	22	A93005	22.2	Welded Tube
ASTM	B313	5050	21	A95050	22.2	Welded Tube
ASTM	B313	5052	22	A95052	22.3	Welded Tube
ASTM	B313	5086	25	A95086	22.4	Welded Tube
ASTM	B313	5154	22	A95154	22.4	Welded Tube
ASTM	B313	6061	23	A96061	23.1	Welded Tube
ASTM	B313	Alclad 3004	22	—	—	Welded Tube
ASTM/ASME	B/SB-315	—	35	C61300	35	Seamless Pipe & Tube
ASTM/ASME	B/SB-315	—	35	C61400	35	Seamless Pipe & Tube
ASTM/ASME	B/SB-315	—	33	C65100	37	Seamless Pipe & Tube
ASTM/ASME	B/SB-315	—	33	C65500	33	Seamless Pipe & Tube
ASTM	B317	6101	23	A96101	23.1	Bar, Rod, Shapes, & Tube
ASTM	B324	1350	21	A91350	21	Wire
ASTM/ASME	B/SB-333	—	44	N10001	44	Plate, Sheet, & Strip
ASTM/ASME	B/SB-333	—	44	N10001	44	Plate, Sheet, & Strip
ASTM/ASME	B/SB-333	—	44	N10624	44	Plate, Sheet, & Strip
ASTM/ASME	B/SB-333	—	44	N10629	44	Plate, Sheet, & Strip
ASTM/ASME	B/SB-333	—	44	N10665	44	Plate, Sheet, & Strip
ASTM/ASME	B/SB-333	—	44	N10675	44	Plate, Sheet, & Strip
ASTM/ASME	B/SB-335	—	44	N10001	44	Rod
ASTM/ASME	B/SB-335	—	44	N10001	44	Rod
ASTM/ASME	B/SB-335	—	44	N10624	44	Rod
ASTM/ASME	B/SB-335	—	44	N10629	44	Rod
ASTM/ASME	B/SB-335	—	44	N10665	44	Rod
ASTM/ASME	B/SB-335	—	44	N10675	44	Rod
ASTM	B337	1	51	R50250	51	Seamless & Welded Pipe
ASTM	B337	11	51	R52250	51	Seamless & Welded Pipe
ASTM	B337	12	52	R53400	52	Seamless & Welded Pipe
ASTM	B337	2	51	R50400	51	Seamless & Welded Pipe
ASTM	B337	3	52	R50550	52	Seamless & Welded Pipe
ASTM	B337	7	51	R52400	51	Seamless & Welded Pipe
ASTM	B337	9	53	R56320	53	Seamless & Welded Pipe
ASTM/ASME	B/SB-338	1	51	R50250	51	Seamless & Welded Tube
ASTM/ASME	B/SB-338	11	51	R52250	51	Seamless & Welded Tube
ASTM/ASME	B/SB-338	12	52	R53400	52	Seamless & Welded Tube
ASTM/ASME	B/SB-338	13	51	R53413	52	Seamless & Welded Tube
ASTM/ASME	B/SB-338	14	52	R53414	52	Seamless & Welded Tube
ASTM/ASME	B/SB-338	15	52	R53415	52	Seamless & Welded Tube
ASTM/ASME	B/SB-338	16	51	R52402	51	Seamless & Welded Tube
ASTM/ASME	B/SB-338	16H	51	R52402	51	Seamless & Welded Tube
ASTM/ASME	B/SB-338	17	51	R52252	51	Seamless & Welded Tube

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-338	18	53	R56322	53	Seamless & Welded Tube
ASTM/ASME	B/SB-338	2	51	R50400	51	Seamless & Welded Tube
ASTM/ASME	B/SB-338	26	51	R52404	51	Seamless & Welded Tube
ASTM/ASME	B/SB-338	26H	51	R52404	51	Seamless & Welded Tube
ASTM/ASME	B/SB-338	27	51	R52254	51	Seamless & Welded Tube
ASTM/ASME	B/SB-338	28	53	R56323	53	Seamless & Welded Tube
ASTM/ASME	B/SB-338	2H	51	R50400	51	Seamless & Welded Tube
ASTM/ASME	B/SB-338	3	52	R50550	52	Seamless & Welded Tube
ASTM/ASME	B/SB-338	30	51	R53530	52	Seamless & Welded Tube
ASTM/ASME	B/SB-338	31	52	R53532	52	Seamless & Welded Tube
ASTM/ASME	B/SB-338	33	51	R53442	54	Seamless & Welded Tube
ASTM/ASME	B/SB-338	34	52	R53445	54	Seamless & Welded Tube
ASTM/ASME	B/SB-338	35	54	R56340	53	Seamless & Welded Tube
ASTM/ASME	B/SB-338	7	51	R52400	51	Seamless & Welded Tube
ASTM/ASME	B/SB-338	7H	51	R52400	51	Seamless & Welded Tube
ASTM/ASME	B/SB-338	9	53	R56320	53	Seamless & Welded Tube
ASTM	B345	1060	21	A91060	21	Seamless Pipe & Tube
ASTM	B345	3003	21	A93003	22.1	Seamless Pipe & Tube
ASTM	B345	5083	25	A95083	22.4	Seamless Pipe & Tube
ASTM	B345	5086	25	A95086	22.4	Seamless Pipe & Tube
ASTM	B345	6061	23	A96061	23.1	Seamless Pipe & Tube
ASTM	B345	6063	23	A96063	23.1	Seamless Pipe & Tube
ASTM	B345	6351	23	A96351	23.1	Seamless Pipe & Tube
ASTM	B345	Alclad 3003	21	A83003	—	Seamless Pipe & Tube
ASTM/ASME	B/SB-348	1	51	R50250	51	Bars & Billets
ASTM/ASME	B/SB-348	11	51	R52250	51	Bars & Billets
ASTM/ASME	B/SB-348	12	52	R53400	52	Bars & Billets
ASTM/ASME	B/SB-348	13	51	R53413	52	Bars & Billets
ASTM/ASME	B/SB-348	14	52	R53414	52	Bars & Billets
ASTM/ASME	B/SB-348	15	52	R53415	52	Bars & Billets
ASTM/ASME	B/SB-348	16	51	R52402	51	Bars & Billets
ASTM/ASME	B/SB-348	16H	51	R52402	51	Bars & Billets
ASTM/ASME	B/SB-348	17	51	R52252	51	Bars & Billets
ASTM/ASME	B/SB-348	18	53	R56322	53	Bars & Billets
ASTM/ASME	B/SB-348	19	53	R58640	54	Bars & Billets
ASTM/ASME	B/SB-348	2	51	R50400	51	Bars & Billets
ASTM/ASME	B/SB-348	20	53	R58645	54	Bars & Billets
ASTM/ASME	B/SB-348	21	53	R58210	54	Bars & Billets
ASTM/ASME	B/SB-348	23	54	R56407	53	Bars & Billets
ASTM/ASME	B/SB-348	24	54	R56405	53	Bars & Billets
ASTM/ASME	B/SB-348	25	54	R56403	53	Bars & Billets
ASTM/ASME	B/SB-348	26	51	R52404	51	Bars & Billets
ASTM/ASME	B/SB-348	26H	51	R52404	51	Bars & Billets
ASTM/ASME	B/SB-348	28	53	R56323	53	Bars & Billets

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-348	2H	51	R50400	51	Bars & Billets
ASTM/ASME	B/SB-348	3	52	R50550	52	Bars & Billets
ASTM/ASME	B/SB-348	30	51	R53530	52	Bars & Billets
ASTM/ASME	B/SB-348	31	52	R53532	52	Bars & Billets
ASTM/ASME	B/SB-348	32	53	R55111	52	Bars & Billets
ASTM/ASME	B/SB-348	33	51	R53442	54	Bars & Billets
ASTM/ASME	B/SB-348	34	52	R53445	54	Bars & Billets
ASTM/ASME	B/SB-348	35	54	R56340	53	Bars & Billets
ASTM/ASME	B/SB-348	4	53	R50700	51.4	Bars & Billets
ASTM/ASME	B/SB-348	5	54	R56400	53	Bars & Billets
ASTM/ASME	B/SB-348	6	54	R54520	52	Bars & Billets
ASTM/ASME	B/SB-348	7	51	R52400	51	Bars & Billets
ASTM/ASME	B/SB-348	7H	51	R52400	51	Bars & Billets
ASTM/ASME	B/SB-348	9	53	R56320	53	Bars & Billets
ASTM/ASME	A/SA-351	CN7M	45	N08007	8.2	Castings
ASTM/ASME	A/SA-351	CT15C	45	N08151	45	Castings
ASTM	B351	R60001	61	R60001	61	Bar, Rod, & Wire
ASTM	B351	R60802	61	R60802	61	Bar, Rod, & Wire
ASTM	B351	R60804	61	R60804	61	Bar, Rod, & Wire
ASTM	B351	R60901	62	R60901	62	Bar, Rod, & Wire
ASTM	B353	R60001	61	R60001	61	Plate, Sheet, & Strip
ASTM	B352	R60802	61	R60802	61	Plate, Sheet, & Strip
ASTM	B352	R60804	61	R60804	61	Sheet & Strip
ASTM	B352	R60804	61	R60804	61	Plate
ASTM	B352	R60901	62	R60901	62	Plate, Sheet, & Strip
ASTM	B353	R60001	61	R60001	61	Seamless & Welded Tube
ASTM	B353	R60802	61	R60802	61	Seamless & Welded Tube
ASTM	B353	R60804	61	R60804	61	Seamless & Welded Tube
ASTM	B353	R60901	62	R60901	62	Seamless & Welded Tube
ASTM	B353	R60904	62	R60904	62	Seamless & Welded Tube
ASTM	A358	N08367	45	N08367	8.2	Fusion Welded Pipe
ASTM	A358	N08367	45	N08367	8.2	Fusion Welded Pipe
ASTM	B359	—	31	C10100	31	Seamless Tube
ASTM	B359	—	31	C10200	31	Seamless Tube
ASTM	B359	—	31	C10300	31	Seamless Tube
ASTM	B359	—	31	C10800	31	Seamless Tube
ASTM	B359	—	31	C12000	31	Seamless Tube
ASTM/ASME	B/SB-359	—	31	C12200	31	Seamless Tube
ASTM	B359	—	31	C14200	31	Seamless Tube
ASTM	B359	—	31	C19200	31	Seamless Tube
ASTM	B359	—	32	C23000	32.1	Seamless Tube
ASTM/ASME	B/SB-359	—	32	C44300	32.2	Seamless Tube
ASTM/ASME	B/SB-359	—	32	C44400	32.2	Seamless Tube
ASTM/ASME	B/SB-359	—	32	C44500	32.2	Seamless Tube

(Continued)



**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM	B359	—	35	C60800	35	Seamless Tube
ASTM	B359	—	32	C68700	32.2	Seamless Tube
ASTM	B359	—	34	C70400	34	Seamless Tube
ASTM/ASME	B/SB-359	—	34	C70600	34	Seamless Tube
ASTM/ASME	B/SB-359	—	34	C71000	34	Seamless Tube
ASTM/ASME	B/SB-359	—	34	C71500	34	Seamless Tube
ASTM	B359	—	34	C72200	34	Seamless Tube
ASTM	B361	5083	25	A95083	22.4	Fittings
ASTM	B361	5154	22	A95154	22.3	Fittings
ASTM	B361	WP Alclad 3003	21	A83003	—	Fittings
ASTM	B361	WP1060	21	A91060	21	Fittings
ASTM	B361	WP1100	21	A91100	21	Fittings
ASTM	B361	WP3003	21	A93003	22.1	Fittings
ASTM	B361	WP6061	23	A96061	23.1	Fittings
ASTM	B361	WP6063	23	A96063	23.1	Fittings
ASTM/ASME	B/SB-363	WPT 1	51	R50250	51	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 11	51	R52250	51	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 12	52	R53400	52	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 13	51	R53413	52	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 14	52	R53414	52	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 15	52	R53415	52	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 16	51	R52402	51	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 16H	51	R52402	51	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 17	51	R52252	51	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 18	53	R56322	53	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 19	53	R58640	54	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 2	51	R50400	51	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 20	53	R58645	54	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 21	53	R58210	54	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 23	54	R56407	53	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 24	54	R56405	53	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 25	54	R56403	53	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 26	51	R52404	51	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 26H	51	R52404	51	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 28	53	R56323	53	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 3	52	R50550	52	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 30	51	R53530	52	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 7	51	R52400	51	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 7H	51	R52400	51	Seamless & Welded Fittings
ASTM/ASME	B/SB-363	WPT 9	53	R56320	53	Seamless & Welded Fittings
ASTM/ASME	B/SB-366	—	41	N02200	41	Fittings
ASTM/ASME	B/SB-366	—	41	N02201	41	Fittings
ASTM/ASME	B/SB-366	—	42	N04400	42	Fittings
ASTM/ASME	B/SB-366	—	43	N06002	43	Fittings

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-366	—	45	N06007	43	Fittings
ASTM/ASME	B/SB-366	—	43	N06022	44	Fittings
ASTM/ASME	B/SB-366	—	43	N06025	43	Fittings
ASTM/ASME	B/SB-366	—	45	N06030	45	Fittings
ASTM/ASME	B/SB-366	—	43	N06035	43	Fittings
ASTM/ASME	B/SB-366	—	46	N06045	45	Fittings
ASTM/ASME	B/SB-366	—	43	N06059	43	Fittings
ASTM/ASME	B/SB-366	—	43	N06200	43	Fittings
ASTM/ASME	B/SB-366	—	43	N06210	43	Fittings
ASTM/ASME	B/SB-366	—	43	N06230	43	Fittings
ASTM/ASME	B/SB-366	—	43	N06455	43	Fittings
ASTM/ASME	B/SB-366	—	43	N06600	43	Fittings
ASTM/ASME	B/SB-366	—	43	N06603	43	Fittings
ASTM/ASME	B/SB-366	—	43	N06625	43	Fittings
ASTM/ASME	B/SB-366	—	45	N06985	45	Fittings
ASTM/ASME	B/SB-366	—	45	N08020	45	Fittings
ASTM/ASME	B/SB-366	—	45	N08031	45	Fittings
ASTM/ASME	B/SB-366	—	45	N08120	45	Fittings
ASTM/ASME	B/SB-366	—	46	N08330	45	Fittings
ASTM/ASME	B/SB-366	—	45	N08367	8.2	Fittings
ASTM/ASME	B/SB-366	—	45	N08367	8.2	Fittings
ASTM/ASME	B/SB-366	—	45	N08800	45	Fittings
ASTM/ASME	B/SB-366	—	45	N08810	45	Fittings
ASTM/ASME	B/SB-366	—	45	N08811	45	Fittings
ASTM/ASME	B/SB-366	—	45	N08825	45	Fittings
ASTM/ASME	B/SB-366	—	45	N08904	8.2	Fittings
ASTM/ASME	B/SB-366	—	45	N08925	8.2	Fittings
ASTM/ASME	B/SB-366	—	45	N08926	8.2	Fittings
ASTM/ASME	B/SB-366	—	44	N10001	44	Fittings
ASTM/ASME	B/SB-366	—	44	N10003	44	Fittings
ASTM/ASME	B/SB-366	—	44	N10242	44	Fittings
ASTM/ASME	B/SB-366	—	43	N10276	43	Fittings
ASTM/ASME	B/SB-366	—	44	N10624	44	Fittings
ASTM/ASME	B/SB-366	—	44	N10629	44	Fittings
ASTM/ASME	B/SB-366	—	44	N10665	44	Fittings
ASTM/ASME	B/SB-366	—	44	N10675	44	Fittings
ASTM/ASME	B/SB-366	—	46	N12160	46	Fittings
ASTM/ASME	B/SB-366	—	45	R20033	45	Fittings
ASTM/ASME	B/SB-366	—	45	R30556	45	Fittings
ASTM/ASME	B/SB-367	C-16	51	R52402	51	Castings
ASTM/ASME	B/SB-367	C-17	51	R52252	51	Castings
ASTM/ASME	B/SB-367	C-2	51	R50400	51	Castings
ASTM/ASME	B/SB-367	C-3	52	R50550	52	Castings
ASTM/ASME	B/SB-367	C-5	54	R56400	53	Castings

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-367	C-6	54	R54520	52	Castings
ASTM/ASME	B/SB-367	C-7	51	—	51	Castings
ASTM/ASME	B/SB-367	C-8	52	—	52	Castings
ASTM/ASME	B/SB-369	—	34	C96200	34	Castings
ASTM/ASME	B/SB-381	F-1	51	R50250	51	Forgings
ASTM/ASME	B/SB-381	F-11	51	R52250	51	Forgings
ASTM/ASME	B/SB-381	F-12	52	R53400	52	Forgings
ASTM/ASME	B/SB-381	F-13	51	R53413	52	Forgings
ASTM/ASME	B/SB-381	F-14	52	R53414	52	Forgings
ASTM/ASME	B/SB-381	F-15	52	R53415	52	Forgings
ASTM/ASME	B/SB-381	F-16	51	R52402	51	Forgings
ASTM/ASME	B/SB-381	F-16H	51	R52402	51	Forgings
ASTM/ASME	B/SB-381	F-17	51	R52252	51	Forgings
ASTM/ASME	B/SB-381	F-18	53	R56322	53	Forgings
ASTM/ASME	B/SB-381	F-19	53	R58640	54	Forgings
ASTM/ASME	B/SB-381	F-2	51	R50400	51	Forgings
ASTM/ASME	B/SB-381	F-20	53	R58645	54	Forgings
ASTM/ASME	B/SB-381	F-21	53	R58210	54	Forgings
ASTM/ASME	B/SB-381	F-23	54	R56407	53	Forgings
ASTM/ASME	B/SB-381	F-24	54	R56405	53	Forgings
ASTM/ASME	B/SB-381	F-25	54	R56403	53	Forgings
ASTM/ASME	B/SB-381	F-26	51	R52404	51	Forgings
ASTM/ASME	B/SB-381	F-26H	51	R52404	51	Forgings
ASTM/ASME	B/SB-381	F-28	53	R56323	53	Forgings
ASTM/ASME	B/SB-381	F-2H	51	R50400	51	Forgings
ASTM/ASME	B/SB-381	F-3	52	R50550	52	Forgings
ASTM/ASME	B/SB-381	F-30	51	R53530	52	Forgings
ASTM/ASME	B/SB-381	F-31	52	R53532	52	Forgings
ASTM/ASME	B/SB-381	F-4	53	R50700	51.4	Forgings
ASTM/ASME	B/SB-381	F-5	54	R56400	53	Forgings
ASTM/ASME	B/SB-381	F-6	54	R54520	52	Forgings
ASTM/ASME	B/SB-381	F-7	51	R52400	51	Forgings
ASTM/ASME	B/SB-381	F-7H	51	R52400	51	Forgings
ASTM/ASME	B/SB-381	F-9	53	R56320	53	Forgings
ASTM/ASME	B/SB-395	—	31	C10200	31	Seamless Tube
ASTM/ASME	B/SB-395	—	31	C10300	31	Seamless Tube
ASTM/ASME	B/SB-395	—	31	C10800	31	Seamless Tube
ASTM/ASME	B/SB-395	—	31	C12000	31	Seamless Tube
ASTM/ASME	B/SB-395	—	31	C12200	31	Seamless Tube
ASTM/ASME	B/SB-395	—	31	C14200	31	Seamless Tube
ASTM/ASME	B/SB-395	—	31	C19200	31	Seamless Tube
ASTM/ASME	B/SB-395	—	32	C23000	32.1	Seamless Tube
ASTM/ASME	B/SB-395	—	32	C44300	32.2	Seamless Tube
ASTM/ASME	B/SB-395	—	32	C44400	32.2	Seamless Tube

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-395	—	32	C44500	32.2	Seamless Tube
ASTM/ASME	B/SB-395	—	35	C60800	35	Seamless Tube
ASTM/ASME	B/SB-395	—	32	C68700	32.2	Seamless Tube
ASTM/ASME	B/SB-395	—	34	C70400	34	Seamless Tube
ASTM/ASME	B/SB-395	—	34	C70600	34	Seamless Tube
ASTM/ASME	B/SB-395	—	34	C71000	34	Seamless Tube
ASTM/ASME	B/SB-395	—	34	C71500	34	Seamless Tube
ASTM/ASME	B/SB-395	—	34	C72200	34	Seamless Tube
ASTM	B396	5005	22	A95005	22.2	Wire
ASTM	B403	AM100A, F	83	M10100	—	Castings
ASTM	B403	AZ91C, F	83	M11914	—	Castings
ASTM	B403	AZ92A, F	83	M11920	—	Castings
ASTM	B403	K1A	83	M18010	—	Castings
ASTM/ASME	B/SB-407	—	45	N08120	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-407	—	45	N08800	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-407	—	45	N08801	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-407	—	45	N08810	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-407	—	45	N08811	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-408	—	45	N08120	45	Rod & Bar
ASTM/ASME	B/SB-408	—	45	N08800	45	Rod & Bar
ASTM/ASME	B/SB-408	—	45	N08810	45	Rod & Bar
ASTM/ASME	B/SB-408	—	45	N08811	45	Rod & Bar
ASTM/ASME	B/SB-409	—	45	N08120	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-409	—	45	N08800	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-409	—	45	N08810	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-409	—	45	N08811	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-423	—	45	N08221	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-423	—	45	N08825	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-424	—	45	N08221	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-424	—	45	N08825	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-425	—	45	N08221	45	Rod & Bar
ASTM/ASME	B/SB-425	—	45	N08825	45	Rod & Bar
ASTM	B429	6061	23	A96061	23.1	Pipe & Tube
ASTM	B429	6063	23	A96063	23.1	Pipe & Tube
ASTM/ASME	B/SB-434	—	44	N10003	44	Plate, Sheet, & Strip
ASTM/ASME	B/SB-434	—	44	N10242	44	Plate, Sheet, & Strip
ASTM/ASME	B/SB-435	—	43	N06002	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-435	—	43	N06230	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-435	—	46	N12160	46	Plate, Sheet, & Strip
ASTM/ASME	B/SB-435	—	45	R30556	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-443	1	43	N06625	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-443	2	43	N06625	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-444	1	43	N06625	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-444	2	43	N06625	43	Seamless Pipe & Tube

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-446	1	43	N06625	43	Rod & Bar
ASTM/ASME	B/SB-446	2	43	N06625	43	Rod & Bar
ASTM/ASME	B/SB-462	—	43	N06022	44	Forgings
ASTM/ASME	B/SB-462	—	45	N06030	45	Forgings
ASTM/ASME	B/SB-462	—	43	N06035	43	Forgings
ASTM/ASME	B/SB-462	—	46	N06045	45	Forgings
ASTM/ASME	B/SB-462	—	43	N06059	43	Forgings
ASTM/ASME	B/SB-462	—	43	N06200	43	Forgings
ASTM/ASME	B/SB-462	—	43	N06686	43	Forgings
ASTM/ASME	B/SB-462	—	45	N08020	45	Forgings
ASTM/ASME	B/SB-462	—	45	N08024	45	Forgings
ASTM/ASME	B/SB-462	—	45	N08026	45	Forgings
ASTM/ASME	B/SB-462	—	45	N08031	45	Forgings
ASTM/ASME	B/SB-462	—	45	N08367	8.2	Forgings
ASTM/ASME	B/SB-462	—	43	N10276	43	Forgings
ASTM/ASME	B/SB-462	—	44	N10629	44	Forgings
ASTM/ASME	B/SB-462	—	44	N10665	44	Forgings
ASTM/ASME	B/SB-462	—	44	N10675	44	Forgings
ASTM/ASME	B/SB-462	—	45	R20033	45	Forgings
ASTM/ASME	B/SB-463	—	45	N08020	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-463	—	45	N08024	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-463	—	45	N08026	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-464	—	45	N08020	45	Welded Pipe
ASTM/ASME	B/SB-464	—	45	N08024	45	Welded Pipe
ASTM/ASME	B/SB-464	—	45	N08026	45	Welded Pipe
ASTM/ASME	B/SB-466	—	34	C70400	34	Seamless Pipe & Tube
ASTM/ASME	B/SB-466	—	34	C70600	34	Seamless Pipe & Tube
ASTM/ASME	B/SB-466	—	34	C71000	34	Seamless Pipe & Tube
ASTM/ASME	B/SB-466	—	34	C71500	34	Seamless Pipe & Tube
ASTM/ASME	B/SB-466	—	34	C72200	34	Seamless Pipe & Tube
ASTM/ASME	B/SB-467	—	34	C70600	34	Welded Pipe
ASTM/ASME	B/SB-467	—	34	C70600	34	Welded Pipe
ASTM/ASME	B/SB-467	—	34	C71500	34	Welded Pipe
ASTM/ASME	B/SB-467	—	34	C71500	34	Welded Pipe
ASTM/ASME	B/SB-468	—	45	N08020	45	Welded Tube
ASTM/ASME	B/SB-468	—	45	N08024	45	Welded Tube
ASTM/ASME	B/SB-468	—	45	N08026	45	Welded Tube
ASTM/ASME	B/SB-473	—	45	N08020	45	Bar
ASTM/ASME	B/SB-473	—	45	N08024	45	Bar
ASTM/ASME	B/SB-473	—	45	N08026	45	Bar
ASTM	A479	904L	45	N08904	8.2	Bars & Shapes
ASTM	B483	1060	21	A91060	21	Tube
ASTM	B483	1100	21	A91100	21	Tube
ASTM	B483	1435	21	A91435	21	Tube

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM	B483	3003	21	A93003	22.1	Tube
ASTM	B483	3102	21	A93102	22.1	Tube
ASTM	B483	5005	22	A95005	22.2	Tube
ASTM	B483	5050	21	A95050	22.2	Tube
ASTM	B483	5052	22	A95052	22.3	Tube
ASTM	B483	6061	23	A96061	23.1	Tube
ASTM	B483	6063	23	A96063	23.1	Tube
ASTM	B491	1050	21	A91050	21	Extruded Tube
ASTM	B491	1100	21	A91100	21	Extruded Tube
ASTM	B491	1200	21	A91200	21	Extruded Tube
ASTM	B491	1235	21	A91235	21	Extruded Tube
ASTM	B491	3003	21	A93003	22.1	Extruded Tube
ASTM	B491	3102	21	A93102	22.1	Extruded Tube
ASTM	B491	6063	23	A96063	23.1	Extruded Tube
ASTM/ASME	B/SB-493	R60702	61	R60702	61	Forgings
ASTM/ASME	B/SB-493	R60704	62	R60704	62	Forgings
ASTM/ASME	B/SB-493	R60705	62	R60705	62	Forgings
ASTM/ASME	A/SA-494	CU5MCuC	45	N08826	45	Castings
ASTM/ASME	A/SA-494	CW2M	43	N26455	43	Castings
ASTM/ASME	A/SA-494	CW6M	44	N30107	44	Castings
ASTM/ASME	A/SA-494	CW6MC	43	N26625	43	Castings
ASTM/ASME	A/SA-494	CX2MW	43	N26022	44	Castings
ASTM/ASME	A/SA-494	CY40	43	N06040	43	Castings
ASTM/ASME	A/SA-494	M30C	42	N24130	42	Castings
ASTM/ASME	A/SA-494	M35-1	42	N24135	42	Castings
ASTM/ASME	A/SA-494	M35-2	42	N04020	42	Castings
ASTM/ASME	A/SA-494	N7M	44	N30007	44	Castings
ASTM/ASME	B/SB-505	—	35	C95200	35	Castings
ASTM/ASME	B/SB-511	—	46	N08330	45	Bars & Shapes
ASTM/ASME	B/SB-511	—	46	N08332	45	Bars & Shapes
ASTM	B512	—	46	N08330	45	Bars & Billets
ASTM/ASME	B/SB-514	—	45	N08120	45	Welded Pipe
ASTM/ASME	B/SB-514	—	45	N08800	45	Welded Pipe
ASTM/ASME	B/SB-514	—	45	N08810	45	Welded Pipe
ASTM/ASME	B/SB-515	—	45	N08120	45	Welded Tube
ASTM/ASME	B/SB-515	—	45	N08800	45	Welded Tube
ASTM/ASME	B/SB-515	—	45	N08810	45	Welded Tube
ASTM/ASME	B/SB-515	—	45	N08811	45	Welded Tube
ASTM/ASME	B/SB-516	—	43	N06025	43	Welded Tube
ASTM/ASME	B/SB-516	—	46	N06045	45	Welded Tube
ASTM/ASME	B/SB-516	—	43	N06600	43	Welded Tube
ASTM/ASME	B/SB-516	—	43	N06603	43	Welded Tube
ASTM/ASME	B/SB-517	—	43	N06025	43	Welded Pipe
ASTM/ASME	B/SB-517	—	46	N06045	45	Welded Pipe

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-517	—	43	N06600	43	Welded Pipe
ASTM/ASME	B/SB-517	—	43	N06603	43	Welded Pipe
ASTM/ASME	B/SB-523	R60702	61	R60702	61	Seamless & Welded Tube
ASTM/ASME	B/SB-523	R60704	62	R60704	62	Seamless & Welded Tube
ASTM/ASME	B/SB-523	R60705	62	R60705	62	Seamless & Welded Tube
ASTM/ASME	B/SB-535	—	46	N08330	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-535	—	46	N08332	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-536	—	46	N08330	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-536	—	46	N08332	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-543	—	31	C10800	31	Welded Tube
ASTM/ASME	B/SB-543	—	31	C12200	31	Welded Tube
ASTM/ASME	B/SB-543	—	31	C19400	31	Welded Tube
ASTM/ASME	B/SB-543	—	32	C23000	32.1	Welded Tube
ASTM/ASME	B/SB-543	—	32	C44300	32.2	Welded Tube
ASTM/ASME	B/SB-543	—	32	C44400	32.2	Welded Tube
ASTM/ASME	B/SB-543	—	32	C44500	32.2	Welded Tube
ASTM/ASME	B/SB-543	—	32	C68700	32.2	Welded Tube
ASTM/ASME	B/SB-543	—	34	C70400	34	Welded Tube
ASTM/ASME	B/SB-543	—	34	C70600	34	Welded Tube
ASTM	B543	—	34	C71000	34	Welded Tube
ASTM/ASME	B/SB-543	—	34	C71500	34	Welded Tube
ASTM/ASME	B/SB-543	—	34	C71640	34	Welded Tube
ASTM	B543	—	34	C72200	34	Welded Tube
ASTM	B547	1100	21	A91100	21	Welded Tube
ASTM	B547	3003	21	A93003	22.1	Welded Tube
ASTM	B547	3004	22	A93004	22.2	Welded Tube
ASTM	B547	5050	21	A95050	22.2	Welded Tube
ASTM	B547	5052	22	A95052	22.3	Welded Tube
ASTM	B547	5083	25	A95083	22.4	Welded Tube
ASTM	B547	5086	25	A95086	22.4	Welded Tube
ASTM	B547	5154	22	A95154	22.4	Welded Tube
ASTM	B547	5454	22	A95454	22.3	Welded Tube
ASTM	B547	6061	23	A96061	23.1	Welded Tube
ASTM	B547	Alclad 3003	21	A83003	—	Welded Tube
ASTM	B547	Alclad 3004	22	—	—	Welded Tube
ASTM/ASME	B/SB-550	R60702	61	R60702	61	Bar & Wire
ASTM/ASME	B/SB-550	R60704	62	R60704	62	Bar & Wire
ASTM/ASME	B/SB-550	R60705	62	R60705	62	Bar & Wire
ASTM/ASME	B/SB-551	R60702	61	R60702	61	Plate, Sheet, & Strip
ASTM/ASME	B/SB-551	R60704	62	R60704	62	Plate, Sheet, & Strip
ASTM/ASME	B/SB-551	R60705	62	R60705	62	Plate, Sheet, & Strip
ASTM/ASME	B/SB-551	R60706	62	R60706	62	Plate, Sheet, & Strip
ASTM/ASME	B/SB-564	—	41	N02200	41	Forgings
ASTM/ASME	B/SB-564	—	42	N04400	42	Forgings

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-564	—	43	N06022	44	Forgings
ASTM/ASME	B/SB-564	—	43	N06025	43	Forgings
ASTM/ASME	B/SB-564	—	43	N06025	43	Forgings
ASTM/ASME	B/SB-564	—	43	N06035	43	Forgings
ASTM/ASME	B/SB-564	—	46	N06045	45	Forgings
ASTM/ASME	B/SB-564	—	43	N06059	43	Forgings
ASTM/ASME	B/SB-564	—	43	N06110	43	Forgings
ASTM/ASME	B/SB-564	—	43	N06110	43	Forgings
ASTM/ASME	B/SB-564	—	43	N06200	43	Forgings
ASTM/ASME	B/SB-564	—	43	N06210	43	Forgings
ASTM/ASME	B/SB-564	—	43	N06230	43	Forgings
ASTM/ASME	B/SB-564	—	43	N06600	43	Forgings
ASTM/ASME	B/SB-564	—	43	N06603	43	Forgings
ASTM/ASME	B/SB-564	—	43	N06617	46	Forgings
ASTM/ASME	B/SB-564	—	43	N06625	43	Forgings
ASTM/ASME	B/SB-564	—	43	N06625	43	Forgings
ASTM/ASME	B/SB-564	—	43	N06686	43	Forgings
ASTM/ASME	B/SB-564	—	43	N06690	43	Forgings
ASTM/ASME	B/SB-564	—	45	N08031	45	Forgings
ASTM/ASME	B/SB-564	—	45	N08120	45	Forgings
ASTM/ASME	B/SB-564	—	45	N08367	8.2	Forgings
ASTM/ASME	B/SB-564	—	45	N08800	45	Forgings
ASTM/ASME	B/SB-564	—	45	N08810	45	Forgings
ASTM/ASME	B/SB-564	—	45	N08811	44	Forgings
ASTM/ASME	B/SB-564	—	45	N08825	45	Forgings
ASTM/ASME	B/SB-564	—	44	N10242	44	Forgings
ASTM/ASME	B/SB-564	—	43	N10276	43	Forgings
ASTM/ASME	B/SB-564	—	44	N10624	44	Forgings
ASTM/ASME	B/SB-564	—	44	N10629	44	Forgings
ASTM/ASME	B/SB-564	—	44	N10665	44	Forgings
ASTM/ASME	B/SB-564	—	44	N10675	44	Forgings
ASTM/ASME	B/SB-564	—	46	N12160	46	Forgings
ASTM/ASME	B/SB-564	—	45	R20033	45	Forgings
ASTM/ASME	B/SB-572	—	43	N06002	43	Rod
ASTM/ASME	B/SB-572	—	43	N06230	43	Rod
ASTM/ASME	B/SB-572	—	46	N12160	46	Rod
ASTM/ASME	B/SB-572	—	45	R30556	45	Rod
ASTM/ASME	B/SB-573	—	44	N10003	44	Rod
ASTM/ASME	B/SB-573	—	44	N10242	44	Rod
ASTM/ASME	B/SB-574	—	43	N06022	44	Rod
ASTM/ASME	B/SB-574	—	43	N06035	43	Rod
ASTM/ASME	B/SB-574	—	43	N06059	43	Rod
ASTM/ASME	B/SB-574	—	43	N06200	43	Rod
ASTM/ASME	B/SB-574	—	43	N06210	43	Rod

(Continued)



**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-574	—	43	N06455	43	Rod
ASTM/ASME	B/SB-574	—	43	N06686	43	Rod
ASTM/ASME	B/SB-574	—	43	N10276	43	Rod
ASTM/ASME	B/SB-575	—	43	N06022	44	Plate, Sheet, & Strip
ASTM/ASME	B/SB-575	—	43	N06035	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-575	—	43	N06059	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-575	—	43	N06200	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-575	—	43	N06210	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-575	—	43	N06455	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-575	—	43	N06686	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-575	—	43	N10276	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-581	—	45	N06007	43	Rod
ASTM/ASME	B/SB-581	—	45	N06007	43	Rod
ASTM/ASME	B/SB-581	—	45	N06030	45	Rod
ASTM/ASME	B/SB-581	—	45	N06975	45	Rod
ASTM/ASME	B/SB-581	—	45	N06985	45	Rod
ASTM/ASME	B/SB-581	—	45	N06985	45	Rod
ASTM/ASME	B/SB-581	—	45	N08031	45	Rod
ASTM/ASME	B/SB-582	—	45	N06007	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-582	—	45	N06007	43	Plate, Sheet, & Strip
ASTM/ASME	B/SB-582	—	45	N06030	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-582	—	45	N06975	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-582	—	45	N06985	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-582	—	45	N06985	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-599	—	45	N08700	8.2	Plate, Sheet, & Strip
ASTM	B608	—	35	C61300	35	Welded Pipe
ASTM	B608	—	35	C61400	35	Welded Pipe
ASTM	B608	—	34	C70620	34	Welded Pipe
ASTM	B608	—	34	C71520	34	Welded Pipe
ASTM	B609	1350	21	A91350	21	Wire
ASTM	B618	208.0	26	A02080	25	Castings
ASTM	B618	319.0	26	A03190	25	Castings
ASTM	B618	328.0	26	A03280	25	Castings
ASTM	B618	356.0	26	A03560	24.2	Castings
ASTM	B618	443.0	26	A04430	24.1	Castings
ASTM	B618	514.0	26	A05140	23.1	Castings
ASTM	B618	535.0	26	A05350	—	Castings
ASTM	B618	A356.0	26	A13560	24.2	Castings
ASTM	B618	B443.0	26	A24430	24.1	Castings
ASTM/ASME	B/SB-619	—	43	N06002	43	Welded Pipe
ASTM/ASME	B/SB-619	—	45	N06007	43	Welded Pipe
ASTM/ASME	B/SB-619	—	43	N06022	44	Welded Pipe
ASTM/ASME	B/SB-619	—	45	N06030	45	Welded Pipe
ASTM/ASME	B/SB-619	—	43	N06035	43	Welded Pipe

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-619	—	43	N06059	43	Welded Pipe
ASTM/ASME	B/SB-619	—	43	N06200	43	Welded Pipe
ASTM/ASME	B/SB-619	—	43	N06210	43	Welded Pipe
ASTM/ASME	B/SB-619	—	43	N06230	43	Welded Pipe
ASTM/ASME	B/SB-619	—	43	N06455	43	Welded Pipe
ASTM/ASME	B/SB-619	—	43	N06686	43	Welded Pipe
ASTM/ASME	B/SB-619	—	45	N06975	45	Welded Pipe
ASTM/ASME	B/SB-619	—	45	N06985	45	Welded Pipe
ASTM/ASME	B/SB-619	—	45	N08031	45	Welded Pipe
ASTM/ASME	B/SB-619	—	45	N08320	8.2	Welded Pipe
ASTM/ASME	B/SB-619	—	44	N10001	44	Welded Pipe
ASTM/ASME	B/SB-619	—	44	N10242	44	Welded Pipe
ASTM/ASME	B/SB-619	—	43	N10276	43	Welded Pipe
ASTM/ASME	B/SB-619	—	44	N10624	44	Welded Pipe
ASTM/ASME	B/SB-619	—	44	N10629	44	Welded Pipe
ASTM/ASME	B/SB-619	—	44	N10665	44	Welded Pipe
ASTM/ASME	B/SB-619	—	44	N10675	44	Welded Pipe
ASTM/ASME	B/SB-619	—	46	N12160	46	Welded Pipe
ASTM/ASME	B/SB-619	—	45	R20033	45	Welded Pipe
ASTM/ASME	B/SB-619	—	45	R30556	45	Welded Pipe
ASTM/ASME	B/SB-620	—	45	N08320	8.2	Plate, Sheet, & Strip
ASTM/ASME	B/SB-621	—	45	N08320	8.2	Rod
ASTM/ASME	B/SB-622	—	43	N06002	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	45	N06007	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	43	N06022	44	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	45	N06030	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	43	N06035	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	43	N06059	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	43	N06060	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	43	N06200	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	43	N06210	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	43	N06230	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	43	N06250	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	43	N06255	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	43	N06455	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	43	N06686	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	45	N06975	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	45	N06985	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	45	N08031	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	45	N08135	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	45	N08320	8.2	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	45	N08535	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	44	N10001	44	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	44	N10242	44	Seamless Pipe & Tube

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-622	—	43	N10276	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	44	N10624	44	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	44	N10629	44	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	44	N10665	44	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	44	N10675	44	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	46	N12160	46	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	45	R20033	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-622	—	45	R30556	45	Seamless Pipe & Tube
ASTM/ASME	B/SB-625	—	45	N08031	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-625	—	45	N08904	8.2	Plate, Sheet, & Strip
ASTM/ASME	B/SB-625	—	45	N08925	8.2	Plate, Sheet, & Strip
ASTM/ASME	B/SB-625	—	45	N08926	8.2	Plate, Sheet, & Strip
ASTM/ASME	B/SB-625	—	45	N08932	8.2	Plate, Sheet, & Strip
ASTM/ASME	B/SB-625	—	45	R20033	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-626	—	43	N06002	43	Welded Tube
ASTM/ASME	B/SB-626	—	45	N06007	43	Welded Tube
ASTM/ASME	B/SB-626	—	43	N06022	44	Welded Tube
ASTM/ASME	B/SB-626	—	45	N06030	45	Welded Tube
ASTM/ASME	B/SB-626	—	43	N06035	43	Welded Tube
ASTM/ASME	B/SB-626	—	43	N06059	43	Welded Tube
ASTM/ASME	B/SB-626	—	43	N06200	43	Welded Tube
ASTM/ASME	B/SB-626	—	43	N06210	43	Welded Tube
ASTM/ASME	B/SB-626	—	43	N06230	43	Welded Tube
ASTM/ASME	B/SB-626	—	43	N06455	43	Welded Tube
ASTM/ASME	B/SB-626	—	43	N06686	43	Welded Tube
ASTM/ASME	B/SB-626	—	45	N06975	45	Welded Tube
ASTM/ASME	B/SB-626	—	45	N06985	45	Welded Tube
ASTM/ASME	B/SB-626	—	45	N08031	45	Welded Tube
ASTM/ASME	B/SB-626	—	45	N08320	8.2	Welded Tube
ASTM/ASME	B/SB-626	—	44	N10001	44	Welded Tube
ASTM/ASME	B/SB-626	—	44	N10242	44	Welded Tube
ASTM/ASME	B/SB-626	—	43	N10276	43	Welded Tube
ASTM/ASME	B/SB-626	—	44	N10624	44	Welded Tube
ASTM/ASME	B/SB-626	—	44	N10629	44	Welded Tube
ASTM/ASME	B/SB-626	—	44	N10665	44	Welded Tube
ASTM/ASME	B/SB-626	—	44	N10675	44	Welded Tube
ASTM/ASME	B/SB-626	—	46	N12160	46	Welded Tube
ASTM/ASME	B/SB-626	—	45	R20033	45	Welded Tube
ASTM/ASME	B/SB-626	—	45	R30556	45	Welded Tube
ASTM/ASME	B/SB-649	—	45	N08031	45	Bar & Wire
ASTM/ASME	B/SB-649	—	45	N08904	8.2	Bar & Wire
ASTM/ASME	B/SB-649	—	45	N08925	8.2	Bar & Wire
ASTM/ASME	B/SB-649	—	45	N08926	8.2	Bar & Wire
ASTM/ASME	B/SB-649	—	45	R20033	45	Bar & Wire

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-653	R60702	61	R60702	61	Seamless & Welded Fittings
ASTM/ASME	B/SB-658	R60702	61	R60702	61	Seamless & Welded Pipe
ASTM/ASME	B/SB-658	R60704	62	R60704	62	Seamless & Welded Pipe
ASTM/ASME	B/SB-658	R60705	62	R60705	62	Seamless & Welded Pipe
ASTM/ASME	B/SB-668	—	45	N08028	45	Seamless Tube
ASTM/ASME	B/SB-672	—	45	N08700	8.2	Bar & Wire
ASTM/ASME	B/SB-673	—	45	N08904	8.2	Welded Pipe
ASTM/ASME	B/SB-673	—	45	N08925	8.2	Welded Pipe
ASTM/ASME	B/SB-673	—	45	N08926	8.2	Welded Pipe
ASTM/ASME	B/SB-674	—	45	N08904	8.2	Welded Tube
ASTM/ASME	B/SB-674	—	45	N08925	8.2	Welded Tube
ASTM/ASME	B/SB-674	—	45	N08926	8.2	Welded Tube
ASTM/ASME	B/SB-675	—	45	N08367	8.2	Welded Pipe
ASTM/ASME	B/SB-675	—	45	N08367	8.2	Welded Pipe
ASTM/ASME	B/SB-676	—	45	N08367	8.2	Welded Tube
ASTM/ASME	B/SB-676	—	45	N08367	8.2	Welded Tube
ASTM/ASME	B/SB-677	—	45	N08904	8.2	Seamless Pipe & Tube
ASTM/ASME	B/SB-677	—	45	N08925	8.2	Seamless Pipe & Tube
ASTM/ASME	B/SB-677	—	45	N08926	8.2	Seamless Pipe & Tube
ASTM	B686	A356.0	26	A13560	24.2	Castings
ASTM/ASME	B/SB-688	—	45	N08366	8.2	Plate, Sheet, & Strip
ASTM/ASME	B/SB-688	—	45	N08367	8.2	Plate, Sheet, & Strip
ASTM/ASME	B/SB-688	—	45	N08367	8.2	Plate, Sheet, & Strip
ASTM/ASME	B/SB-690	—	45	N08366	8.2	Seamless Pipe & Tube
ASTM/ASME	B/SB-690	—	45	N08367	8.2	Seamless Pipe & Tube
ASTM/ASME	B/SB-690	—	45	N08367	8.2	Seamless Pipe & Tube
ASTM/ASME	B/SB-691	—	45	N08366	8.2	Rod, Bar, & Wire
ASTM/ASME	B/SB-691	—	45	N08367	8.2	Rod, Bar, & Wire
ASTM/ASME	B/SB-704	—	43	N06625	43	Welded Tube
ASTM/ASME	B/SB-704	—	45	N08825	45	Welded Tube
ASTM/ASME	B/SB-705	—	43	N06625	43	Welded Pipe
ASTM/ASME	B/SB-705	—	45	N08825	45	Welded Pipe
ASTM/ASME	B/SB-709	—	45	N08028	45	Plate, Sheet, & Strip
ASTM/ASME	B/SB-710	—	46	N08330	45	Welded Pipe
ASTM/ASME	B/SB-710	—	46	N08332	45	Welded Pipe
ASTM	B718	—	45	N06333	43	Plate, Sheet, & Strip
ASTM	B719	—	45	N06333	43	Bar
ASTM	B720	—	45	N08310	—	Seamless Tube
ASTM	B722	—	45	N06333	43	Seamless Pipe & Tube
ASTM	B723	—	45	N06333	43	Welded Pipe
ASTM	B725	—	41	N02200	41	Welded Pipe
ASTM	B726	—	45	N06333	43	Welded Tube
ASTM/ASME	B/SB-729	—	45	N08020	45	Seamless Pipe & Tube
ASTM	B755	—	43	N06110	43	Plate, Sheet, & Strip

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM	B756	—	43	N06110	43	Rod & Bar
ASTM	B756	—	43	N06110	43	Rod & Bar
ASTM	B757	—	43	N06110	43	Welded Pipe
ASTM	B758	—	43	N06110	43	Welded Tube
ASTM	B759	—	43	N06110	43	Seamless Pipe & Tube
ASTM/ASME	B/SB-804	—	45	N08367	8.2	Welded Pipe
ASTM/ASME	B/SB-804	—	45	N08367	8.2	Welded Pipe
ASTM	A813	N08367	45	N08367	8.2	Welded Pipe
ASTM	A813	N08367	45	N08367	8.2	Welded Pipe
ASTM	B814	—	45	N06920	43	Plate, Sheet, & Strip
ASTM	A814	N08367	45	N08367	8.2	Cold Worked Welded Pipe
ASTM	A814	N08367	45	N08367	8.2	Cold Worked Welded Pipe
ASTM/ASME	B/SB-815	—	49	R31233	—	Rod
ASTM/ASME	B/SB-818	—	49	R31233	—	Plate, Sheet, & Strip
ASTM/ASME	B/SB-861	1	51	R50250	51	Seamless Pipe
ASTM/ASME	B/SB-861	11	51	R52250	51	Seamless Pipe
ASTM/ASME	B/SB-861	12	52	R53400	52	Seamless Pipe
ASTM/ASME	B/SB-861	13	51	R53413	52	Seamless Pipe
ASTM/ASME	B/SB-861	14	52	R53414	52	Seamless Pipe
ASTM/ASME	B/SB-861	15	52	R53415	52	Seamless Pipe
ASTM/ASME	B/SB-861	16	51	R52402	51	Seamless Pipe
ASTM/ASME	B/SB-861	16H	51	R52402	51	Seamless Pipe
ASTM/ASME	B/SB-861	17	51	R52252	51	Seamless Pipe
ASTM/ASME	B/SB-861	18	53	R56322	53	Seamless Pipe
ASTM/ASME	B/SB-861	19	53	R58640	54	Seamless Pipe
ASTM/ASME	B/SB-861	2	51	R50400	51	Seamless Pipe
ASTM/ASME	B/SB-861	20	53	R58645	54	Seamless Pipe
ASTM/ASME	B/SB-861	21	53	R58210	54	Seamless Pipe
ASTM/ASME	B/SB-861	23	54	R56407	53	Seamless Pipe
ASTM/ASME	B/SB-861	24	54	R56405	53	Seamless Pipe
ASTM/ASME	B/SB-861	25	54	R56403	53	Seamless Pipe
ASTM/ASME	B/SB-861	26	51	R52404	51	Seamless Pipe
ASTM/ASME	B/SB-861	26H	51	R52404	51	Seamless Pipe
ASTM/ASME	B/SB-861	28	53	R56323	53	Seamless Pipe
ASTM/ASME	B/SB-861	29	54	R56404	53	Seamless Pipe
ASTM/ASME	B/SB-861	2H	51	R50400	51	Seamless Pipe
ASTM/ASME	B/SB-861	3	52	R50550	52	Seamless Pipe
ASTM/ASME	B/SB-861	33	51	R53442	54	Seamless Pipe
ASTM/ASME	B/SB-861	34	52	R53445	54	Seamless Pipe
ASTM/ASME	B/SB-861	35	54	R56340	53	Seamless Pipe
ASTM/ASME	B/SB-861	5	54	R56400	53	Seamless Pipe
ASTM/ASME	B/SB-861	7	51	R52400	51	Seamless Pipe
ASTM/ASME	B/SB-861	7H	51	R52400	51	Seamless Pipe
ASTM/ASME	B/SB-861	9	53	R56320	53	Seamless Pipe

(Continued)

**Table C.1 (Continued)**  
**List of Base Metal Specifications—Nonferrous Alloys**

Standard	Base Metal Specification	Type, Grade, or Alloy Designation	Material Number	UNS Number	ISO 15608 Group	Product Form
ASTM/ASME	B/SB-862	1	51	R50250	51	Welded Pipe
ASTM/ASME	B/SB-862	11	51	R52250	51	Welded Pipe
ASTM/ASME	B/SB-862	12	52	R53400	52	Welded Pipe
ASTM/ASME	B/SB-862	13	51	R53413	52	Welded Pipe
ASTM/ASME	B/SB-862	14	52	R53414	52	Welded Pipe
ASTM/ASME	B/SB-862	15	52	R53415	52	Welded Pipe
ASTM/ASME	B/SB-862	16	51	R52402	51	Welded Pipe
ASTM/ASME	B/SB-862	16H	51	R52402	51	Welded Pipe
ASTM/ASME	B/SB-862	17	51	R52252	51	Welded Pipe
ASTM/ASME	B/SB-862	18	53	R56322	53	Welded Pipe
ASTM/ASME	B/SB-862	19	53	R58640	54	Welded Pipe
ASTM/ASME	B/SB-862	2	51	R50400	51	Welded Pipe
ASTM/ASME	B/SB-862	20	53	R58645	54	Welded Pipe
ASTM/ASME	B/SB-862	21	53	R58210	54	Welded Pipe
ASTM/ASME	B/SB-862	23	54	R56407	53	Welded Pipe
ASTM/ASME	B/SB-862	24	54	R56405	53	Welded Pipe
ASTM/ASME	B/SB-862	25	54	R56403	53	Welded Pipe
ASTM/ASME	B/SB-862	26	51	R52404	51	Welded Pipe
ASTM/ASME	B/SB-862	26H	51	R52404	51	Welded Pipe
ASTM/ASME	B/SB-862	27	51	R52254	51	Welded Pipe
ASTM/ASME	B/SB-862	28	53	R56323	53	Welded Pipe
ASTM/ASME	B/SB-862	29	54	R56404	53	Welded Pipe
ASTM/ASME	B/SB-862	2H	51	R50400	51	Welded Pipe
ASTM/ASME	B/SB-862	3	52	R50550	52	Welded Pipe
ASTM/ASME	B/SB-862	33	51	R53442	54	Welded Pipe
ASTM/ASME	B/SB-862	34	52	R53445	54	Welded Pipe
ASTM/ASME	B/SB-862	35	54	R56340	53	Welded Pipe
ASTM/ASME	B/SB-862	5	54	R56400	53	Welded Pipe
ASTM/ASME	B/SB-862	7	51	R52400	51	Welded Pipe
ASTM/ASME	B/SB-862	7H	51	R52400	51	Welded Pipe
ASTM/ASME	B/SB-862	9	53	R56320	53	Welded Pipe
ASTM/ASME	B/SB-928	5083	25	A95083	22.4	Plate & Sheet
ASTM/ASME	B/SB-928	5086	25	A95086	22.4	Plate & Sheet
ASTM/ASME	B/SB-928	5456	25	A95456	22.4	Plate & Sheet
ASTM/ASME	B/SB-956	—	34	C70600	34	Finned Welded Tube
ASTM/ASME	B/SB-956	—	34	C71500	34	Finned Welded Tube
ISO	209	6082, T4, T6	23	A96082	23.1	Bar, Rod, Shapes, & Tube
ISO	209	7020, T5	27	A97020	23.2	Bar, Rod, Shapes, & Tube
NACE	MR 01-75	100	45	N06950	43	Pipe
NACE	MR 01-75	110	45	N06950	43	Pipe
NACE	MR 01-75	125	45	N06950	43	Pipe
NACE	MR 01-75	140	45	N06950	43	Pipe

**Table C.2**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	1.1	AAR	M201	A	—		60/30 [415/205]	Castings	C-Mn-Si
1	1.1	ASTM	A1018	SS 40	—		55/40 [380/275]	Sheet & Strip	C
1	1.1	ABS	ABS	A	K02300		58/34 [400/235]	Plate, Bar, & Shapes	C
1	1.2	ABS	ABS	AH32	K11846		64/46 [440/315]	Plate, Bar, & Shapes	C-Mn-Si
1	1.1	ABS	ABS	B	K02102		58/34 [400/235]	Plate, Bar, & Shapes	C
1	1.1	ABS	ABS	D	K02101		58/34 [400/235]	Plate, Bar, & Shapes	C-Si
1	1.2	ABS	ABS	DH32	K11846		64/46 [440/315]	Plate, Bar, & Shapes	C-Mn-Si
1	1.1	ABS	ABS	E	K01801		58/34 [400/235]	Plate, Bar, & Shapes	C-Si
1	1.2	ABS	ABS	EH32	K11846		64/46 [440/315]	Plate, Bar, & Shapes	C-Mn-Si
1	1.2	ABS	ABS	FH32	K11846		64/46 [440/315]	Plate, Bar, & Shapes	C-Mn-Si
1	1.2	API	2H	42	—		62/42 [425/290]	Plate	C-Mn
1	1.2	API	2MT1	50	—		65/50 [450/345]	Plate	C-Mn
1	1.2	API	2W	50	—		65/50 [450/345]	Plate	C-Mn
1	1.2	API	2Y	42	—		62/42 [425/290]	Plate	C-Mn
1	1.2	API	2Y	50	—		65/50 [450/345]	Plate	C-Mn
1	1.1	API	5L	A	—		49/30 [340/205]	Seamless & Welded Pipe	C-Mn
1	1.1	API	5L	A25	—		45/25 [310/175]	Seamless & Welded Pipe	C-Mn
1	1.1	API	5L	A25, Cl. I	—		45/25 [310/170]	Seamless & Wld. Pipe & Tube	C-Mn
1	1.1	API	5L	A25, Cl. II	—		45/25 [310/170]	Seamless & Wld. Pipe & Tube	C-Mn
1	1.1	API	5L	A25P	—		45/25 [310/175]	Seamless & Welded Pipe	C-Mn
1	1.1	API	5L	B	—		60/35 [415/240]	Seamless & Welded Pipe	C-Mn
1	1.1	API	5L	BM	—		60/35 [415/240]	Welded Pipe	C-Mn
1	1.1	API	5L	BMO	—		60/35 [415/240]	Welded Pipe	C-Mn
1	1.1	API	5L	BMS	—		60/35 [415/240]	Welded Pipe	C-Mn
1	1.1	API	5L	BN	—		60/35 [415/240]	Seamless & Welded Pipe	C-Mn
1	1.1	API	5L	BNO	—		60/35 [415/240]	Seamless & Welded Pipe	C-Mn
1	1.1	API	5L	BNS	—		60/35 [415/240]	Seamless & Welded Pipe	C-Mn
1	1.1	API	5L	BQ	—		60/35 [415/240]	Seamless & Welded Pipe	C-Mn
1	1.1	API	5L	BQO	—		60/35 [415/240]	Seamless & Welded Pipe	C-Mn

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Steel and Steel Alloys</b>									
1	1.1	API	5L	BQS	—		60/35 [415/240]	Seamless & Welded Pipe	C-Mn
1	1.1	API	5L	BR	—		60/35 [415/240]	Seamless & Welded Pipe	C-Mn
1	1.1.1	API	5L	X42	—		60/42 [415/290]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X42M	—		60/42 [415/290]	Welded Pipe	C-Mn
1	1.2	API	5L	X42MO	—		60/42 [415/290]	Welded Pipe	C-Mn
1	1.2	API	5L	X42MS	—		60/42 [415/290]	Welded Pipe	C-Mn
1	1.2	API	5L	X42N	—		60/42 [415/290]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X42NO	—		60/42 [415/290]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X42NS	—		60/42 [415/290]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X42Q	—		60/42 [415/290]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X42QO	—		60/42 [415/290]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X42QS	—		60/42 [415/290]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X42R	—		60/42 [415/290]	Seamless & Welded Pipe	C-Mn
1	1.1.1	API	5L	X46	—		63/46 [435/315]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X46M	—		63/46 [435/315]	Welded Pipe	C-Mn
1	1.2	API	5L	X46MO	—		63/46 [435/315]	Welded Pipe	C-Mn
1	1.2	API	5L	X46MS	—		63/46 [435/315]	Welded Pipe	C-Mn
1	1.2	API	5L	X46N	—		63/46 [435/315]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X46NO	—		63/46 [435/315]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X46NS	—		63/46 [435/315]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X46Q	—		63/46 [435/315]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X46QO	—		63/46 [435/315]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X46QS	—		63/46 [435/315]	Seamless & Welded Pipe	C-Mn
1	1.1.1	API	5L	X52	—		67/52 [460/360]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X52M	—		67/52 [460/360]	Welded Pipe	C-Mn
1	1.2	API	5L	X52MO	—		67/52 [460/360]	Welded Pipe	C-Mn
1	1.2	API	5L	X52MS	—		67/52 [460/360]	Welded Pipe	C-Mn
1	1.2	API	5L	X52N	—		67/52 [460/360]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X52NO	—		67/52 [460/360]	Seamless & Welded Pipe	C-Mn

(Continued)



**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Steel and Steel Alloys</b>									
1	1.2	API	5L	X52NS	—		67/52 [460/360]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X52Q	—		67/52 [460/360]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X52QO	—		67/52 [460/360]	Seamless & Welded Pipe	C-Mn
1	1.2	API	5L	X52QS	—		67/52 [460/360]	Seamless & Welded Pipe	C-Mn
1	11.1	API	5LS	X46	—		63/46 [435/315]	Spiral Welded Pipe	C-Mn
1	1.2	AS	1548	7-430	—		62.5/43.5 [430/300]	Plate	C
1	1.2	AS	1548	7-460	—		66.5/44 [460/305]	Plate	C
1	1.2	AS	1548	PT430	—		62.5/43.5 [430/300]	Plate	C
1	1.2	AS	1548	PT460	—		66.5/44 [460/305]	Plate	C
1	1.1	AS/NZS	1594	HA1	—		48/29 [330/200]	Plate, Sheet, & Strip	C
1	1.1	AS/NZS	1594	HA200	—		43.5/29 [300/200]	Plate, Sheet, & Strip	C
1	1.1	AS/NZS	1594	HA250	—		51/36 [350/250]	Plate, Sheet, & Strip	C
1	1.1	AS/NZS	1594	HA250/1	—		55/36 [380/250]	Plate, Sheet, & Strip	C
1	1.1	AS/NZS	1594	HA3	—		43.5/29 [300/200]	Plate, Sheet, & Strip	C
1	1.2	AS/NZS	1594	HA300	—		58/43.5 [400/300]	Plate, Sheet, & Strip	C-Mn
1	1.2	AS/NZS	1594	HA300/1	—		62.5/43.5 [430/300]	Plate, Sheet, & Strip	C-Mn
1	1.2	AS/NZS	1594	HA350	—		62.5/51 [430/350]	Plate, Sheet, & Strip	C-Mn
1	2.1	AS/NZS	1594	HA400	—		67/55 [460/380]	Plate, Sheet, & Strip	C-Mn
1	1.1	AS/NZS	1594	HA4N	—		40.5/25 [280/170]	Plate, Sheet, & Strip	C
1	1.1	AS/NZS	1594	HU250	—		51/36 [350/250]	Plate, Sheet, & Strip	C
1	1.2	AS/NZS	1594	HU300	—		58/43.5 [400/300]	Plate, Sheet, & Strip	C-Mn
1	1.2	AS/NZS	1594	HU300/1	—		62.5/43.5 [430/300]	Plate, Sheet, & Strip	C-Mn
1	1.4	AS/NZS	1594	HW350	—		65/50 [450/340]	Plate, Sheet, & Strip	C-Mn
1	1.2	AS/NZS	1594	XF300	—		64/43.5 [440/300]	Plate, Sheet, & Strip	C-Mn-Cr-Ni-Cu
1	2.1	AS/NZS	1594	XF400	—		67/55 [460/380]	Plate, Sheet, & Strip	C-Mn
1	1.1	AS/NZS	3678	200	—		43.5/29 [300/200]	Plate	C-Mn
1	1.2	AS/NZS	3678	250	—		59.5/40.5 [410/280]	Plate	C-Mn
1	1.2	AS/NZS	3678	250L15	—		59.5/40.5 [410/280]	Plate	C-Mn
1	1.1	AS/NZS	3679.1	250	—		59.5/38 [410/260]	Bar & Sections	C-Mn

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	1.1	AS/NZS	3679.1	250L0	—		59.5/38 [410/260]	Bar & Sections	C-Mn
1	1.1	AS/NZS	3679.1	250L15	—		59.5/38 [410/260]	Bar & Sections	C-Mn
1	1.1	ASTM	A27	60-30	J03000		60/30 [415/205]	Castings	C
1	1.1	ASTM	A27	65-35	J03001		65/35 [450/240]	Castings	C
1	1.1	ASTM	A27	U-60-30	J03000		60/30 [415/205]	Castings	C
1	1.1	ASTM/ASME	A/SA-31	B	K03100		58/29 [400/200]	Rivets	C
1	1.1	ASTM/ASME	A/SA-36	—	—		58/36 [400/250]	Bar	C-Mn-Si
1	1.1	ASTM/ASME	A/SA-36	—	K02595	>4 [≥100]	58/36 [400/250]	Plates	C-Mn-Si
1	1.1	ASTM/ASME	A/SA-36	—	K02596	>2.5 and ≤4 [≥65 and ≤100]	58/36 [400/250]	Plates	C-Mn-Si
1	1.1	ASTM/ASME	A/SA-36	—	K02597	>1.5 and ≤2.5 [≥40 and ≤65]	58/36 [400/250]	Plates	C-Mn-Si
1	1.1	ASTM/ASME	A/SA-36	—	K02598	>0.75 and ≤1.5 [≥20 and ≤40]	58/36 [400/250]	Plates	C-Mn-Si
1	1.1	ASTM/ASME	A/SA-36	—	K02599	≤0.75 [≤20]	58/36 [400/250]	Plates	C-Mn-Si
1	1.1	ASTM/ASME	A/SA-36	—	K02600		58/36 [400/250]	Shapes	C-Mn-Si
1	1.1	ASTM/ASME	A/SA-53	E, A	K02504		48/30 [330/205]	Resistance Welded Pipe	C
1	1.1	ASTM/ASME	A/SA-53	E, B	K03005		60/35 [415/240]	Resistance Welded Pipe	C-Mn
1	1.1	ASTM/ASME	A/SA-53	F	K03005		48/30 [330/205]	Furnace Welded Pipe	C
1	1.1	ASTM/ASME	A/SA-53	S, A	K02504		48/30 [330/205]	Seamless Pipe	C
1	1.1	ASTM/ASME	A/SA-53	S, B	K03005		60/35 [415/240]	Seamless Pipe	C-Mn
1	1.1	ASTM/ASME	A/SA-106	A	K02501		48/30 [330/205]	Seamless Pipe	C-Si
1	1.1	ASTM/ASME	A/SA-106	B	K03006		60/35 [415/240]	Seamless Pipe	C-Mn-Si
1	1.1	ASTM	A108	1015 CW	G10150		—/— [—/—]	Bar	C
1	1.1	ASTM	A108	1018 CW	G10180		—/— [—/—]	Bar	C
1	1.1	ASTM	A108	1020 CW	G10200		—/— [—/—]	Bar	C
1	1.1	ASTM	A131	A	—		58/34 [400/235]	Plate, Shapes, Bar, & Rivets	C
1	1.1	ASTM	A131	B	—		58/34 [400/235]	Plate, Shapes, Bar, & Rivets	C-Mn-Si
1	1.1	ASTM	A131	CS	—		58/34 [400/235]	Plate, Shapes, Bar, & Rivets	C-Mn-Si

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	1.1	ASTM	A131	D	—		58/34 [400/235]	Plate, Shapes, Bar, & Rivets	C-Mn-Si
1	1.1	ASTM	A131	DS	—		58/34 [400/235]	Plate, Shapes, Bar, & Rivets	C-Mn-Si
1	1.1	ASTM/ASME	A/SA-134	SA283, A	K01400		45/24 [310/165]	Welded Pipe	C
1	1.1	ASTM/ASME	A/SA-134	SA283, B	K01702		50/27 [345/185]	Welded Pipe	C
1	1.1	ASTM/ASME	A/SA-134	SA283, C	K02401		55/30 [380/205]	Welded Pipe	C
1	1.1	ASTM/ASME	A/SA-134	SA283, D	K02702		60/33 [415/230]	Welded Pipe	C
1	1.1	ASTM/ASME	A/SA-134	SA285, A	K01700		45/24 [310/165]	Welded Pipe	C
1	1.1	ASTM/ASME	A/SA-134	SA285, B	K02200		50/27 [345/185]	Welded Pipe	C
1	1.1	ASTM/ASME	A/SA-134	SA285, C	K02801		55/30 [380/205]	Welded Pipe	C
1	1.1	ASTM/ASME	A/SA-134	SA36	K02599		58/36 [400/250]	Welded Pipe	C
1	1.1	ASTM/ASME	A/SA-135	A	K02509		48/30 [330/205]	E.R.W. Pipe	C
1	1.1	ASTM/ASME	A/SA-135	B	K03018		60/35 [415/240]	E.R.W. Pipe	C
1	1.1	ASTM	A139	A	K02508		48/30 [330/205]	Welded Pipe	C
1	1.1	ASTM	A139	B	K03003		60/35 [415/240]	Welded Pipe	C
1	1.1	ASTM	A139	C	K03004		60/42 [415/290]	Welded Pipe	C
1	1.1	ASTM	A139	D	K03010		60/46 [415/315]	Welded Pipe	C
1	1.1	ASTM	A139	E	K03012		66/52 [455/360]	Welded Pipe	C
1	—	ASTM	A161	Low Carbon	K01504		47/26 [325/180]	Tube	C
1	1.1	ASTM/ASME	A/SA-178	A	K01200		47/26 [325/180]	E.R.W. Tube	C
1	1.1	ASTM/ASME	A/SA-178	C	K03503		60/37 [415/255]	E.R.W. Tube	C
1	1.1	ASTM/ASME	A/SA-179	—	K01200		47/26 [325/180]	Seamless Tube	C
1	1.1	ASTM/ASME	A/SA-181	Cl. 60	K03502		60/30 [415/205]	Pipe Flange & Fittings	C-Si
1	1.1	ASTM/ASME	A/SA-192	—	K01201		47/26 [325/180]	Seamless Tube	C-Si
1	1.1	ASTM/ASME	A/SA-210	A-1	K02707		60/37 [415/255]	Seamless Tube	C-Si
1	1.1	ASTM	A211	A570-30	K02502		49/30 [340/205]	Welded Pipe	C
1	1.1	ASTM	A211	A570-33	K02502		52/33 [360/230]	Welded Pipe	C
1	1.1	ASTM	A211	A570-40	K02502		55/40 [380/275]	Welded Pipe	C
1	1.1	ASTM/ASME	A/SA-214	—	K01807		47/26 [325/180]	E.R.W. Tube	C
1	1.1	ASTM/ASME	A/SA-216	WCA	J02502		60/30 [415/205]	Castings	C-Si

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	1	1.1	ASTM	A226	—	K01201		47/26 [325/180]	E.R.W. Tube	C-Si
1	1	11.1	ASTM/ASME	A/SA-234	WPB	K03006		60/35 [415/240]	Piping Fittings	C-Mn-Si
1	1	—	ASTM	A252	1	—		50/30 [345/205]	Pipe Piles	C
1	1	—	ASTM	A252	2	—		60/35 [415/240]	Pipe Piles	C
1	1	—	ASTM	A252	3	—		66/45 [455/310]	Pipe Piles	C
1	1	11.1	ASTM/ASME	A/SA-266	1	K03506		60/30 [415/205]	Forgings	C-Si
1	1	1.1	ASTM/ASME	A/SA-283	A	K01400		45/24 [310/165]	Plate	C
1	1	1.1	ASTM/ASME	A/SA-283	B	K01702		50/27 [345/185]	Plate	C
1	1	1.1	ASTM/ASME	A/SA-283	C	K02401		55/30 [380/205]	Plate	C
1	1	1.1	ASTM/ASME	A/SA-283	D	K02702		60/33 [415/230]	Plate	C
1	1	1.1	ASTM/ASME	A/SA-285	A	K01700		45/24 [310/165]	Plate	C
1	1	1.1	ASTM/ASME	A/SA-285	B	K02200		50/27 [345/185]	Plate	C
1	1	1.1	ASTM/ASME	A/SA-285	C	K02801		55/30 [380/205]	Plate	C
1	1	11.1	ASTM/ASME	A/SA-333	1	K03008		55/30 [380/205]	Seamless & Welded Pipe	C-Mn
1	1	11.1	ASTM/ASME	A/SA-333	6	K03006		60/35 [415/240]	Seamless & Welded Pipe	C-Mn-Si
1	1	11.1	ASTM/ASME	A/SA-334	1	K03008		55/30 [380/205]	Welded Tube	C-Mn
1	1	11.1	ASTM/ASME	A/SA-334	6	K03006		60/35 [415/240]	Welded Tube	C-Mn-Si
1	1	11.1	ASTM/ASME	A/SA-350	LF1	K03009		60/30 [415/205]	Forgings	C-Mn-Si
1	1	1.2	ASTM/ASME	A/SA-350	LF6, Cl.1	K12202		66/52 [455/360]	Forgings	C-Mn-Si-V
1	1	11.1	ASTM/ASME	A/SA-352	LCA	J02504		60/30 [415/205]	Castings	C-Si
1	1	1.1	ASTM/ASME	A/SA-352	LCB	J03003		65/35 [450/240]	Castings	C-Si
1	1	1.1	ASTM	A366	CS	—		43/20 [295/140]	Sheet	C
1	1	1.1	ASTM/ASME	A/SA-369	FPA	K02501		48/30 [330/205]	Forged Pipe	C-Si
1	1	1.1	ASTM/ASME	A/SA-369	FPB	K03006		60/35 [415/240]	Forged Pipe	C-Mn-Si
1	1	11.1	ASTM/ASME	A/SA-372	A	K03002		60/35 [415/240]	Forgings	C-Si
1	1	11.1	ASTM	A381	Y35	—		60/35 [415/240]	Welded Pipe	C
1	1	11.1	ASTM	A381	Y42	—		60/42 [415/290]	Welded Pipe	C
1	1	11.1	ASTM	A381	Y46	—		63/46 [435/315]	Welded Pipe	C
1	1	11.1	ASTM	A381	Y48	—		62/48 [425/330]	Welded Pipe	C

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Steel and Steel Alloys</b>									
1	11.1	ASTM	A381	Y50	—		64/50 [440/345]	Welded Pipe	C
1	1.1	ASTM/ASME	A/SA-414	A	K01501		45/25 [310/170]	Sheet	C
1	1.1	ASTM/ASME	A/SA-414	B	K02201		50/30 [345/205]	Sheet	C
1	1.1	ASTM/ASME	A/SA-414	C	K02503		55/33 [380/230]	Sheet	C
1	1.1	ASTM/ASME	A/SA-414	D	K02505		60/35 [415/240]	Sheet	C-Mn
1	1.1	ASTM/ASME	A/SA-414	E	K02704		65/38 [450/260]	Sheet	C-Mn
1	1.1	ASTM/ASME	A/SA-420	WPL6	K03006		60/35 [415/240]	Piping Fittings	C-Mn-Si
1	1.1	ASTM	A500	A	K03000		45/33 [310/230]	Seamless & Welded Tube	C
1	1.1	ASTM	A500	B	K03000		58/42 [400/290]	Seamless & Welded Tube	C
1	1.2	ASTM	A500	C	K02705		62/46 [425/315]	Seamless & Welded Tube	C
1	1.1	ASTM	A500	D	K03000		58/36 [400/250]	Seamless & Welded Tube	C
1	1.1	ASTM	A501	A	K03000		58/36 [400/250]	Seamless & Welded Tube	C
1	1.2	ASTM	A501	B	K03000		70/50 [485/345]	Seamless & Welded Tube	C
1	1.1	ASTM	A512	1008	G10080		40/20 [275/140]	Tube	C
1	1.1	ASTM	A512	1010	G10100		40/20 [275/140]	Tube	C
1	1.1	ASTM	A512	1012	G10120		40/20 [275/140]	Tube	C
1	1.1	ASTM	A512	1015	G10150		40/20 [275/140]	Tube	C
1	—	ASTM	A512	1016	G10160		40/20 [275/140]	Tube	C
1	1.1	ASTM	A512	1018	G10180		43/25 [295/170]	Tube	C
1	—	ASTM	A512	1019	G10190		43/25 [295/170]	Tube	C
1	1.1	ASTM	A512	1020	G10200		50/30 [345/205]	Tube	C
1	—	ASTM	A512	1021	G10210		50/30 [345/205]	Tube	C
1	1.1	ASTM	A512	1026	G10260		55/35 [380/240]	Tube	C
1	—	ASTM	A512	1110	G11100		55/35 [380/240]	Tube	C
1	—	ASTM	A512	1115	G11150		55/35 [380/240]	Tube	C
1	—	ASTM	A512	1117	G11170		40/20 [275/140]	Tube	C
1	1.1	ASTM	A512	MT 1010	G10100		40/20 [275/140]	Tube	C
1	1.1	ASTM	A512	MT 1015	G10150		43/25 [295/170]	Tube	C
1	1.1	ASTM	A512	MT 1020	G10200		50/30 [345/205]	Tube	C

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	1	1.1	ASTM	A512	MTX 1015	—	40/20 [275/140]	Tube	C	
1	1	1.1	ASTM	A512	MTX 1020	—	50/30 [345/205]	Tube	C	
1	1	1.1	ASTM/ASME	A/SA-513	1008	G10080	42/30 [290/205]	Tube	C	
1	1	1.1	ASTM/ASME	A/SA-513	1010	G10100	45/32 [310/220]	Tube	C	
1	1	1.1	ASTM/ASME	A/SA-513	1015	G10150	48/35 [330/240]	Tube	C	
1	1	1.1	ASTM	A513	1015 CW	G10150	—/— [—/—]	Tube	C	
1	1	—	ASTM/ASME	A/SA-513	1017	G10170	48/35 [330/240]	Tube	C	
1	1	1.1	ASTM/ASME	A/SA-513	1018	G10180	48/35 [330/240]	Tube	C	
1	1	—	ASTM/ASME	A/SA-513	1019	G10190	48/35 [330/240]	Tube	C	
1	1	1.1	ASTM/ASME	A/SA-513	1020	G10200	52/38 [360/260]	Tube	C	
1	1	1.1	ASTM/ASME	A/SA-513	1021	G10210	54/40 [370/275]	Tube	C	
1	1	1.1	ASTM/ASME	A/SA-513	1022	G10220	52/38 [360/260]	Tube	C	
1	1	—	ASTM/ASME	A/SA-513	1023	G10230	52/38 [360/260]	Tube	C	
1	1	—	ASTM/ASME	A/SA-513	1024	G10240	52/38 [360/260]	Tube	C	
1	1	1.1	ASTM/ASME	A/SA-513	1026	G10260	62/45 [425/310]	Tube	C	
1	1	1.1	ASTM/ASME	A/SA-513	MT 1010	G10100	45/32 [310/220]	Tube	C	
1	1	1.1	ASTM/ASME	A/SA-513	MT 1015	G10150	—/— [—/—]	Tube	C	
1	1	1.1	ASTM/ASME	A/SA-513	MT 1020	G10200	—/— [—/—]	Tube	C	
1	1	—	ASTM/ASME	A/SA-513	MTX 1015	—	—/— [—/—]	Tube	C	
1	1	—	ASTM/ASME	A/SA-513	MTX 1020	—	—/— [—/—]	Tube	C	
1	1	1.1	ASTM	A515	55	K02001	55/30 [380/205]	Plate	C-Si	
1	1	1.1	ASTM/ASME	A/SA-515	60	—	60/32 [415/220]	Plate	C-Si	
1	1	1.1	ASTM/ASME	A/SA-515	60	K02401	60/32 [415/220]	Plate	C	
1	1	1.1	ASTM/ASME	A/SA-515	65	K02800	65/35 [450/240]	Plate	C-Si	
1	1	1.1	ASTM/ASME	A/SA-516	55	K01800	55/30 [380/205]	Plate	C-Si	
1	1	1.1	ASTM/ASME	A/SA-516	60	K02100	60/32 [415/220]	Plate	C-Mn-Si	
1	1	1.1	ASTM/ASME	A/SA-516	65	K02403	65/35 [450/240]	Plate	C-Mn-Si	
1	1	1.1	ASTM	A519	1008	G10080	40/20 [275/140]	Tube	C	
1	1	1.1	ASTM	A519	1012	G10120	40/20 [275/140]	Tube	C	

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	1.1	ASTM	A519	1015	G10150		40/20 [275/140]	Tube	C
1	—	ASTM	A519	1016	G10160		40/20 [275/140]	Tube	C
1	—	ASTM	A519	1017	G10170		40/20 [275/140]	Tube	C
1	1.1	ASTM	A519	1018	G10180		43/25 [295/170]	Tube	C
1	1.1	ASTM	A519	1018 HR	G10180		— [—]	Tube	C
1	—	ASTM	A519	1019	G10190		50/30 [345/205]	Tube	C
1	1.1	ASTM	A519	1020	G10200		48/28 [330/195]	Tube	C
1	1.1	ASTM	A519	1020 HR	G10200		—/32 [—/220]	Tube	C
1	—	ASTM	A519	1021	G10210		50/30 [345/205]	Tube	C
1	1.1	ASTM	A519	1022	G10220		50/30 [345/205]	Tube	C
1	1.1	ASTM	A519	1022 HR	G10220		— [—]	Tube	C
1	1.1	ASTM	A519	1025 HR	G10250		—/35 [—/240]	Tube	C
1	—	ASTM	A519	1026	G10260		55/35 [380/240]	Tube	C
1	1.1	ASTM	A519	1026 HR	G10260		— [—]	Tube	C
1	1.1	ASTM	A519	MT 1010	G10100		40/20 [275/140]	Tube	C
1	1.1	ASTM	A519	MT 1015	G10150		43/25 [295/170]	Tube	C
1	1.1	ASTM	A519	MT 1020	G10200		50/30 [345/205]	Tube	C
1	—	ASTM	A519	MTX 1015	—		40/20 [275/140]	Tube	C
1	—	ASTM	A519	MTX 1020	—		50/30 [345/205]	Tube	C
1	—	ASTM	A521	CC	—		60/30 [415/205]	Die Forging	C
1	—	ASTM	A521	CC1	—		66/33 [455/230]	Die Forging	C
1	1.1	ASTM	A523	A	K02504		48/30 [330/205]	Pipe	C-Mn
1	1.1	ASTM	A523	B	K03005		60/35 [415/240]	Pipe	C-Mn
1	1.1	ASTM/ASME	A/SA-524	I	K02104		60/35 [415/240]	Seamless Pipe	C-Mn-Si
1	1.1	ASTM/ASME	A/SA-524	II	K02104		55/30 [380/205]	Seamless Pipe	C-Mn-Si
1	—	ASTM	A526	II	—		42/25 [290/170]	Galvanized Sheet	
1	—	ASTM	A527	II	—		42/25 [290/170]	Galvanized Sheet	
1	1.1	ASTM	A529	42	K02703		60/42 [415/290]	Plate, Bar, & Shapes	C-Mn
1	—	ASTM	A539	—	K01506		45/35 [310/240]	Coiled Tube	C

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	1	1.1	ASTM/ASME	A/SA-556	A2	K01807		47/26 [325/180]	Seamless Tube	C
1	1	1.1.1	ASTM/ASME	A/SA-556	B2	K02707		60/37 [415/255]	Seamless Tube	C-Si
1	1	1.1	ASTM/ASME	A/SA-557	A2	K01807		47/26 [325/180]	E.R.W. Tube	C
1	1	1.1.1	ASTM/ASME	A/SA-557	B2	K03007		60/37 [415/255]	E.R.W. Tube	C
1	1	1.1	ASTM/ASME	A/SA-562	—	K11224		55/30 [380/205]	Plate	C-Mn-Ti
1	1	1.1	ASTM	A569	30	K02502		49/30 [340/205]	Sheet & Strip	C
1	1	1.1	ASTM	A569	33	K02502		52/33 [360/230]	Sheet & Strip	C
1	1	1.1	ASTM	A569	36	K02502		53/36 [365/250]	Sheet & Strip	C
1	1	1.1	ASTM	A569	40	K02502		55/40 [380/275]	Sheet & Strip	C
1	1	1.2	ASTM	A569	45	K02502		60/45 [415/310]	Sheet & Strip	C
1	1	1.2	ASTM	A569	50	K02502		65/50 [450/345]	Sheet & Strip	C
1	1	1.1	ASTM	A570	30	K02502		49/30 [340/205]	Sheet & Strip	C
1	1	1.1	ASTM	A570	33	K02502		52/33 [360/230]	Sheet & Strip	C
1	1	1.1	ASTM	A570	36	K02502		53/36 [365/250]	Sheet & Strip	C
1	1	1.1	ASTM	A570	40	K02502		55/40 [380/275]	Sheet & Strip	C
1	1	1.2	ASTM	A570	45	K02502		60/45 [415/310]	Sheet & Strip	C
1	1	1.2	ASTM	A570	50	K02502		65/50 [450/345]	Sheet & Strip	C
1	1	1.3	ASTM	A570	55	K02502		70/55 [485/380]	Sheet & Strip	C
1	1	1.2	ASTM/ASME	A/SA-572	42	—		60/42 [415/290]	Plate & Shapes	C-Mn-Si
1	1	1.2	ASTM/ASME	A/SA-572	50	—		65/50 [450/345]	Plate & Shapes	C-Mn-Si
1	1	1.1.1	ASTM	A573	58	—		58/32 [400/220]	Plate	C
1	1	1.1.1	ASTM	A573	65	—		65/35 [450/240]	Plate	C
1	1	1.1	ASTM	A575	M1008	—		—/— [—/—]	Bar	C
1	1	1.1	ASTM	A575	M1010	—		—/— [—/—]	Bar	C
1	1	1.1	ASTM	A575	M1012	—		—/— [—/—]	Bar	C
1	1	1.1	ASTM	A575	M1015	—		—/— [—/—]	Bar	C
1	1	1.1	ASTM	A575	M1017	—		—/— [—/—]	Bar	C
1	1	1.1.1	ASTM	A575	M1020	—		—/— [—/—]	Bar	C
1	1	1.1.1	ASTM	A575	M1023	—		—/— [—/—]	Bar	C

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	1	11.1	ASTM	A575	M1025	—	—/— [—/—]	Bar	C	
1	1	1.1	ASTM	A576	G10080	—	—/— [—/—]	Bar	C	
1	1	1.1	ASTM	A576	G10100	—	—/— [—/—]	Bar	C	
1	1	1.1	ASTM	A576	G10120	—	—/— [—/—]	Bar	C	
1	1	1.1	ASTM	A576	G10150	—	—/— [—/—]	Bar	C	
1	1	1.1	ASTM	A576	G10160	—	—/— [—/—]	Bar	C	
1	1	1.1	ASTM	A576	G10170	—	—/— [—/—]	Bar	C	
1	1	1.1	ASTM	A576	G10180	—	—/— [—/—]	Bar	C	
1	1	1.1	ASTM	A576	G10190	—	—/— [—/—]	Bar	C	
1	1	1.1	ASTM	A576	G10200	—	—/— [—/—]	Bar	C	
1	1	11.1	ASTM	A576	G10210	—	—/— [—/—]	Bar	C	
1	1	11.1	ASTM	A576	G10220	—	—/— [—/—]	Bar	C	
1	1	11.1	ASTM	A576	G10230	—	—/— [—/—]	Bar	C	
1	1	11.1	ASTM	A576	G10250	—	—/— [—/—]	Bar	C	
1	1	1.1	ASTM/ASME	A/SA-587	—	K11500	48/30 [330/205]	E.R.W. Pipe	C	
1	1	1.1	ASTM/ASME	A/SA-587	A2	K01807	47/26 [325/180]	E.R.W. Tube	C	
1	1	—	ASTM/ASME	A/SA-587	B2	K03007	60/37 [415/255]	E.R.W. Tube	C	
1	1	—	ASTM	A607	45	—	65/45 [450/310]	Sheet & Strip	C-Mn-Cb-V	
1	1	—	ASTM	A607	50	—	65/50 [450/345]	Sheet & Strip	C-Mn-Cb-V	
1	1	—	ASTM	A611	A	G10170	42/25 [290/170]	Sheet & Strip	C	
1	1	—	ASTM	A611	B	G10170	45/30 [310/205]	Sheet & Strip	C	
1	1	—	ASTM	A611	C	G10170	48/33 [330/230]	Sheet & Strip	C	
1	1	1.1	ASTM	A611	D	G10120	52/40 [360/275]	Sheet & Strip	C	
1	1	1.2	ASTM	A618	III	K12700	65/50 [450/345]	Tube	Mn-V	
1	1	1.1	ASTM	A620	A	K00040	40/22 [275/150]	Sheet	C	
1	1	1.1	ASTM	A620	B	K00040	40/22 [275/150]	Sheet	C	
1	1	1.1	ASTM	A633	A	K01802	63/42 [435/290]	Plate & Shapes	Mn-Cb	
1	1	1.1	ASTM	A633	C	K12000	65/46 [450/315] >2.5 and ≤4 >64 and ≤102]	Plate & Shapes	Mn-Cb	

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	1	1.1	ASTM	A633	D	K12037	>2.5 and ≤4 [>64 and ≤102]	65/46 [450/315]	Plate & Shapes	C-Mn-Si
1	1	—	ASTM	A653	33	—	—	45/33 [310/230]	Galvanized Sheet	C
1	1	—	ASTM	A653	37	—	—	52/37 [360/255]	Galvanized Sheet	C
1	1	—	ASTM	A653	40	—	—	55/40 [380/275]	Galvanized Sheet	C
1	1	—	ASTM	A653	80	—	—	82/80 [565/550]	Galvanized Sheet	C
1	1	1.2	ASTM/ASME	A/SA-656	50	K11804	≤2 [≤50]	60/50 [415/345]	Plate	C-Mn-V
1	1	1.3	ASTM/ASME	A/SA-656	60	K11804	≤1.5 [≤40]	70/60 [485/415]	Plate	C-Mn-V
1	1	1.2	ASTM/ASME	A/SA-656	T3, 50	—	—	60/50 [415/345]	Plate	C-Mn-Si-V-Cb
1	1	1.2	ASTM/ASME	A/SA-656	T7, 50	—	—	60/50 [415/345]	Plate	C-Mn-Si-V-Cb
1	1	1.1	ASTM	A659	1015	G10150	—	— [—]	Sheet & Strip	C
1	1	—	ASTM	A659	1016	G10160	—	— [—]	Sheet & Strip	C
1	1	—	ASTM	A659	1017	G10170	—	— [—]	Sheet & Strip	C
1	1	1.1	ASTM	A659	1018	G10180	—	— [—]	Sheet & Strip	C
1	1	1.1	ASTM	A659	1020	G10200	—	— [—]	Sheet & Strip	C
1	1	—	ASTM	A659	1021	G10210	—	— [—]	Sheet & Strip	C
1	1	—	ASTM	A659	1023	G10230	—	— [—]	Sheet & Strip	C
1	1	11.1	ASTM/ASME	A/SA-660	WCA	J02504	—	60/30 [415/205]	Centrifugal Cast Pipe	C-Si
1	1	1.1	ASTM/ASME	A/SA-662	A	K01701	—	58/40 [400/275]	Plate	C-Mn-Si
1	1	1.1	ASTM/ASME	A/SA-662	B	K02203	—	65/40 [450/275]	Plate	C-Mn-Si
1	1	—	ASTM	A663	—	—	—	— [—]	Bar	C
1	1	—	ASTM	A663	45	—	—	45/25 [310/175]	Bars & Shapes	C
1	1	—	ASTM	A663	50	—	—	50/28 [345/195]	Bars & Shapes	C
1	1	—	ASTM	A663	55	—	—	55/30 [380/205]	Bars & Shapes	C
1	1	—	ASTM	A663	60	—	—	60/33 [415/230]	Bars & Shapes	C
1	1	—	ASTM	A663	65	—	—	65/36 [450/250]	Bars & Shapes	C
1	1	1.1	ASTM	A668	B	G10200	—	60/30 [415/205]	Forgings	C
1	1	11.1	ASTM/ASME	A/SA-671	CA55	K02801	—	55/30 [380/205]	Fusion Welded Pipe	C
1	1	1.1	ASTM/ASME	A/SA-671	CB60	K02401	—	60/32 [415/220]	Fusion Welded Pipe	C

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	11.1	ASTM/ASME	A/SA-671	CB65	K02800		65/35 [450/240]	Fusion Welded Pipe	C-Si
1	11.1	ASTM/ASME	A/SA-671	CC60	K02100		60/32 [415/220]	Fusion Welded Pipe	C-Mn-Si
1	11.1	ASTM/ASME	A/SA-671	CC65	K02403		65/35 [450/240]	Fusion Welded Pipe	C-Mn-Si
1	11.1	ASTM/ASME	A/SA-671	CE55	K02202		55/30 [380/205]	Fusion Welded Pipe	C
1	11.1	ASTM/ASME	A/SA-671	CE60	K02402		60/32 [415/220]	Fusion Welded Pipe	C-Mn-Si
1	11.1	ASTM/ASME	A/SA-672	A45	K01700		45/24 [310/165]	Fusion Welded Pipe	C
1	11.1	ASTM/ASME	A/SA-672	A50	K02200		50/27 [345/185]	Fusion Welded Pipe	C
1	11.1	ASTM/ASME	A/SA-672	A55	K02801		55/30 [380/205]	Fusion Welded Pipe	C
1	11.1	ASTM/ASME	A/SA-672	B55	K02001		55/30 [380/205]	Fusion Welded Pipe	C-Si
1	11.1	ASTM/ASME	A/SA-672	B60	K02401		60/32 [415/220]	Fusion Welded Pipe	C
1	11.1	ASTM/ASME	A/SA-672	B65	K02800		65/35 [450/240]	Fusion Welded Pipe	C-Si
1	11.1	ASTM/ASME	A/SA-672	C55	K01800		55/30 [380/205]	Fusion Welded Pipe	C-Si
1	11.1	ASTM/ASME	A/SA-672	C60	K02100		60/32 [415/220]	Fusion Welded Pipe	C-Mn-Si
1	11.1	ASTM/ASME	A/SA-672	C65	K02403		65/35 [450/240]	Fusion Welded Pipe	C-Mn-Si
1	11.1	ASTM/ASME	A/SA-672	E55	K02202		55/30 [380/205]	Fusion Welded Pipe	C
1	11.1	ASTM/ASME	A/SA-672	E60	K02402		60/32 [415/220]	Fusion Welded Pipe	C-Mn-Si
1	11.1	ASTM/ASME	A/SA-675	45	—		45/23 [310/160]	Bar	C
1	11.1	ASTM/ASME	A/SA-675	50	—		50/25 [345/170]	Bar	C
1	11.1	ASTM/ASME	A/SA-675	55	—		55/27 [380/185]	Bar	C
1	11.1	ASTM/ASME	A/SA-675	60	—		60/30 [415/205]	Bar	C
1	11.1	ASTM/ASME	A/SA-675	65	—		65/32 [450/220]	Bar	C
1	11.1	ASTM	A694	F42	K03014		60/42 [415/290]	Forgings	C-Mn
1	11.1	ASTM	A694	F46	K03014		60/46 [415/315]	Forgings	C-Mn
1	11.1	ASTM	A694	F48	K03014		62/48 [425/330]	Forgings	C-Mn
1	11.1	ASTM	A694	F50	K03014		64/50 [440/345]	Forgings	C-Mn
1	11.1	ASTM	A694	F52	K03014		66/52 [455/360]	Forgings	C-Mn
1	11.1	ASTM/ASME	A/SA-695	B, 35	K03504		60/35 [415/240]	Bar	C
1	11.1	ASTM/ASME	A/SA-696	B	K03200		60/35 [415/240]	Bar	C-Mn-Si
1	1.2	ASTM	A707	L1, Cl. 1	K02302		60/42 [415/290]	Forgings	C-Mn

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Steel and Steel Alloys</b>									
1	1.2	ASTM	A707	L1, Cl. 2	K02302		66/52 [455/360]	Forgings	C-Mn
1	11.1	ASTM	A707	L2, Cl. 1	K03301		60/42 [415/290]	Forgings	C-Mn
1	11.1	ASTM	A707	L2, Cl. 2	K03301		66/52 [455/360]	Forgings	C-Mn
1	1.2	ASTM	A707	L3, Cl. 1	K12510		60/42 [415/290]	Forgings	C-Mn-V-N
1	1.2	ASTM	A707	L3, Cl. 2	K12510		66/52 [455/360]	Forgings	C-Mn-V-N
1	—	ASTM	A707	L4, Cl. 1	K12089		60/42 [415/290]	Forgings	1.8Ni-0.6Mn-0.3Mo
1	—	ASTM	A707	L4, Cl. 2	K12089		66/52 [455/360]	Forgings	1.8Ni-0.6Mn-0.3Mo
1	—	ASTM	A707	L5, Cl. 1	K20934		60/42 [415/290]	Forgings	1.1.2Cu-1Ni-0.7Cr-0.5Mn
1	—	ASTM	A707	L5, Cl. 2	K20934		66/52 [455/360]	Forgings	1.2Cu-1Ni-0.7Cr-0.5Mn
1	11.1	ASTM	A709	36	—		58/36 [400/250]	Plate, Bar, & Shapes	C-Mn
1	1.2	ASTM	A709	50	—		65/50 [450/345]	Plate, Bar, & Shapes	C-Mn
1	1.2	ASTM	A709	50S	—		65/50 [450/345]	Plate, Bar, & Shapes	C-Mn
1	11.1	ASTM/ASME	A/SA-727	—	K02506		60/36 [415/250]	Forgings	C-Mn-Si
1	11.1	ASTM/ASME	A/SA-765	I	K03046		60/30 [415/205]	Forgings	C-Mn-Si
1	—	ASTM	A795	E, A	—		60/— [415/—]	Resistance Welded Pipe	C-Mn
1	—	ASTM	A795	E, B	—		60/— [415/—]	Resistance Welded Pipe	C-Mn
1	—	ASTM	A795	F	—		60/— [415/—]	Furnace Welded Pipe	C-Mn
1	—	ASTM	A795	S, A	—		60/— [415/—]	Seamless Pipe	C-Mn
1	—	ASTM	A795	S, B	—		60/— [415/—]	Seamless Pipe	C-Mn
1	1.4	ASTM	A808	—	K11852	≤2.5 [≤64]	60/42 [415/290]	Plate	C-Mn-Cb-V
1	1.1	ASTM	A830	1006	G10060		40/20 [275/140]	Plate	C
1	1.1	ASTM	A830	1008	G10080		40/20 [275/140]	Plate	C
1	1.1	ASTM	A830	1009	G10090		40/20 [275/140]	Plate	C
1	1.1	ASTM	A830	1010	G10100		40/20 [275/140]	Plate	C
1	1.1	ASTM	A830	1012	G10120		40/20 [275/140]	Plate	C
1	1.1	ASTM	A830	1015	G10150		40/20 [275/140]	Plate	C
1	1.1	ASTM	A830	1016	G10160		40/20 [275/140]	Plate	C
1	1.1	ASTM	A830	1017	G10170		40/20 [275/140]	Plate	C
1	1.1	ASTM	A830	1018	G10180		43/25 [295/170]	Plate	C

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	1.1	ASTM	A830	1019	G10190		43/25 [295/170]	Plate	C
1	1.1	ASTM	A830	1020	G10200		43/25 [295/170]	Plate	C
1	1.1	ASTM	A830	1021	G10210		43/25 [295/170]	Plate	C
1	1.1	ASTM	A830	1022	G10220		43/25 [295/170]	Plate	C
1	1.1	ASTM	A830	1023	G10230		43/25 [295/170]	Plate	C
1	1.1	ASTM/ASME	A/SA-836	—	—		55/25 [380/175]	Forgings	C-Si-Ti
1	1.1	ASTM	A857	25	—		38/25 [260/170]	Sheet & Strip	C
1	1.1	ASTM	A857	30	—		49/30 [340/205]	Sheet & Strip	C
1	1.1	ASTM	A857	33	—		52/33 [360/230]	Sheet & Strip	C
1	1.1	ASTM	A857	36	—		53/36 [365/250]	Sheet & Strip	C
1	1.2	ASTM	A935	45 Cl. 1	—		60/45 [415/310]	Sheet & Strip	C-Mn-Cb-V
1	1.2	ASTM	A935	45 Cl. 2	—		55/45 [380/310]	Sheet & Strip	C-Mn-Cb-V
1	1.2	ASTM	A935	50 Cl. 1	—		65/50 [450/345]	Sheet & Strip	C-Mn-Cb-V
1	1.2	ASTM	A935	50 Cl. 2	—		60/50 [415/345]	Sheet & Strip	C-Mn-Cb-V
1	1.3	ASTM	A935	55 Cl. 2	—		65/55 [450/380]	Sheet & Strip	C-Mn-Cb-V
1	1.1	ASTM	A984	35	—		60/35 [415/240]	Pipe	C
1	1.1	ASTM	A992	—	—		65/50 [450/345]	Shapes	C-Mn-Si
1	1.2	ASTM	A992	—	—		65/50 [450/345]	Plate & Shapes	C-Mn
1	1.1	ASTM/ASME	A/SA-1008	CS, A	—		40/20 [275/140]	Sheet	C
1	1.1	ASTM/ASME	A/SA-1008	CS, B	—		40/20 [275/140]	Sheet	C
1	1.1	ASTM	A1008	CS, C	—		40/20 [275/140]	Sheet	C
1	1.1	ASTM	A1008	DS, A	—		40/22 [275/150]	Sheet	C
1	1.1	ASTM/ASME	A/SA-1008	DS, B	—		40/22 [275/150]	Sheet	C
1	1.2	ASTM	A1008	HSLAS 45 Cl. 1	—		60/45 [415/310]	Sheet	C
1	1.2	ASTM	A1008	HSLAS 45 Cl. 2	—		55/45 [380/310]	Sheet	C
1	1.2	ASTM	A1008	HSLAS 50 Cl. 1	—		65/50 [450/345]	Sheet	C
1	1.2	ASTM	A1008	HSLAS 50 Cl. 2	—		60/50 [415/345]	Sheet	C
1	1.3	ASTM	A1008	HSLAS 55 Cl. 2	—		65/55 [450/380]	Sheet	C
1	1.2	ASTM	A1008	HSLAS-F 50	—		60/50 [415/345]	Sheet	C

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	1	1.1	ASTM	A1008	SS 25	—	42/25 [290/170]	Sheet	C	
1	1	1.1	ASTM	A1008	SS 30	—	45/30 [310/205]	Sheet	C	
1	1	1.1	ASTM	A1008	SS 33, 1	—	48/33 [330/230]	Sheet	C	
1	1	1.1	ASTM	A1008	SS 33, 2	—	48/33 [330/230]	Sheet	C	
1	1	1.1	ASTM	A1008	SS 40, 1	—	52/40 [360/275]	Sheet	C	
1	1	1.1	ASTM	A1008	SS 40, 2	—	52/40 [360/275]	Sheet	C	
1	1	1.1	ASTM	A1011	CS, A	—	40/30 [275/205]	Sheet & Strip	C	
1	1	1.1	ASTM/ASME	A/SA-1011	CS, B	—	40/30 [275/205]	Sheet & Strip	C	
1	1	1.1	ASTM	A1011	CS, C	—	40/30 [275/205]	Sheet & Strip	C	
1	1	1.1	ASTM	A1011	CS, D	—	40/30 [275/205]	Sheet & Strip	C	
1	1	1.1	ASTM	A1011	DS, A	—	40/30 [275/205]	Sheet & Strip	C	
1	1	1.1	ASTM/ASME	A/SA-1011	DS, B	—	40/30 [275/205]	Sheet & Strip	C	
1	1	1.2	ASTM	A1011	HSLAS 45 Cl. 1	—	60/45 [415/310]	Sheet & Strip	C	
1	1	1.2	ASTM	A1011	HSLAS 45 Cl. 2	—	55/45 [380/310]	Sheet & Strip	C	
1	1	1.2	ASTM	A1011	HSLAS 50 Cl. 1	—	65/50 [450/345]	Sheet & Strip	C	
1	1	1.2	ASTM	A1011	HSLAS 50 Cl. 2	—	60/50 [415/345]	Sheet & Strip	C	
1	1	1.3	ASTM	A1011	HSLAS 55 Cl. 2	—	65/55 [450/380]	Sheet & Strip	C	
1	1	1.2	ASTM	A1011	HSLAS-F 50	—	60/50 [415/345]	Sheet & Strip	C	
1	1	1.1	ASTM	A1011	SS 30	—	49/30 [340/205]	Sheet & Strip	C	
1	1	1.1	ASTM	A1011	SS 33	—	52/33 [360/230]	Sheet & Strip	C	
1	1	1.1	ASTM	A1011	SS 36, 1	—	53/36 [365/250]	Sheet & Strip	C	
1	1	1.1	ASTM	A1011	SS 36, 2	—	53/36 [365/250]	Sheet & Strip	C	
1	1	1.1	ASTM	A1011	SS 40	—	55/40 [380/275]	Sheet & Strip	C	
1	1	1.2	ASTM	A1011	SS 45, 1	—	60/45 [415/310]	Sheet & Strip	C	
1	1	1.2	ASTM	A1011	SS 45, 2	—	60/45 [415/310]	Sheet & Strip	C	
1	1	1.2	ASTM	A1011	SS 50	—	65/50 [450/345]	Sheet & Strip	C	
1	1	1.2	ASTM	A1018	HSLAS 45 Cl. 1	—	60/45 [415/310]	Sheet & Strip	C	
1	1	1.2	ASTM	A1018	HSLAS 45 Cl. 2	—	55/45 [380/310]	Sheet & Strip	C	
1	1	1.2	ASTM	A1018	HSLAS 50 Cl. 1	—	65/50 [450/345]	Sheet & Strip	C	

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	1	1.2	ASTM	A1018	HSLAS 50 Cl. 2	—		60/50 [415/345]	Sheet & Strip	C
1	1	1.3	ASTM	A1018	HSLAS 55 Cl. 2	—		65/55 [450/380]	Sheet & Strip	C
1	1	1.2	ASTM	A1018	HSLAS-F 50	—		60/50 [415/345]	Sheet & Strip	C
1	1	1.1	ASTM	A1018	SS 30	—		49/30 [340/205]	Sheet & Strip	C
1	1	1.1	ASTM	A1018	SS 33	—		52/33 [360/230]	Sheet & Strip	C
1	1	1.1	ASTM	A1018	SS 36, 1	—		53/36 [365/250]	Sheet & Strip	C
1	1	1.1	ASTM	A1018	SS 36, 2	—		58/36 [400/250]	Sheet & Strip	C
1	1	1.1	CSA	G40.21	260W	—		60/38 [415/260]	Plate, Bar, & Shapes	C-Mn
1	1	1.1	CSA	G40.21	260WT	—		60/38 [415/260]	Plate, Bar, & Shapes	C-Mn-Si-Cb-V
1	1	1.2	CSA	G40.21	300W	—		65/44 [450/305]	Plate, Bar, & Shapes	C-Mn
1	1	1.2	CSA	G40.21	300WT	—		65/44 [450/305]	Plate, Bar, & Shapes	C-Mn-Si-Cb-V
1	1	1.2	CSA	G40.21	350W	—		65/50 [450/345]	Plate, Bar, & Shapes	C-Mn
1	1	1.1	CSA	Z245.1	172	—		45/25 [310/170]	Pipe	C
1	1	1.1	CSA	Z245.1	207	—		48/30 [330/205]	Pipe	C
1	1	1.1	CSA	Z245.1	241	—		60/35 [415/240]	Pipe	C
1	1	1.1	CSA	Z245.1	290	—		60/42 [415/290]	Pipe	C
1	1	1.1	CSA	Z245.11	207	—		48/30 [330/205]	Fittings	C-Mn-Si
1	1	1.1	CSA	Z245.11	241	—		60/35 [415/240]	Fittings	C-Mn-Si
1	1	1.1	CSA	Z245.11	290	—		60/42 [415/290]	Fittings	C-Mn-Si
1	1	1.1	CSA	Z245.12	248	—		60/36 [415/250]	Flanges	C-Mn-Si
1	1	1.1	CSA	Z245.12	290	—		60/42 [415/290]	Flanges	C-Mn-Si
1	1	1.1	MSS	SP-75	WPHY-42	—		60/42 [415/290]	Seamless & Welded Fittings	C-Mn
1	1	1.1	MSS	SP-75	WPHY-46	—		63/46 [435/315]	Seamless & Welded Fittings	C-Mn
1	1	1.1	MSS	SP-75	WPHY-52	—		66/52 [455/360]	Seamless & Welded Fittings	C-Mn
1	2	1.1	AAR	M201	B	—		70/38 [485/260]	Castings	C-Mn-Si
1	2	1.2	ABS	ABS	AH36	K11852		71/51 [490/350]	Plate, Bar, & Shapes	C-Mn-Si
1	2	1.3	ABS	ABS	AH40	K11857		74/57 [510/395]	Plate, Bar, & Shapes	C-Mn-Si
1	2	1.2	ABS	ABS	DH36	K11852		71/51 [490/350]	Plate, Bar, & Shapes	C-Mn-Si
1	2	1.3	ABS	ABS	DH40	K11857		74/57 [510/395]	Plate, Bar, & Shapes	C-Mn-Si

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Steel and Steel Alloys</b>										
1	2	1.2	ABS	ABS	EH36	K11852		71/51 [490/350]	Plate, Bar, & Shapes	C-Mn-Si
1	2	1.3	ABS	ABS	EH40	K11857		74/57 [510/395]	Plate, Bar, & Shapes	C-Mn-Si
1	2	1.2	ABS	ABS	FH36	K11852		71/51 [490/350]	Plate, Bar, & Shapes	C-Mn-Si
1	2	1.3	ABS	ABS	FH40	K11857		74/57 [510/395]	Plate, Bar, & Shapes	C-Mn-Si
1	2	1.2	API	2H	50	—		70/50 [485/345]	Plate	C-Mn
1	2	1.3	API	2W	60	—		75/60 [515/415]	Plate	C-Mn
1	2	1.2	API	2Y	50T	—		70/50 [485/345]	Plate	C-Mn
1	2	1.3	API	2Y	60	—		75/60 [515/415]	Plate	C-Mn
1	2	11.1	API	5L	X56	—		71/56 [490/385]	Seamless & Welded Pipe	C-Mn
1	2	2.1	API	5L	X56M	—		71/56 [490/385]	Welded Pipe	C-Mn
1	2	2.1	API	5L	X56MO	—		71/56 [490/385]	Welded Pipe	C-Mn
1	2	2.1	API	5L	X56MS	—		71/56 [490/385]	Welded Pipe	C-Mn
1	2	1.3	API	5L	X56N	—		71/56 [490/385]	Seamless & Welded Pipe	C-Mn
1	2	3.1	API	5L	X56Q	—		71/56 [490/385]	Seamless & Welded Pipe	C-Mn
1	2	3.1	API	5L	X56QO	—		71/56 [490/385]	Seamless & Welded Pipe	C-Mn
1	2	3.1	API	5L	X56QS	—		71/56 [490/385]	Seamless & Welded Pipe	C-Mn
1	2	11.1	API	5L	X60	—		75/60 [515/415]	Seamless & Welded Pipe	C-Mn
1	2	2.1	API	5L	X60M	—		75/60 [515/415]	Welded Pipe	C-Mn
1	2	2.1	API	5L	X60MO	—		75/60 [515/415]	Welded Pipe	C-Mn
1	2	2.1	API	5L	X60MS	—		75/60 [515/415]	Welded Pipe	C-Mn
1	2	1.3	API	5L	X60N	—		75/60 [515/415]	Seamless & Welded Pipe	C-Mn
1	2	3.1	API	5L	X60Q	—		75/60 [515/415]	Seamless & Welded Pipe	C-Mn
1	2	3.1	API	5L	X60QO	—		75/60 [515/415]	Seamless & Welded Pipe	C-Mn
1	2	3.1	API	5L	X60QS	—		75/60 [515/415]	Seamless & Welded Pipe	C-Mn
1	2	11.1	API	5L	X65	—		78/65 [535/450]	Seamless & Welded Pipe	C-Mn
1	2	2.1	API	5L	X65M	—		78/65 [535/450]	Welded Pipe	C-Mn
1	2	2.1	API	5L	X65MO	—		78/65 [535/450]	Welded Pipe	C-Mn
1	2	2.1	API	5L	X65MS	—		78/65 [535/450]	Welded Pipe	C-Mn
1	2	3.1	API	5L	X65Q	—		78/65 [535/450]	Seamless & Welded Pipe	C-Mn

(Continued)



**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	2	API	5L	X65QO	—		78/65 [535/450]	Seamless & Welded Pipe	C-Mn
1	2	API	5L	X65QS	—		78/65 [535/450]	Seamless & Welded Pipe	C-Mn
1	2	AS ASTM	A945	50	—		70/50 [485/345]	Plate	C-Mn-Si
1	2	AS ASTM	A945	65	—		78/65 [540/450]	Plate	C-Mn-Si-Ti
1	2	AS	1548	5-490	—		71/52 [490/360]	Plate	C
1	2	AS	1548	7-490	—		71/46 [490/320]	Plate	C
1	2	AS	1548	PT490	—		71/46 [490/320]	Plate	C
1	2	AS/NZS	3678	300	—		62.5/46 [430/320]	Plate	C-Mn
1	2	AS/NZS	3678	300L15	—		62.5/46 [430/320]	Plate	C-Mn
1	2	AS/NZS	3678	350	—		65/52 [450/360]	Plate	C-Mn
1	2	AS/NZS	3678	350L15	—		65/52 [450/360]	Plate	C-Mn
1	2	AS/NZS	3678	400	—		70/58 [485/400]	Plate	C-Mn
1	2	AS/NZS	3678	400L15	—		69.5/58 [480/400]	Plate	C-Mn
1	2	AS/NZS	3678	450	—		75.5/65 [520/450]	Plate	C-Mn
1	2	AS/NZS	3678	450L15	—		75.5/65 [520/450]	Plate	C-Mn
1	2	AS/NZS	3679.1	300	—		64/46 [440/320]	Bar & Sections	C-Mn
1	2	AS/NZS	3679.1	300L0	—		64/46 [440/320]	Bar & Sections	C-Mn
1	2	AS/NZS	3679.1	300L15	—		64/46 [440/320]	Bar & Sections	C-Mn
1	2	AS/NZS	3679.1	350	—		70/52 [485/360]	Bar & Sections	C-Mn
1	2	AS/NZS	3679.1	350L0	—		69.5/52 [480/360]	Bar & Sections	C-Mn
1	2	AS/NZS	3679.1	350L15	—		69.5/52 [480/360]	Bar & Sections	C-Mn
1	2	AS/NZS	3679.1	400	—		75.5/58 [520/400]	Bar & Sections	C-Mn
1	2	AS/NZS	3679.1	400L0	—		75.5/58 [520/400]	Bar & Sections	C-Mn
1	2	AS/NZS	3679.1	400L15	—		75.5/58 [520/400]	Bar & Sections	C-Mn
1	2	ASTM	A27	70-36	J03501		70/36 [485/250]	Castings	C
1	2	ASTM	A27	70-40	J02501		70/40 [485/275]	Castings	C
1	2	ASTM/ASME	A/SA-105	—	K03504		70/36 [485/250]	Flanges & Fittings	C
1	2	ASTM/ASME	A/SA-106	C	K03501		70/40 [485/275]	Seamless Pipe	C-Mn-Si
1	2	ASTM	A131	AH32	—		64/46 [440/315]	Plate, Shapes, Bar, & Rivets	C-Mn-Si

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	2	1.2	ASTM	A131	AH36	—		71/51 [490/350]	Plate, Shapes, Bar, & Rivets	C-Mn-Si
1	2	1.2	ASTM	A131	DH32	—		64/46 [440/315]	Plate, Shapes, Bar, & Rivets	C-Mn-Si
1	2	1.2	ASTM	A131	DH36	—		71/51 [490/350]	Plate, Shapes, Bar, & Rivets	C-Mn-Si
1	2	1.1	ASTM	A131	E	—		58/34 [400/235]	Plate, Shapes, Bar, & Rivets	C-Mn-Si
1	2	1.2	ASTM	A131	EH32	—		64/46 [440/315]	Plate, Shapes, Bar, & Rivets	C-Mn-Si
1	2	1.2	ASTM	A131	EH36	—		71/51 [490/350]	Plate, Shapes, Bar, & Rivets	C-Mn-Si
1	2	11.1	ASTM/ASME	A/SA-178	D	K02709		70/40 [485/275]	E.R.W. Tube	C-Mn-Si
1	2	11.1	ASTM/ASME	A/SA-181	Cl. 70	K03502		70/36 [485/250]	Pipe Flange & Fittings	C-Si
1	2	11.1	ASTM/ASME	A/SA-210	C	K03501		70/40 [485/275]	Seamless Tube	C-Mn-Si
1	2	1.1	ASTM/ASME	A/SA-216	WCB	J03002		70/36 [485/250]	Castings	C-Si
1	2	1.1	ASTM/ASME	A/SA-216	WCC	J02503		70/40 [485/275]	Castings	C-Mn-Si
1	2	11.1	ASTM/ASME	A/SA-234	WPC	K03501		70/40 [485/275]	Piping Fittings	C-Mn-Si
1	2	1.2	ASTM	A242	1	K11510	>1.5 and ≤4 [>38 and ≤100]	63/42 [435/290]	Plate, Bar, & Shapes	C
1	2	1.2	ASTM	A242	1	K11510	≤0.75 [≤19]	70/50 [485/345]	Plate, Bar, & Shapes	C
1	2	1.2	ASTM	A242	1	K11510	>0.75 and ≤1.5 [>19 and ≤38]	67/46 [460/315]	Plate, Bar, & Shapes	C
1	2	11.1	ASTM/ASME	A/SA-266	2	K03506		70/36 [485/250]	Forgings	C-Si
1	2	11.2	ASTM/ASME	A/SA-266	3	K05001		75/37.5 [515/260]	Forgings	C-Si
1	2	11.1	ASTM/ASME	A/SA-266	4	K03017		70/36 [485/250]	Forgings	C-Mn-Si
1	2	11.1	ASTM/ASME	A/SA-299	A	K02803		75/40 [515/275]	Plate	C-Mn-Si
1	2	11.1	ASTM/ASME	A/SA-350	LF2	K03011		70/36 [485/250]	Forgings	C-Mn-Si
1	2	1.3	ASTM/ASME	A/SA-350	LF6, Cl. 3	K12202		75/60 [515/415]	Forgings	C-Mn-Si-V
1	2	3.3	ASTM/ASME	A/SA-350	LF787, Cl. 2	K20747		65/55 [450/380]	Forgings	1Ni-1Cu-0.75Cr-Mo-Nb
1	2	11.1	ASTM/ASME	A/SA-352	LCC	J02505		70/40 [485/275]	Castings	C-Mn-Si
1	2	11.1	ASTM	A356	1	J03502		70/36 [485/250]	Castings	C-Si
1	2	11.1	ASTM/ASME	A/SA-372	B	K04001		75/45 [515/310]	Forgings	C-Mn-Si
1	2	11.1	ASTM	A381	Y52	—		66/52 [455/360]	Welded Pipe	C
1	2	11.1	ASTM	A381	Y56	—		71/56 [490/385]	Welded Pipe	C

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	2	11.1	ASTM	A381	Y60	—		75/60 [515/415]	Welded Pipe	C
1	2	11.1	ASTM/ASME	A/SA-414	F	K03102		70/42 [485/290]	Sheet	C-Mn
1	2	11.1	ASTM/ASME	A/SA-414	G	K03103		75/45 [515/310]	Sheet	C-Mn
1	2	—	ASTM	A441	—	K12211	>0.75 and <1.5 [ $\geq 20$ and <40]	67/46 [460/315]	Plate & Bar	C-Mn-Si-Cb-V
1	2	—	ASTM	A441	—	K12211	>1.5 and $\leq 4$ [ $>40$ and $\leq 100$ ]	63/42 [435/290]	Plate & Bar	C-Mn-Si-Cb-V
1	2	—	ASTM	A441	—	K12211	>4 and $\leq 8$ [ $>100$ and $\leq 200$ ]	60/40 [415/275]	Plate & Bar	C-Mn-Si-Cb-V
1	2	—	ASTM	A441	—	K12211	$\leq 0.75$ [ $\leq 20$ ]	70/50 [485/345]	Plate & Bar	C-Mn-Si-Cb-V
1	2	—	ASTM	A441	Group 1	—		70/50 [485/345]	Shapes	C-Mn-Si-Cb-V
1	2	—	ASTM	A441	Group 2	—		70/50 [485/345]	Shapes	C-Mn-Si-Cb-V
1	2	—	ASTM	A441	Group 3	—		67/46 [460/315]	Shapes	C-Mn-Si-Cb-V
1	2	—	ASTM	A441	Group 4	—		63/42 [435/290]	Shapes	C-Mn-Si-Cb-V
1	2	—	ASTM	A441	Group 5	—		63/42 [435/290]	Shapes	C-Mn-Si-Cb-V
1	2	11.2	ASTM/ASME	A/SA-455	—	K03300	>0.375 and <0.580 [ $>10$ and <15]	73/37 [505/255]	Plate	C-Mn-Si
1	2	11.2	ASTM/ASME	A/SA-455	—	K03300	>0.580 and <0.750 [ $>15$ and <19]	70/35 [485/240]	Plate	C-Mn-Si
1	2	11.2	ASTM/ASME	A/SA-455	—	K03300	$\leq 0.375$ [ $\leq 10$ ]	75/38 [515/260]	Plate	C-Mn-Si
1	2	1.1	ASTM/ASME	A/SA-487	16, Cl. A	J31200		70/40 [485/275]	Castings	Low C-Mn-Ni
1	2	11.1	ASTM/ASME	A/SA-508	1	K13502		70/36 [485/250]	Forgings	C
1	2	11.1	ASTM/ASME	A/SA-508	1A	K13502		70/36 [485/250]	Forgings	C
1	2	11.1	ASTM	A512	1025	G10250		55/35 [380/240]	Tube	C
1	2	11.1	ASTM	A512	1030	G10300		65/40 [450/275]	Tube	C
1	2	1.1	ASTM	A513	1020 CW	G10200		— [—]	Tube	C
1	2	11.1	ASTM/ASME	A/SA-513	1025	G10250		56/40 [385/275]	Tube	C
1	2	1.2	ASTM	A513	1025 CW	G10250		— [—]	Tube	C
1	2	11.1	ASTM/ASME	A/SA-513	1030	G10300		62/45 [425/310]	Tube	C
1	2	11.1	ASTM/ASME	A/SA-515	70	K03101		70/38 [485/260]	Plate	C-Si

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	2	11.1	ASTM/ASME	A/SA-516	70	K02700		70/38 [485/260]	Plate	C-Mn-Si
1	2	1.1	ASTM	A519	1018 CW	G10180		-/- [-/-]	Tube	C
1	2	1.1	ASTM	A519	1020 CW	G10200		-60 [-/415]	Tube	C
1	2	1.1	ASTM	A519	1022 CW	G10220		-/- [-/-]	Tube	C
1	2	11.1	ASTM	A519	1025	G10250		53/30 [365/205]	Tube	C
1	2	1.2	ASTM	A519	1025 CW	G10250		-65 [-/450]	Tube	C
1	2	11.1	ASTM	A519	1026 CW	G10260		-/- [-/-]	Tube	C
1	2	—	ASTM	A519	1030	G10300		75/55 [515/380]	Tube	C
1	2	—	ASTM	A521	CE	—		75/37 [515/255]	Die Forging	C
1	2	11.1	ASTM	A529	50	—		70/50 [485/345]	Plate, Bar, & Shapes	C-Mn
1	2	11.1	ASTM	A529	55	—		70/55 [485/380]	Plate, Bar, & Shapes	C-Mn
1	2	1.2	ASTM/ASME	A/SA-537	Cl. 1	K12437	≤2.5 [≤64]	70/50 [485/345]	Plate	C-Mn-Si
1	2	1.2	ASTM/ASME	A/SA-537	Cl. 1	K12437	>2.5 and ≤4 [≥64 and ≤102]	65/45 [450/310]	Plate	C-Mn-Si
1	2	11.1	ASTM/ASME	A/SA-541	1	K03506		70/36 [485/250]	Forgings	C-Si
1	2	11.1	ASTM/ASME	A/SA-541	1A	K03020		70/36 [485/250]	Forgings	C-Mn-Si
1	2	11.1	ASTM/ASME	A/SA-556	C2	K03006		70/40 [485/275]	Seamless Tube	C-Mn-Si
1	2	11.1	ASTM/ASME	A/SA-557	C2	K03505		70/40 [485/275]	E.R.W. Tube	C-Mn
1	2	1.3	ASTM	A572	55	—		70/55 [485/380]	Plate, Sheet, Bar, & Shapes	C-Mn-Si-Cb-V
1	2	11.1	ASTM/ASME	A/SA-572	60	—		75/60 [515/415]	Plate & Shapes	C-Mn-Si
1	2	11.1	ASTM	A573	70	—		70/42 [485/290]	Plate	C
1	2	11.1	ASTM	A595	A	K02004		65/55 [450/380]	Welded Tube	Low C
1	2	11.1	ASTM	A595	B	K02005		70/60 [485/415]	Welded Tube	Low C
1	2	1.4	ASTM	A606	2, CR, AR	—		65/45 [450/310]	Sheet & Strip	C-Mn
1	2	1.4	ASTM	A606	2, HR, A	—		65/45 [450/310]	Sheet & Strip	C-Mn
1	2	1.4	ASTM	A606	2, HR, AR	—		70/50 [485/345]	Sheet & Strip	C-Mn
1	2	1.4	ASTM	A606	2, HR, N	—		65/45 [450/310]	Sheet & Strip	C-Mn
1	2	1.4	ASTM	A606	4, CR, AR	—		65/45 [450/310]	Sheet & Strip	C-Mn
1	2	1.4	ASTM	A606	4, HR, A	—		65/45 [450/310]	Sheet & Strip	C-Mn

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	2	ASTM	A606	4, HR, AR	—		70/50 [485/345]	Sheet & Strip	C-Mn
1	2	ASTM	A606	4, HR, N	—		65/45 [450/310]	Sheet & Strip	C-Mn
1	2	ASTM	A607	55	—		70/55 [485/380]	Sheet & Strip	C-Mn-Cb-V
1	2	ASTM	A618	Ia	—	≤0.75 [≤19]	70/50 [485/345]	Tube	Mn-Cu-V
1	2	ASTM	A618	Ia	—	>0.75 and <1.5 [ $>19$ and $<38$ ]	67/46 [460/315]	Tube	Mn-Cu-V
1	2	ASTM	A618	Ib	—		65/50 [450/345]	Seamless & Welded Tube	C-Mn
1	2	ASTM	A618	Ib	K02601	>0.75 and <1.5 [ $>19$ and $<38$ ]	67/46 [460/315]	Tube	Mn-Cu-V
1	2	ASTM	A618	Ib	K02601	≤0.75 [≤19]	70/50 [485/345]	Tube	Mn-Cu-V
1	2	ASTM	A618	II	K12609	>0.75 and <1.5 [ $>19$ and $<38$ ]	67/46 [460/315]	Tube	Mn-Cu-V
1	2	ASTM	A618	II	K12609	≤0.75 [≤19]	70/50 [485/345]	Tube	Mn-Cu-V
1	2	ASTM	A633	C	K12000	≤2.5 [≤64]	70/50 [485/345]	Plate & Shapes	Mn-Cb
1	2	ASTM	A633	D	K12037	≤2.5 [≤64]	70/50 [485/345]	Plate & Shapes	C-Mn-Si
1	2	ASTM/ASME	A/SA-656	70	K11804	≤1 [≤25]	80/70 [550/485]	Plate	C-Mn-V
1	2	ASTM/ASME	A/SA-656	T3, 60	—		70/60 [485/415]	Plate	C-Mn-Si-V-Cb
1	2	ASTM/ASME	A/SA-656	T7, 60	—		70/60 [485/415]	Plate	C-Mn-Si-V-Cb
1	2	ASTM/ASME	A/SA-660	WCB	J03003		70/36 [485/250]	Centrifugal Cast Pipe	C-Si
1	2	ASTM/ASME	A/SA-660	WCC	J02505		70/40 [485/275]	Centrifugal Cast Pipe	C-Mn-Si
1	2	ASTM/ASME	A/SA-662	C	K02007		70/43 [485/295]	Plate	C-Mn-Si
1	2	ASTM	A663	70	—		70/39 [485/270]	Bars & Shapes	C
1	2	ASTM	A663	75	—		75/41 [515/285]	Bars & Shapes	C
1	2	ASTM	A668	C	G10250		66/33 [455/230]	Forgings	C
1	2	ASTM	A668	D	G10300		75/37 [515/255]	Forgings	C
1	2	ASTM/ASME	A/SA-671	CB70	K03101		70/38 [485/260]	Fusion Welded Pipe	C-Si
1	2	ASTM/ASME	A/SA-671	CC70	K02700		70/38 [485/260]	Fusion Welded Pipe	C-Mn-Si
1	2	ASTM/ASME	A/SA-671	CD70	K12437		70/50 [485/345]	Fusion Welded Pipe	C-Mn-Si
1	2	ASTM/ASME	A/SA-671	CK75	K02803		75/40 [515/275]	Fusion Welded Pipe	C-Mn-Si

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	2	11.1	ASTM/ASME	A/SA-672	B70	K03101		70/38 [485/260]	Fusion Welded Pipe	C-Si
1	2	11.1	ASTM/ASME	A/SA-672	C70	K02700		70/38 [485/260]	Fusion Welded Pipe	C-Mn-Si
1	2	1.2	ASTM/ASME	A/SA-672	D70	K12437		70/45 [485/310]	Fusion Welded Pipe	C-Mn-Si
1	2	11.1	ASTM/ASME	A/SA-672	N75	K02803		75/40 [515/275]	Fusion Welded Pipe	C-Mn-Si
1	2	11.1	ASTM/ASME	A/SA-675	70	—		70/35 [485/240]	Bar	C
1	2	1.2	ASTM	A678	A	K01600	≤1.5 [≤40]	70/50 [485/345]	Plate	C-Mn-Si
1	2	1.4	ASTM	A690	—	K12249	>4 [≥100]	70/50 [485/345]	Marine Piling—Plate & Bar	0.75Mn-0.6Ni-0.12P
1	2	11.1	ASTM/ASME	A/SA-691	CMS-75	K02803		75/40 [515/275]	Fusion Welded Pipe	C-Mn-Si
1	2	1.2	ASTM/ASME	A/SA-691	CMSH-70	K12437	>2.5 and <4 >64 and <102]	65/45 [450/310]	Fusion Welded Pipe	C-Mn-Si
1	2	1.2	ASTM/ASME	A/SA-691	CMSH-70	K12437	≤2.5 [≤64]	70/50 [485/345]	Fusion Welded Pipe	C-Mn-Si
1	2	11.1	ASTM	A694	F56	K03014		68/56 [470/385]	Forgings	C-Mn
1	2	11.1	ASTM	A694	F60	K03014		75/60 [515/415]	Forgings	C-Mn
1	2	11.1	ASTM	A694	F65	K03014		77/65 [530/450]	Forgings	C-Mn
1	2	11.1	ASTM/ASME	A/SA-695	B, 40	K03504		70/40 [485/275]	Bar	C
1	2	11.1	ASTM/ASME	A/SA-696	C	K03200		70/40 [485/275]	Bar	C-Mn-Si
1	2	11.1	ASTM	A707	L2, Cl. 3	K03301		75/60 [515/415]	Forgings	C-Mn
1	2	1.3	ASTM	A707	L3, Cl. 3	K12510		75/60 [515/415]	Forgings	C-Mn-V-N
1	2	—	ASTM	A707	L4, Cl. 3	K12089		75/60 [515/415]	Forgings	1.8Ni-0.6Mn-0.3Mo
1	2	—	ASTM	A707	L5, Cl. 3	K20934		75/60 [515/415]	Forgings	1.2Cu-1Ni-0.7Cr-0.5Mn
1	2	1.4	ASTM	A709	50W, A	—		70/50 [485/345]	Plate, Bar, & Shapes	C-Mn
1	2	1.4	ASTM	A709	50W, B	—		70/50 [485/345]	Plate, Bar, & Shapes	C-Mn
1	2	1.4	ASTM	A709	HPS 50W	—		70/50 [485/345]	Plate, Bar, & Shapes	C-Mn
1	2	11.1	ASTM/ASME	A/SA-737	B	K12001		70/50 [485/345]	Plate	C-Mn-Si-Cb
1	2	11.1	ASTM/ASME	A/SA-738	A	K12447		75/45 [515/310]	Plate	C-Mn-Si
1	2	11.1	ASTM/ASME	A/SA-765	II	K03047		70/36 [485/250]	Forgings	C-Mn-Si
1	2	11.1	ASTM	A830	1025	G10250		43/25 [295/170]	Plate	C
1	2	1.2	ASTM/ASME	A/SA-841	A, Cl. 1	—	>2.5 [≥65]	65/45 [450/310]	Plate	C-Mn-Si
1	2	1.2	ASTM/ASME	A/SA-841	A, Cl. 1	—	≤2.5 [≤65]	70/50 [485/345]	Plate	C-Mn-Si

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	2	1.2	ASTM	A913	50	—	65/50 [450/345]	Shapes	C-Mn-Ni-Cr-Cb-V	
1	2	1.3	ASTM	A935	55 Cl. 1	—	70/55 [485/380]	Sheet & Strip	C-Mn-Cb-V	
1	2	11.1	ASTM	A935	60 Cl. 1	—	75/60 [515/415]	Sheet & Strip	C-Mn-Cb-V	
1	2	1.3	ASTM	A935	60 Cl. 2	—	70/60 [485/415]	Sheet & Strip	C-Mn-Cb-V	
1	2	1.3	ASTM	A935	65 Cl. 2	—	75/65 [515/450]	Sheet & Strip	C-Mn-Cb-V	
1	2	1.2	ASTM	A984	50	—	70/50 [485/345]	Pipe	C	
1	2	1.3	ASTM	A984	60	—	75/60 [515/415]	Pipe	C	
1	2	1.3	ASTM	A1008	HSLAS 55 Cl. 1	—	70/55 [485/380]	Sheet	C	
1	2	11.1	ASTM	A1008	HSLAS 60 Cl. 1	—	75/60 [515/415]	Sheet	C	
1	2	1.3	ASTM	A1008	HSLAS 60 Cl. 2	—	70/60 [485/415]	Sheet	C	
1	2	1.3	ASTM	A1008	HSLAS 65 Cl. 2	—	75/65 [515/450]	Sheet	C	
1	2	1.3	ASTM	A1008	HSLAS-F 60	—	70/60 [485/415]	Sheet	C	
1	2	1.3	ASTM	A1011	HSLAS 55 Cl. 1	—	70/55 [485/380]	Sheet & Strip	C	
1	2	11.1	ASTM	A1011	HSLAS 60 Cl. 1	—	75/60 [515/415]	Sheet & Strip	C	
1	2	1.3	ASTM	A1011	HSLAS 60 Cl. 2	—	70/60 [485/415]	Sheet & Strip	C	
1	2	1.3	ASTM	A1011	HSLAS 65 Cl. 2	—	75/65 [515/450]	Sheet & Strip	C	
1	2	1.3	ASTM	A1011	HSLAS-F 60	—	70/60 [485/415]	Sheet & Strip	C	
1	2	1.3	ASTM	A1011	SS 55	—	70/55 [485/380]	Sheet & Strip	C	
1	2	1.3	ASTM	A1011	SS 60	—	75/60 [515/415]	Sheet & Strip	C	
1	2	1.3	ASTM	A1018	HSLAS 55 Cl. 1	—	70/55 [485/380]	Sheet & Strip	C	
1	2	11.1	ASTM	A1018	HSLAS 60 Cl. 1	—	70/60 [485/415]	Sheet & Strip	C	
1	2	1.3	ASTM	A1018	HSLAS 60 Cl. 2	—	70/60 [485/415]	Sheet & Strip	C	
1	2	11.1	ASTM	A1018	HSLAS 65 Cl. 1	—	80/65 [550/450]	Sheet & Strip	C	
1	2	1.3	ASTM	A1018	HSLAS 65 Cl. 2	—	75/65 [515/450]	Sheet & Strip	C	
1	2	1.4	CSA	G40.21	350A	—	70/50 [485/345]	HSLA Plate, Bar, & Shapes	C-Mn-Si-Cb-V	
1	2	1.4	CSA	G40.21	350AT	—	70/50 [485/345]	HSLA Plate, Bar, & Shapes	C-Mn-Si-Cb-V	
1	2	1.4	CSA	G40.21	350R	—	70/50 [485/345]	HSLA Plate, Bar, & Shapes	C-Mn-P	
1	2	1.2	CSA	G40.21	350WT	—	70/50 [485/345]	Plate, Bar, & Shapes	C-Mn-Si-Cb-V	
1	2	1.3	CSA	G40.21	380W	—	70/55 [485/380]	Plate, Bar, & Shapes	C-Mn	

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	2	1.3	CSA	G40.21	380WT	—	—	70/55 [485/380]	Plate, Bar, & Shapes	C-Mn-Si-Cb-V
1	2	1.4	CSA	G40.21	400A	—	—	75/60 [515/415]	HSLA Plate, Bar, & Shapes	C-Mn-Si-Cb-V
1	2	1.4	CSA	G40.21	400AT	—	—	75/60 [515/415]	HSLA Plate, Bar, & Shapes	C-Mn-Si-Cb-V
1	2	1.3	CSA	G40.21	400W	—	—	75/60 [515/415]	HSLA Plate, Bar, & Shapes	C-Mn
1	2	1.3	CSA	G40.21	400WT	—	—	75/60 [515/415]	HSLA Plate, Bar, & Shapes	C-Mn-Si-Cb-V
1	2	11.1	CSA	Z245.1	317	—	—	63/46 [435/315]	Pipe	C-Mn
1	2	11.1	CSA	Z245.1	359	—	—	66/52 [455/360]	Pipe	C-Mn
1	2	11.1	CSA	Z245.1	386	—	—	71/56 [490/385]	Pipe	C-Mn
1	2	11.1	CSA	Z245.11	317	—	—	63/46 [435/315]	Fittings	C-Mn-Si
1	2	11.1	CSA	Z245.11	359	—	—	66/52 [455/360]	Fittings	C-Mn-Si
1	2	11.1	CSA	Z245.11	386	—	—	71/56 [490/385]	Fittings	C-Mn-Si
1	2	11.1	CSA	Z245.12	317	—	—	63/46 [435/315]	Flanges	C-Mn-Si
1	2	11.1	CSA	Z245.12	359	—	—	66/52 [455/360]	Flanges	C-Mn-Si
1	2	11.1	CSA	Z245.12	386	—	—	71/56 [490/385]	Flanges	C-Mn-Si
1	2	11.1	MSS	SP-75	WPHY-56	—	—	71/56 [490/385]	Seamless & Welded Fittings	C-Mn
1	2	11.1	MSS	SP-75	WPHY-60	—	—	75/60 [515/415]	Seamless & Welded Fittings	C-Mn
1	2	11.1	MSS	SP-75	WPHY-65	—	—	77/65 [530/450]	Seamless & Welded Fittings	C-Mn
1	3	11.1	AAR	M201	B+	—	—	80/50 [550/345]	Castings	C-Mn-Si
1	3	11.1	API	5L	X70	—	—	83/70 [570/485]	Seamless & Welded Pipe	C-Mn
1	3	2.2	API	5L	X70M	—	—	83/70 [570/485]	Welded Pipe	C-Mn
1	3	2.2	API	5L	X70MO	—	—	83/70 [570/485]	Welded Pipe	C-Mn
1	3	2.2	API	5L	X70MS	—	—	83/70 [570/485]	Welded Pipe	C-Mn
1	3	3.1	API	5L	X70Q	—	—	83/70 [570/485]	Seamless & Welded Pipe	C-Mn
1	3	3.1	API	5L	X70QO	—	—	83/70 [570/485]	Seamless & Welded Pipe	C-Mn
1	3	3.1	API	5L	X70QS	—	—	83/70 [570/485]	Seamless & Welded Pipe	C-Mn
1	3	2.2	AS/NZS	1594	XF500	—	—	83/69.5 [570/480]	Plate, Sheet, Strip	C-Mn
1	3	11.1	ASTM/ASME	A/SA-299	B	K02803	—	80/45 [550/310]	Plate	C-Mn-Si
1	3	11.1	ASTM/ASME	A/SA-333	10	—	—	80/65 [550/450]	Seamless & Welded Pipe	C-Mn-Si
1	3	4.1	ASTM/ASME	A/SA-350	LF6, Cl.2	K12202	—	75/60 [515/415]	Forgings	C-Mn-Si-V

(Continued)



**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	3	3.3	ASTM/ASME	A/SA-350	LF787, Cl.3	K20747		75/65 [515/450]	Forgings	INi-1Cu-0.75Cr-Mo-Nb
1	3	11.1	ASTM	A381	Y65	—		77/65 [530/450]	Welded Pipe	C
1	3	11.1	ASTM	A513	1026 CW	G10260		— [—]	Tube	C
1	3	1.2	ASTM/ASME	A/SA-537	Cl. 2	K12437	>2.5 and ≤4 [>64 and ≤102]	75/55 [515/380]	Plate	C-Mn-Si
1	3	1.2	ASTM/ASME	A/SA-537	Cl. 2	K12437	≤2.5 [≤64]	80/60 [550/415]	Plate	C-Mn-Si
1	3	1.2	ASTM/ASME	A/SA-537	Cl. 2	K12437	>4 and ≤6 [>102 and ≤152]	70/46 [485/315]	Plate	C-Mn-Si
1	3	1.2	ASTM/ASME	A/SA-537	Cl. 3	K12437	>4 [>102]	70/40 [485/275]	Plate	C-Mn-Si
1	3	1.2	ASTM/ASME	A/SA-537	Cl. 3	K12437	>2.5 and ≤4 [>64 and ≤102]	75/50 [515/345]	Plate	C-Mn-Si
1	3	1.2	ASTM/ASME	A/SA-537	Cl. 3	K12437	≤2.5 [≤64]	80/55 [550/380]	Plate	C-Mn-Si
1	3	11.1	ASTM	A572	65	—		80/65 [550/450]	Plate, Sheet, Bar, & Shapes	C-Mn-Si-Cb-V
1	3	—	ASTM	A607	60	—		75/60 [515/415]	Sheet & Strip	C-Mn-Cb-V
1	3	—	ASTM	A607	65	—		80/65 [550/450]	Sheet & Strip	C-Mn-Cb-V
1	3	—	ASTM	A607	70	—		85/70 [585/485]	Sheet & Strip	C-Mn-Cb-V
1	3	—	ASTM	A611	E	G10170		82/80 [565/550]	Sheet & Strip	C
1	3	4.1	ASTM	A633	E	K12202		80/55 [550/380]	Plate & Shapes	C-Mn-Si-V
1	3	1.3	ASTM/ASME	A/SA-656	80	K11804	≤0.75 [≤20]	90/80 [620/550]	Plate	C-Mn-V
1	3	2.2	ASTM/ASME	A/SA-656	T3, 70	—		80/70 [550/485]	Plate	C-Mn-Si-V-Cb
1	3	2.2	ASTM/ASME	A/SA-656	T7, 70	—		80/70 [550/485]	Plate	C-Mn-Si-V-Cb
1	3	—	ASTM	A663	80	—		80/44 [550/305]	Bars & Shapes	C
1	3	11.1	ASTM	A668	F	—	≤4 [≤100]	90/55 [620/380]	Forgings	C
1	3	11.1	ASTM	A668	F	—	>4 and ≤10 [>100 and ≤250]	85/50 [585/345]	Forgings	C
1	3	11.1	ASTM	A668	F	—	>10 and ≤20 [>250 and ≤500]	82/48 [565/330]	Forgings	C
1	3	1.2	ASTM/ASME	A/SA-671	CD80	K12437		80/60 [550/415]	Fusion Welded Pipe	C-Mn-Si
1	3	1.2	ASTM/ASME	A/SA-672	D80	K12437		80/46 [550/315]	Fusion Welded Pipe	C-Mn-Si
1	3	—	ASTM/ASME	A/SA-675	80	—		80/40 [550/275]	Bar	C

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	3	1.3	ASTM	A678	B	K02002	≤2.5 [≤65]	80/60 [550/415]	Plate	C-Mn-Si
1	3	1.3	ASTM	A678	C	K02204	>1.5 and ≤2 >40 and ≤50]	85/65 [585/450]	Plate	C-Mn-Si
1	3	1.2	ASTM/ASME	A/SA-691	CMSH-80	K12437	≤2.5 [≤64]	80/60 [550/415]	Fusion Welded Pipe	C-Mn-Si
1	3	1.2	ASTM/ASME	A/SA-691	CMSH-80	K12437	>2.5 and <4 >64 and <102]	75/55 [515/380]	Fusion Welded Pipe	C-Mn-Si
1	3	11.1	ASTM	A694	F70	K03014		82/70 [565/485]	Forgings	C-Mn
1	3	4.1	ASTM/ASME	A/SA-737	C	K12202		80/60 [550/415]	Plate	C-Mn-Si-V
1	3	11.1	ASTM/ASME	A/SA-738	B	K12007		85/60 [585/415]	Plate	C-Mn-Si-Cb
1	3	11.1	ASTM/ASME	A/SA-738	C	K02008	>2.5 and ≤4 >64 and ≤102]	75/55 [515/380]	Plate	C-Mn-Si
1	3	11.1	ASTM/ASME	A/SA-738	C	K02008	≤2.5 [≤64]	80/60 [550/415]	Plate	C-Mn-Si
1	3	11.1	ASTM/ASME	A/SA-738	C	K02008	>4 and ≤6 >102 and ≤152]	70/46 [485/315]	Plate	C-Mn-Si
1	3	1.1	ASTM/ASME	A/SA-765	IV	K02009		80/50 [550/345]	Forgings	C-Mn-Si
1	3	1.3	ASTM/ASME	A/SA-841	B, Cl. 2	—	≤2.5 [≤65]	80/60 [550/415]	Plate	C-Mn-Si
1	3	1.3	ASTM/ASME	A/SA-841	B, Cl. 2	—	>2.5 [>65]	75/55 [515/380]	Plate	C-Mn-Si
1	3	3.1	ASTM	A913	60	—		75/60 [515/415]	Shapes	C-Mn-Ni-Cr-Cb-V
1	3	3.1	ASTM	A913	65	—		80/65 [550/450]	Shapes	C-Mn-Ni-Cr-Cb-V
1	3	3.1	ASTM	A913	70	—		80/70 [550/485]	Shapes	C-Mn-Ni-Cr-Cb-V
1	3	11.1	ASTM	A935	65 Cl. 1	—		80/65 [550/450]	Sheet & Strip	C-Mn-Cb-V
1	3	11.1	ASTM	A935	70 Cl. 1	—		85/70 [585/485]	Sheet & Strip	C-Mn-Cb-V
1	3	1.3	ASTM	A935	70 Cl. 2	—		80/70 [550/485]	Sheet & Strip	C-Mn-Cb-V
1	3	—	ASTM	A984	70	—		80/70 [550/485]	Pipe	C
1	3	11.1	ASTM	A1008	HSLAS 65 Cl. 1	—		80/65 [550/450]	Sheet	C
1	3	11.1	ASTM	A1008	HSLAS 70 Cl. 1	—		85/70 [585/485]	Sheet	C
1	3	1.3	ASTM	A1008	HSLAS 70 Cl. 2	—		80/70 [550/485]	Sheet	C
1	3	1.3	ASTM	A1008	HSLAS-F 70	—		80/70 [550/485]	Sheet	C
1	3	1.3	ASTM	A1008	SS 80	—		82/80 [565/550]	Sheet	C

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	3	11.1	ASTM	A1011	HSLAS 65 Cl. 1	—		80/65 [550/450]	Sheet & Strip	C
1	3	11.1	ASTM	A1011	HSLAS 70 Cl. 1	—		85/70 [585/485]	Sheet & Strip	C
1	3	1.3	ASTM	A1011	HSLAS 70 Cl. 2	—		80/70 [550/485]	Sheet & Strip	C
1	3	1.3	ASTM	A1011	HSLAS-F 70	—		80/70 [550/485]	Sheet & Strip	C
1	3	1.3	ASTM	A1011	SS 70	—		85/70 [585/485]	Sheet & Strip	C
1	3	11.1	ASTM	A1018	HSLAS 70 Cl. 1	—		80/70 [550/485]	Sheet & Strip	C
1	3	1.3	ASTM	A1018	HSLAS 70 Cl. 2	—		80/70 [550/485]	Sheet & Strip	C
1	3	1.3	ASTM	A1018	HSLAS-F 60	—		70/60 [485/415]	Sheet & Strip	C
1	3	1.3	ASTM	A1018	HSLAS-F 70	—		80/70 [550/485]	Sheet & Strip	C
1	3	1.4	CSA	G40.21	480A	—		85/70 [585/485]	HSLA Plate, Bar, & Shapes	C-Mn-Si-Cb-V
1	3	1.4	CSA	G40.21	480AT	—		85/70 [585/485]	HSLA Plate, Bar, & Shapes	C-Mn-Si-Cb-V
1	3	11.1	CSA	G40.21	480W	—		85/70 [585/485]	HSLA Plate, Bar, & Shapes	C-Mn
1	3	11.1	CSA	G40.21	480WT	—		85/70 [585/485]	HSLA Plate, Bar, & Shapes	C-Mn-Si-Cb-V
1	3	11.1	CSA	Z245.1	414	—		75/60 [515/415]	Pipe	C-Mn
1	3	11.1	CSA	Z245.1	448	—		77/65 [530/450]	Pipe	C-Mn
1	3	11.1	CSA	Z245.1	483	—		82/70 [565/485]	Pipe	C-Mn
1	3	11.1	CSA	Z245.11	414	—		75/60 [515/415]	Fittings	C-Mn-Si
1	3	11.1	CSA	Z245.11	448	—		77/65 [530/450]	Fittings	C-Mn-Si
1	3	11.1	CSA	Z245.11	483	—		82/70 [565/485]	Fittings	C-Mn-Si
1	3	11.1	CSA	Z245.12	414	—		75/60 [515/415]	Flanges	C-Mn-Si
1	3	11.1	CSA	Z245.12	448	—		77/65 [530/450]	Flanges	C-Mn-Si
1	3	11.1	CSA	Z245.12	483	—		82/70 [565/485]	Flanges	C-Mn-Si
1	3	11.1	MSS	SP-75	WPHY-70	—		82/70 [565/485]	Seamless & Welded Fittings	C-Mn
1	4	11.1	AAR	M201	C	—		90/60 [620/415]	Castings	C-Mn-Si
1	4	2.2	API	5L	X80M	—		91/80 [625/550]	Welded Pipe	C-Mn
1	4	2.2	API	5L	X80MO	—		91/80 [625/550]	Welded Pipe	C-Mn
1	4	3.1	API	5L	X80Q	—		91/80 [625/550]	Seamless & Welded Pipe	C-Mn
1	4	3.1	API	5L	X80QO	—		91/80 [625/550]	Seamless & Welded Pipe	C-Mn
1	4	2.2	ASTM/ASME	A/SA-656	T3, 80	—		90/80 [620/550]	Plate	C-Mn-Si-V-Cb

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
1	4	2.2	ASTM/ASME	A/SA-656	T7, 80	—	—	90/80 [620/550]	Plate	C-Mn-Si-V-Cb
1	4	—	ASTM/ASME	A/SA-675	90	—	—	90/55 [620/380]	Bar	C
1	4	1.3	ASTM	A678	C	K02204	≤0.75 [≤20]	95/75 [655/515]	Plate	C-Mn-Si
1	4	1.3	ASTM	A678	C	K02204	>0.75 and ≤1.5 [ >20 and ≤40]	90/70 [620/485]	Plate	C-Mn-Si
1	4	1.3	ASTM	A678	D	K12202	≤3 [≤75]	90/75 [620/515]	Plate	C-Mn-Si-V-N
1	4	—	ASTM	A707	L5, Cl. 4	K20934	—	90/75 [620/515]	Forgings	1.2Cu-1Ni-0.7Cr-0.5Mn
1	4	3.1	ASTM/ASME	A/SA-724	A	K11831	—	90/70 [620/485]	Plate	C-Mn-Si
1	4	3.1	ASTM/ASME	A/SA-724	B	K12031	—	95/75 [655/515]	Plate	C-Mn-Si
1	4	1.1	ASTM/ASME	A/SA-724	C	K12037	—	90/70 [620/485]	Plate	C-Mn-Si
1	4	—	ASTM	A984	80	—	—	90/80 [620/550]	Pipe	C
1	4	1.3	ASTM	A1008	HSLAS-F 80	—	—	90/80 [620/550]	Sheet	C
1	4	1.3	ASTM	A1011	HSLAS-F 80	—	—	90/80 [620/550]	Sheet & Strip	C
1	4	1.3	ASTM	A1011	SS 80	—	—	95/80 [655/550]	Sheet & Strip	C
1	4	1.3	ASTM	A1018	HSLAS-F 80	—	—	90/80 [620/550]	Sheet & Strip	C
1	4	1.4	CSA	G40.21	550A	—	—	90/80 [620/550]	Plate, Bar, & Shapes	C-Mn-Si
1	4	1.4	CSA	G40.21	550AT	—	—	90/80 [620/550]	Plate, Bar, & Shapes	C-Mn-Si
1	4	1.3	CSA	G40.21	550W	—	—	90/80 [620/550]	Plate, Bar, & Shapes	C-Mn
1	4	1.3	CSA	G40.21	550WT	—	—	90/80 [620/550]	Plate, Bar, & Shapes	C-Mn-Si
1	4	11.1	CSA	Z245.1	550	—	—	90/80 [620/550]	Pipe	C-Mn
1	4	11.1	CSA	Z245.11	550	—	—	90/80 [620/550]	Fittings	C-Mn-Si
10A	1	4.1	ASTM/ASME	A/SA-225	C	K12524	—	105/70 [725/485]	Plate	Mn-0.5Ni-V
10A	1	2.1	ASTM/ASME	A/SA-225	D	K12004	>3 [>76]	75/55 [515/380]	Plate	Mn-0.5Ni-V
10A	1	2.1	ASTM/ASME	A/SA-225	D	K12004	≤3 [≤76]	80/60 [550/415]	Plate	Mn-0.5Ni-V
10A	1	2.1	ASTM/ASME	A/SA-487	1, Cl. A	J13002	—	85/55 [585/380]	Castings	Mn-V
10A	1	2.1	ASTM/ASME	A/SA-487	1, Cl. B	J13002	—	90/65 [620/450]	Castings	Mn-V
10B	1	4.1	ASTM/ASME	A/SA-213	TT17	K12047	—	60/30 [415/205]	Seamless Tube	1Cr-V
10C	1	11.1	AAR	TC128	B	—	—	81/50 [560/345]	Plate	C-Mn-Si
10C	1	1.3	ASTM/ASME	A/SA-612	—	K02900	≤0.5 [≤13]	83/50 [570/345]	Plate	C-Mn-Si

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
10C	1	1.3	ASTM/ASME A/SA-612	—	K02900	>0.5 and <1 [>13 and <25]	81/50 [560/345]	Plate	C-Mn-Si
10H	1	10.1	ASTM/ASME A/SA-182	—	S32202		94/65 [650/450]	Forgings	22Cr-2Ni-Mo-N
10H	1	10.2	ASTM/ASME A/SA-182	F50	S31200		100/65 [690/450]	Forgings	25Cr-6Ni-Mo-N
10H	1	10.1	ASTM/ASME A/SA-182	F51	S31803		90/65 [620/450]	Forgings	22Cr-5Ni-3Mo-N
10H	1	10.2	ASTM/ASME A/SA-182	F53	S32750		116/80 [800/550]	Forgings	25Cr-7Ni-4Mo-N
10H	1	10.2	ASTM/ASME A/SA-182	F54	S39274		116/80 [800/550]	Forgings	25Cr-7Ni-3Mo-2W-Cu-N
10H	1	10.1	ASTM/ASME A/SA-182	F55	S32760		109/80 [750/550]	Forgings	25Cr-8Ni-3Mo-W-Cu-N
10H	1	10.1	ASTM/ASME A/SA-182	F60	S32205		95/70 [655/485]	Forgings	22Cr-5Ni-3Mo-N
10H	1	10.2	ASTM/ASME A/SA-182	F61	S32550		109/80 [750/550]	Forgings	25Cr-5Ni-3Mo-2Cu
10H	1	10.1	ASTM/ASME A/SA-240	—	S32003		90/65 [620/450]	Plate, Sheet, & Strip	21Cr-3.5Ni-Mo-N
10H	1	10.1	ASTM/ASME A/SA-240	—	S32101	>0.25 [>6]	95/65 [655/450]	Plate, Sheet, & Strip	21Cr-5Mn-1.5Ni-Cu-N
10H	1	10.1	ASTM/ASME A/SA-240	—	S32101	≤0.25 [≤6]	101/77 [700/530]	Plate, Sheet, & Strip	21Cr-5Mn-1.5Ni-Cu-N
10H	1	10.1	ASTM/ASME A/SA-240	—	S32202		94/65 [650/450]	Plate, Sheet, & Strip	22Cr-2Ni-Mo-N
10H	1	10.1	ASTM/ASME A/SA-240	2205	S32205		95/65 [655/450]	Plate, Sheet, & Strip	22Cr-5Ni-3Mo-N
10H	1	10.2	ASTM/ASME A/SA-240	329	S32900		90/70 [620/485]	Plate, Sheet, & Strip	26Cr-4Ni-Mo
10H	1	10.2	ASTM/ASME A/SA-240	S31200	S31200		100/65 [690/450]	Plate, Sheet, & Strip	25Cr-6Ni-Mo-N
10H	1	10.2	ASTM/ASME A/SA-240	S31260	S31260		100/70 [690/485]	Plate, Sheet, & Strip	25Cr-6.5Ni-3Mo-N
10H	1	10.1	ASTM/ASME A/SA-240	S31803	S31803		90/65 [620/450]	Plate, Sheet, & Strip	22Cr-5Ni-3Mo-N
10H	1	10.2	ASTM/ASME A/SA-240	S32550	S32550		110/80 [760/550]	Plate, Sheet, & Strip	25Cr-5Ni-3Mo-2Cu
10H	1	10.2	ASTM/ASME A/SA-240	S32750	S32750		116/80 [800/550]	Plate, Sheet, & Strip	25Cr-7Ni-4Mo-N
10H	1	10.2	ASTM/ASME A/SA-240	S32760	S32760		108/80 [745/550]	Plate, Sheet, & Strip	25Cr-8Ni-3Mo-W-Cu-N
10H	1	10.2	ASTM/ASME A/SA-240	S32906	S32906	≥0.40 [≥10]	109/80 [750/550]	Plate, Sheet, & Strip	29Cr-6.5Ni-2Mo-N
10H	1	10.2	ASTM/ASME A/SA-240	S32906	S32906	<0.40 [<10]	116/94 [800/650]	Plate, Sheet, & Strip	29Cr-6.5Ni-2Mo-N
10H	1	10.2	ASTM/ASME A/SA-240	S32950	S32950		100/70 [690/485]	Plate, Sheet, & Strip	26Cr-4Ni-Mo-N
10H	1	10.1	ASTM A276	—	S32101		94/65 [650/450]	Bar	21Cr-5Mn-1.5Ni-Cu-N
10H	1	10.1	ASTM/ASME A/SA-276	—	S32550		94/65 [650/450]	Bars & Shapes	25Cr-5Ni-3Mo-2Cu
10H	1	10.1	ASTM/ASME A/SA-276	S32205	S32205		95/65 [655/450]	Bar	22Cr-5Ni-3Mo-N
10H	1	10.2	ASTM/ASME A/SA-351	CD3MWCuN	J93380		100/65 [690/450]	Castings	25Cr-8Ni-3Mo-W-Cu-N

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
10H	1	10.2	ASTM/ASME	A/SA-351	CD4MCu	J93370		100/70 [690/485]	Castings	26Cr-5Ni-2Mo-3Cu
10H	1	10.2	ASTM/ASME	A/SA-351	CE8MN	J93345		95/65 [655/450]	Castings	24Cr-10Ni-4Mo-N
10H	1	10.1	ASTM/ASME	A/SA-479	—	S31803		90/65 [620/450]	Bars & Shapes	22Cr-5Ni-3Mo-N
10H	1	10.1	ASTM/ASME	A/SA-479	—	S32101		94/65 [650/450]	Bars & Shapes	21Cr-5Mn-1.5Ni-Cu-N
10H	1	10.1	ASTM/ASME	A/SA-479	—	S32202		94/65 [650/450]	Bars & Shapes	22Cr-2Ni-Mo-N
10H	1	10.1	ASTM/ASME	A/SA-479	2205	S32205		95/65 [655/450]	Bars & Shapes	22Cr-5Ni-3Mo-N
10H	1	10.2	ASTM/ASME	A/SA-479	S32550	S32550		110/80 [760/550]	Bars & Shapes	25Cr-5Ni-3Mo-2Cu
10H	1	10.2	ASTM/ASME	A/SA-479	S32750	S32750		116/80 [800/550]	Bars & Shapes	25Cr-7Ni-4Mo-N
10H	1	10.2	ASTM	A479	S32906	S32906		109/80 [750/550]	Bars & Shapes	29Cr-6.5Ni-2Mo-N
10H	1	10.1	ASTM/ASME	A/SA-789	—	S32003		100/70 [690/485]	Seamless & Welded Tube	21Cr-3.5Ni-Mo-N
10H	1	10.1	ASTM/ASME	A/SA-789	—	S32101	>0.187 [ $\geq 5$ ]	94/65 [650/450]	Seamless & Welded Tube	21Cr-5Mn-1.5Ni-Cu-N
10H	1	10.1	ASTM/ASME	A/SA-789	—	S32101	$\leq 0.187$ [ $\leq 5$ ]	101/77 [700/530]	Seamless & Welded Tube	21Cr-5Mn-1.5Ni-Cu-N
10H	1	10.1	ASTM/ASME	A/SA-789	—	S32202		94/65 [650/450]	Seamless & Welded Tube	22Cr-2Ni-Mo-N
10H	1	10.2	ASTM/ASME	A/SA-789	S31200	S31200		100/65 [690/450]	Seamless & Welded Tube	25Cr-6Ni-Mo-N
10H	1	10.2	ASTM/ASME	A/SA-789	S31260	S31260		100/65 [690/450]	Seamless & Welded Tube	25Cr-6.5Ni-3Mo-N
10H	1	10.1	ASTM/ASME	A/SA-789	S31500	S31500		92/64 [635/440]	Seamless & Welded Tube	18Cr-5Ni-3Mo-N
10H	1	10.1	ASTM/ASME	A/SA-789	S31803	S31803		90/65 [620/450]	Seamless & Welded Tube	22Cr-5Ni-3Mo-N
10H	1	10.1	ASTM/ASME	A/SA-789	S32205	S32205		95/70 [655/485]	Seamless & Welded Tube	22Cr-5Ni-3Mo-N
10H	1	10.1	ASTM/ASME	A/SA-789	S32304	S32304	>1 [ $\geq 25$ ]	87/58 [600/400]	Seamless & Welded Tube	23Cr-4Ni-Mo-Cu-N
10H	1	10.1	ASTM/ASME	A/SA-789	S32304	S32304	$\leq 1$ [ $\leq 25$ ]	100/65 [690/450]	Seamless & Welded Tube	23Cr-4Ni-Mo-Cu-N
10H	1	10.2	ASTM/ASME	A/SA-789	S32550	S32550		110/80 [760/550]	Seamless & Welded Tube	25Cr-5Ni-3Mo-2Cu
10H	1	10.2	ASTM/ASME	A/SA-789	S32750	S32750		116/80 [800/550]	Seamless & Welded Tube	25Cr-7Ni-4Mo-N
10H	1	10.2	ASTM/ASME	A/SA-789	S32760	S32760		109/80 [750/550]	Seamless & Welded Tube	25Cr-8Ni-3Mo-W-Cu-N
10H	1	10.2	ASTM/ASME	A/SA-789	S32900	S32900		90/70 [620/485]	Seamless & Welded Tube	26Cr-4Ni-Mo
10H	1	10.2	ASTM/ASME	A/SA-789	S32906	S32906	$\geq 0.40$ [ $\geq 10$ ]	109/80 [750/550]	Seamless & Welded Tube	29Cr-6.5Ni-2Mo-N
10H	1	10.2	ASTM/ASME	A/SA-789	S32906	S32906	<0.40 [ $< 10$ ]	116/94 [800/650]	Seamless & Welded Tube	29Cr-6.5Ni-2Mo-N
10H	1	10.2	ASTM/ASME	A/SA-789	S32950	S32950		100/70 [690/485]	Seamless & Welded Tube	26Cr-4Ni-Mo-N
10H	1	10.2	ASTM/ASME	A/SA-789	S32974	S32974		116/80 [800/550]	Seamless & Welded Tube	25Cr-7Ni-3Mo-2W-Cu-N
10H	1	10.1	ASTM/ASME	A/SA-790	—	S32003		90/65 [620/450]	Seamless & Welded Pipe	21Cr-3.5Ni-Mo-N

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
10H 1	10.1	ASTM/ASME	A/SA-790	—	—	S32101	≤0.187 [≤5]	101/77 [700/530]	Seamless & Welded Pipe	21Cr-5Mn-1.5Ni-Cu-N
10H 1	10.1	ASTM/ASME	A/SA-790	—	—	S32101	>0.187 [>5]	94/65 [650/450]	Seamless & Welded Pipe	21Cr-5Mn-1.5Ni-Cu-N
10H 1	10.1	ASTM/ASME	A/SA-790	—	—	S32202	—	94/65 [650/450]	Seamless & Welded Pipe	22Cr-2Ni-Mo-N
10H 1	10.2	ASTM/ASME	A/SA-790	S31200	S31200	S31200	—	100/65 [690/450]	Seamless & Welded Pipe	25Cr-6Ni-Mo-N
10H 1	10.2	ASTM/ASME	A/SA-790	S31260	S31260	S31260	—	100/65 [690/450]	Seamless & Welded Pipe	25Cr-6Ni-Mo-N
10H 1	10.1	ASTM/ASME	A/SA-790	S31500	S31500	S31500	—	92/64 [635/440]	Seamless & Welded Pipe	25Cr-6.5Ni-3Mo-N
10H 1	10.1	ASTM/ASME	A/SA-790	S31803	S31803	S31803	—	90/65 [620/450]	Seamless & Welded Pipe	18Cr-5Ni-3Mo-N
10H 1	10.1	ASTM/ASME	A/SA-790	S32205	S32205	S32205	—	95/65 [655/450]	Seamless & Welded Pipe	22Cr-5Ni-3Mo-N
10H 1	10.1	ASTM/ASME	A/SA-790	S32304	S32304	S32304	—	87/58 [600/400]	Seamless & Welded Pipe	22Cr-4Ni-Mo-Cu-N
10H 1	10.2	ASTM/ASME	A/SA-790	S32550	S32550	S32550	—	110/80 [760/550]	Seamless & Welded Pipe	25Cr-5Ni-3Mo-2Cu
10H 1	10.2	ASTM/ASME	A/SA-790	S32750	S32750	S32750	—	116/80 [800/550]	Seamless & Welded Pipe	25Cr-7Ni-4Mo-N
10H 1	10.2	ASTM/ASME	A/SA-790	S32760	S32760	S32760	—	109/80 [750/550]	Seamless & Welded Pipe	25Cr-8Ni-3Mo-W-Cu-N
10H 1	10.2	ASTM/ASME	A/SA-790	S32900	S32900	S32900	—	90/70 [620/485]	Seamless & Welded Pipe	26Cr-4Ni-Mo
10H 1	10.2	ASTM/ASME	A/SA-790	S32906	S32906	S32906	≥0.40 [≥10]	109/80 [750/550]	Seamless & Welded Pipe	29Cr-6.5Ni-2Mo-N
10H 1	10.2	ASTM/ASME	A/SA-790	S32906	S32906	S32906	<0.40 [<10]	116/94 [800/650]	Seamless & Welded Pipe	29Cr-6.5Ni-2Mo-N
10H 1	10.2	ASTM/ASME	A/SA-790	S32950	S32950	S32950	—	100/70 [690/485]	Seamless & Welded Pipe	26Cr-4Ni-Mo-N
10H 1	10.2	ASTM/ASME	A/SA-790	S39274	S39274	S39274	—	116/80 [800/550]	Seamless & Welded Pipe	25Cr-7Ni-3Mo-2W-Cu-N
10H 1	10.1	ASTM/ASME	A/SA-815	—	—	S32101	—	94/65 [650/450]	Fittings	21Cr-5Mn-1.5Ni-Cu-N
10H 1	10.1	ASTM/ASME	A/SA-815	—	—	S32202	—	94/65 [650/450]	Fittings	22Cr-2Ni-Mo-N
10H 1	10.1	ASTM/ASME	A/SA-815	S31803	S31803	S31803	—	90/65 [620/450]	Fittings	22Cr-5Ni-3Mo-N
10H 1	10.1	ASTM/ASME	A/SA-815	S32205	S32205	S32205	—	95/65 [655/450]	Fittings	22Cr-5Ni-3Mo-N
10H 1	10.2	ASTM/ASME	A/SA-815	S32550	S32550	S32550	—	110/80 [760/550]	Fittings	25Cr-5Ni-3Mo-2Cu
10H 1	10.2	ASTM/ASME	A/SA-815	S32750	S32750	S32750	—	116/80 [800/550]	Fittings	25Cr-7Ni-4Mo-N
10H 1	10.2	ASTM/ASME	A/SA-815	S32760	S32760	S32760	—	109/80 [750/550]	Fittings	25Cr-8Ni-3Mo-W-Cu-N
10H 1	10.2	ASTM	A890	1A	J93370	J93370	—	100/70 [690/485]	Castings	26Cr-5Ni-2Mo-3Cu
10H 1	10.2	ASTM	A890	1B	J93372	J93372	—	100/70 [690/485]	Castings	25Cr-5Ni-3Mo-2Cu
10H 1	10.2	ASTM	A890	1C	J93373	J93373	—	100/65 [690/450]	Castings	25Cr-6Ni-3Mo-Cu-N
10H 1	10.2	ASTM	A890	2A	J93345	J93345	—	95/65 [655/450]	Castings	24Cr-10Ni-4Mo-N
10H 1	10.2	ASTM	A890	3A	J93371	J93371	—	95/65 [655/450]	Castings	25Cr-5Ni-2Mo-N

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
10H	1	10.1	ASTM	A890	4A	J92205		90/60 [620/415]	Castings	22Cr-5Ni-3Mo-N
10H	1	10.2	ASTM	A890	5A	J93404		100/75 [690/515]	Castings	25Cr-7Ni-4Mo-N
10H	1	10.2	ASTM	A890	6A	J93380		100/65 [690/450]	Castings	25Cr-8Ni-3Mo-W-Cu-N
10H	1	10.2	ASTM	A928	—	S32760		108/80 [745/550]	Welded Pipe	25Cr-8Ni-3Mo-W-Cu-N
10H	1	10.1	ASTM	A928	2205	S32205		90/65 [620/450]	Welded Pipe	22Cr-5Ni-3Mo-N
10H	1	10.2	ASTM	A928	255	S32550		110/80 [760/550]	Welded Pipe	25Cr-5Ni-3Mo-2Cu
10H	1	10.2	ASTM/ASME	A/SA-995	1B	J93372		100/70 [690/485]	Castings	25Cr-5Ni-3Mo-2Cu
10H	1	10.2	ASTM/ASME	A/SA-995	2A	J93345		95/65 [655/450]	Castings	24Cr-10Ni-4Mo-N
10H	1	10.2	ASTM/ASME	A/SA-995	3A	J93371		95/65 [655/450]	Castings	25Cr-5Ni-2Mo-N
10H	1	10.1	ASTM/ASME	A/SA-995	4A	J92205		90/60 [620/415]	Castings	22Cr-5Ni-3Mo-N
10H	1	10.2	ASTM/ASME	A/SA-995	5A	J93404		100/75 [690/515]	Castings	25Cr-7Ni-4Mo-N
10H	1	10.2	ASTM/ASME	A/SA-995	6A	J93380		100/65 [690/450]	Castings	25Cr-8Ni-3Mo-W-Cu-N
10I	1	7.1	ASTM/ASME	A/SA-182	FXM-27Cb	S44627		60/35 [415/240]	Forgings	27Cr-1Mo
10I	1	7.1	ASTM/ASME	A/SA-240	S44635	S44635		90/75 [620/515]	Plate, Sheet, & Strip	25Cr-4Ni-4Mo-Ti
10I	1	7.1	ASTM/ASME	A/SA-240	XM-27	S44627		65/40 [450/275]	Plate, Sheet, & Strip	27Cr-1Mo
10I	1	7.1	ASTM/ASME	A/SA-240	XM-33	S44626		68/45 [470/310]	Plate, Sheet, & Strip	27Cr-1Mo-Ti
10I	1	7.1	ASTM/ASME	A/SA-268	25-4-4	S44635		90/75 [620/515]	Seamless & Welded Tube	25Cr-4Ni-4Mo-Ti
10I	1	7.1	ASTM/ASME	A/SA-268	TP 446-1	S44600		70/40 [485/275]	Seamless & Welded Tube	27Cr
10I	1	7.1	ASTM/ASME	A/SA-268	TP 446-2	S44600		65/40 [450/275]	Seamless & Welded Tube	27Cr
10I	1	7.1	ASTM/ASME	A/SA-268	TP XM-27	S44627		65/40 [450/275]	Seamless & Welded Tube	27Cr-1Mo
10I	1	7.1	ASTM/ASME	A/SA-268	TP XM-33	S44626		68/45 [470/310]	Seamless & Welded Tube	27Cr-1Mo-Ti
10I	1	7.1	ASTM/ASME	A/SA-336	FXM-27Cb	S44627		60/35 [415/240]	Forgings	27Cr-1Mo
10I	1	7.1	ASTM/ASME	A/SA-479	XM-27	S44627		65/40 [450/275]	Bars & Shapes	27Cr-1Mo
10I	1	7.1	ASTM/ASME	A/SA-731	TPXM-27	S44627		65/40 [450/275]	Seamless & Welded Pipe	27Cr-1Mo
10I	1	7.1	ASTM/ASME	A/SA-731	TPXM-33	S44626		65/40 [450/275]	Seamless & Welded Pipe	27Cr-1Mo-Ti
10J	1	7.1	ASTM/ASME	A/SA-240	S44700	S44700		80/60 [550/415]	Plate, Sheet, & Strip	29Cr-4Mo
10J	1	7.1	ASTM/ASME	A/SA-268	29-4	S44700		80/60 [550/415]	Seamless & Welded Tube	29Cr-4Mo
10J	1	7.1	ASTM/ASME	A/SA-268	S44735	S44735		75/60 [515/415]	Seamless & Welded Tube	29Cr-4Mo-Ti
10J	1	7.1	ASTM/ASME	A/SA-479	S44700	S44700		70/55 [485/380]	Bars & Shapes	29Cr-4Mo

(Continued)



**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
10J	7.1	ASTM/ASME	A/SA-731	S44700	S44700		80/60 [550/415]	Seamless & Welded Pipe	29Cr-4Mo
10K	7.1	ASTM/ASME	A/SA-240	S44660	S44660		85/65 [585/450]	Plate, Sheet, & Strip	26Cr-3Ni-3Mo
10K	7.1	ASTM/ASME	A/SA-240	S44800	S44800		80/60 [550/415]	Plate, Sheet, & Strip	29Cr-4Mo-2Ni
10K	7.1	ASTM/ASME	A/SA-268	26-3-3	S44660		85/65 [585/450]	Seamless & Welded Tube	26Cr-3Ni-3Mo
10K	7.1	ASTM/ASME	A/SA-268	29-4-2	S44800		80/60 [550/415]	Seamless & Welded Tube	29Cr-4Mo-2Ni
10K	7.1	ASTM/ASME	A/SA-479	S44800	S44800		70/55 [485/380]	Bars & Shapes	29Cr-4Mo-2Ni
10K	7.1	ASTM/ASME	A/SA-731	S44660	S44660		85/65 [585/450]	Seamless & Welded Pipe	26Cr-3Ni-3Mo
10K	7.1	ASTM/ASME	A/SA-731	S44800	S44800		80/60 [550/415]	Seamless & Welded Pipe	29Cr-4Mo-2Ni
10K	7.1	ASTM/ASME	A/SA-803	26-3-3	S44660		85/65 [585/450]	Welded Tube	26Cr-3Ni-3Mo
11A	9.3	ASTM/ASME	A/SA-333	8	K81340		100/75 [690/515]	Seamless & Welded Pipe	9Ni
11A	9.3	ASTM/ASME	A/SA-334	8	K81340		100/75 [690/515]	Welded Tube	9Ni
11A	9.3	ASTM/ASME	A/SA-353	—	K81340		100/75 [690/515]	Plate	9Ni
11A	9.3	ASTM/ASME	A/SA-420	WPL8	K81340		100/75 [690/515]	Piping Fittings	9Ni
11A	9.3	ASTM/ASME	A/SA-522	I	K81340		100/75 [690/515]	Forgings	9Ni
11A	9.3	ASTM/ASME	A/SA-522	II	K71340		100/75 [690/515]	Forgings	8Ni
11A	9.3	ASTM/ASME	A/SA-553	I	K81340		100/85 [690/585]	Plate	9Ni
11A	9.3	ASTM/ASME	A/SA-553	II	K71340		100/85 [690/585]	Plate	8Ni
11A	9.3	ASTM	A844	—	K81340		100/85 [690/585]	Plate	9Ni
11A	9.2	ASTM/ASME	A/SA-645	A	K41583		95/65 [655/450]	Plate	5Ni-0.25Mo
11A	3.1	ASTM	A734	A	K21205		77/65 [530/450]	Plate	C-Mn-1Ni-1Cr-0.3Mo
11A	3.1	ASTM/ASME	A/SA-487	4, Cl. B	J13047		105/85 [725/585]	Castings	0.5Ni-0.5Cr-0.25Mo-V
11A	3.1	ASTM/ASME	A/SA-487	4, Cl. E	J13047		115/95 [795/655]	Castings	0.5Ni-0.5Cr-0.25Mo-V
11A	3.1	ASTM/ASME	A/SA-533	A, Cl. 3	K12521		100/83 [690/570]	Plate	Mn-0.5Mo
11A	3.2	ASTM/ASME	A/SA-533	B, Cl. 3	K12539		100/83 [690/570]	Plate	Mn-0.5Mo-0.5Ni
11A	3.2	ASTM/ASME	A/SA-533	C, Cl. 3	K12554		100/83 [690/570]	Plate	Mn-0.5Mo-0.75Ni
11A	3.1	ASTM/ASME	A/SA-533	D, Cl. 3	K12529		100/83 [690/570]	Plate	Mn-0.5Mo-0.25Ni
11A	3.2	ASTM/ASME	A/SA-672	J100	K12521		100/83 [690/570]	Fusion Welded Pipe	Mn-0.5Mo
11A	9.2	ASTM/ASME	A/SA-352	LC2-1	J42215		105/80 [725/550]	Castings	3Ni-1.5Cr-0.5Mo
11A	3.1	ASTM/ASME	A/SA-508	4N, Cl. 1	K22375		105/85 [725/585]	Forgings	3.5Ni-1.75Cr-0.5Mo-V

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
11A	5	3.1	ASTM/ASME	A/SA-508	5, Cl.1	K42365		105/85 [725/585]	Forgings	3.5Ni-1.75Cr-0.5Mo-V
11A	5	3.1	ASTM/ASME	A/SA-543	B Cl.1	K42339		105/85 [725/585]	Plate	3Ni-1.75Cr-0.5Mo
11A	5	3.1	ASTM/ASME	A/SA-543	C Cl.1	—		105/85 [725/585]	Plate	2.75Ni-1.5Cr-0.5Mo
11B	—	3.1	AS/NZS	3597	700PV	—		120/109 [830/750]	Plate	C-Mn-1Cr.25Mo
11B	1	3.1	ASTM	A514	A	K11856	≤1.25 [≤32]	110/100 [760/690]	Plate	0.5Cr-0.25Mo-Si
11B	1	3.1	ASTM/ASME	A/SA-517	A	K11856	≤1.25 [≤32]	115/100 [795/690]	Plate	0.5Cr-0.25Mo-Si
11B	1	3.1	ASTM/ASME	A/SA-592	A	K11856	≤1.5 [≤38]	115/100 [795/690]	Forgings	0.5Cr-0.25Mo-Si
11B	10	3.1	ASTM/ASME	A/SA-508	4N, Cl.2	K22375		115/100 [795/690]	Forgings	3.5Ni-1.75Cr-0.5Mo-V
11B	10	3.1	ASTM/ASME	A/SA-508	5, Cl.2	K42365		115/100 [795/690]	Forgings	3.5Ni-1.75Cr-0.5Mo-V
11B	10	3.1	ASTM	A514	M	K11683	≤2 [≤50]	115/100 [795/690]	Plate	1.3Ni-0.5Mo
11B	10	3.1	ASTM	A514	M	K11683	>2.5 and ≤6 [≥64 and ≤152]	100/90 [690/620]	Plate	1.3Ni-0.5Mo
11B	10	3.1	ASTM	A514	M	K11683	>2 and ≤2.5 [≥50 and ≤64]	110/100 [760/690]	Plate	1.3Ni-0.5Mo
11B	10	3.1	ASTM	A517	M	K11683	≤2 [≤50]	115/100 [795/690]	Plate	1.3Ni-0.5Mo
11B	10	3.1	ASTM/ASME	A/SA-543	B Cl.2	K42339		115/100 [795/690]	Plate	3Ni-1.75Cr-0.5Mo
11B	10	3.1	ASTM/ASME	A/SA-543	C Cl.2	—		115/100 [795/690]	Plate	2.75Ni-1.5Cr-0.5Mo
11B	11	1.4	ASTM	A709	HPS 70W	—		85/70 [585/485]	Plate, Bar, & Shapes	C-Mn
11B	11	4.2	ASTM	A852	—	K12043		90/70 [620/485]	Plate	C-Mn
11B	12	3.1	ASTM	A514	R	—	≤2.5 [≤64]	110/100 [760/690]	Plate	C-Mn-Ni-Cu-V
11B	12	3.1	ASTM	A514	R	—	>2.5 and ≤6 [≥64 and ≤152]	100/90 [690/620]	Plate	C-Mn-Ni-Cu-V
11B	14	3.1	ASTM	A517	C	K11511	<1.25 [≤32]	115/100 [795/690]	Plate	1.2Mn-0.2Mo
11B	2	3.1	ASTM	A514	E	K21604	>2.5 and ≤6 [≥64 and ≤152]	100/90 [690/620]	Plate	1.75Cr-0.5Mo-Cu
11B	2	3.1	ASTM	A514	E	K21604	≤2.5 [≤64]	110/100 [760/690]	Plate	1.75Cr-0.5Mo-Cu
11B	2	3.1	ASTM/ASME	A/SA-517	E	K21604	>2.5 and ≤6 [≥64 and ≤152]	105/90 [725/620]	Plate	1.75Cr-0.5Mo-Cu
11B	2	3.1	ASTM/ASME	A/SA-517	E	K21604	≤2.5 [≤64]	115/100 [795/690]	Plate	1.75Cr-0.5Mo-Cu
11B	2	3.1	ASTM/ASME	A/SA-592	E	K11695	≤2.5 [≤64]	115/100 [795/690]	Forgings	1.75Cr-0.5Mo-Cu

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
11B 2	3.1	ASTM/ASME	A/SA-592	E	K11695	≥2.5 and ≤4 [≥64 and ≤102]	105/90 [725/620]	Forgings	1.75Cr-0.5Mo-Cu	
11B 3	3.1	ASTM	A514	F	K11576	≤2.5 [≤64]	110/100 [760/690]	Plate	0.75Ni-0.5Cr-0.5Mo-V	
11B 3	3.1	ASTM	A514	H	K11646	≤2 [≤50]	110/100 [760/690]	Plate	0.5Ni-0.5Cr-0.25Mo-V	
11B 3	3.1	ASTM/ASME	A/SA-517	F	K11576	≤2.5 [≤64]	115/100 [795/690]	Plate	0.75Ni-0.5Cr-0.5Mo-V	
11B 3	3.1	ASTM/ASME	A/SA-517	H	K11646	≤2 [≤50]	115/100 [795/690]	Plate	0.5Ni-0.5Cr-0.25Mo-V	
11B 3	3.1	ASTM/ASME	A/SA-592	F	K11576	≥2.5 and ≤4 [≥64 and ≤102]	105/90 [725/620]	Forgings	0.75Ni-0.5Cr-0.5Mo-V	
11B 3	3.1	ASTM/ASME	A/SA-592	F	K11576	≤2.5 [≤64]	115/100 [795/690]	Forgings	0.75Ni-0.5Cr-0.5Mo-V	
11B 4	3.1	ASTM	A514	B	K11630	≤1.25 [≤32]	110/100 [760/690]	Plate	0.5Cr-0.2Mo-V	
11B 4	3.1	ASTM/ASME	A/SA-517	B	K11630	≤1.25 [≤32]	115/100 [795/690]	Plate	0.5Cr-0.2Mo-V	
11B 4	—	ASTM	A782	I	—	—	115/100 [795/690]	Plate	1Mn-1Cr-1Si-0.5Mo-Zr	
11B 4	—	ASTM	A782	I	—	—	97/80 [670/550]	Plate	1Mn-1Cr-1Si-0.5Mo-Zr	
11B 4	—	ASTM	A782	I	—	—	107/90 [740/620]	Plate	1Mn-1Cr-1Si-0.5Mo-Zr	
11B 6	3.1	ASTM	A514	C	K11511	≤2.5 [≤64]	110/100 [760/690]	Plate	1.2Mn-0.2Mo	
11B 6	3.1	ASTM	A514	C	K11511	>2.5 and ≤6 [>64 and ≤152]	100/90 [690/620]	Plate	1.2Mn-0.2Mo	
11B 6	3.1	ASTM	A514	J	K11625	≤2.5 [≤64]	110/100 [760/690]	Plate	C-0.5Mo	
11B 6	3.1	ASTM	A514	J	K11625	>2.5 and ≤6 [>64 and ≤152]	100/90 [690/620]	Plate	C-0.5Mo	
11B 6	3.1	ASTM	A514	K	K11523	≤2.5 [≤64]	110/100 [760/690]	Plate	Mn-Mo-B	
11B 6	3.1	ASTM	A514	K	K11523	>2.5 and ≤6 [>64 and ≤152]	100/90 [690/620]	Plate	Mn-Mo-B	
11B 6	3.1	ASTM	A514	S	—	≤2.5 [≤64]	110/100 [760/690]	Plate	Mn-Mo-B	
11B 6	3.1	ASTM	A514	T	—	>2.5 and ≤6 [>64 and ≤152]	100/90 [690/620]	Plate	Mn-Mo-B	
11B 6	3.1	ASTM	A514	T	—	≤2.5 [≤64]	110/100 [760/690]	Plate	Mn-Mo-B	
11B 6	3.1	ASTM	A517	J	K11625	≤1.25 [≤32]	115/100 [795/690]	Plate	C-0.5Mo	
11B 6	3.1	ASTM	A517	K	K11523	≤2 [≤50]	115/100 [795/690]	Plate	Mn-Mo-B	
11B 6	3.1	ASTM/ASME	A/SA-517	S	—	≤2 [≤50]	115/100 [795/690]	Plate	Mn-Mo-B	

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
11B 6	3.1	3.1	ASTM	A517	T	—	≤2 [≤50]	115/100 [795/690]	Plate	Mn-Mo-B
11B 8	3.1	3.1	ASTM	A514	P	K21650	>2.5 and ≤6 [>64 and ≤152]	100/90 [690/620]	Plate	1.25Ni-1Cr-0.5Mo
11B 8	3.1	3.1	ASTM	A514	P	K21650	≤2.5 [≤64]	110/100 [760/690]	Plate	1.25Ni-1Cr-0.5Mo
11B 8	3.1	3.1	ASTM/ASME	A/SA-517	P	K21650	>2.5 and ≤4 [>64 and ≤102]	105/90 [725/620]	Plate	1.25Ni-1Cr-0.5Mo
11B 8	3.1	3.1	ASTM/ASME	A/SA-517	P	K21650	≤2.5 [≤64]	115/100 [795/690]	Plate	1.25Ni-1Cr-0.5Mo
11B 9	3.1	3.1	ASTM	A514	Q	—	≤2.5 [≤64]	110/100 [760/690]	Plate	1.3Ni-1.3Cr-0.5Mo-V
11B 9	3.1	3.1	ASTM	A514	Q	—	>2.5 and ≤6 [>64 and ≤152]	100/90 [690/620]	Plate	1.3Ni-1.3Cr-0.5Mo-V
11B 9	3.1	3.1	ASTM/ASME	A/SA-517	Q	—	≤2.5 [≤64]	115/100 [795/690]	Plate	1.3Ni-1.3Cr-0.5Mo-V
11B 9	3.1	3.1	ASTM/ASME	A/SA-517	Q	—	>2.5 and ≤6 [>64 and ≤152]	105/90 [725/620]	Plate	1.3Ni-1.3Cr-0.5Mo-V
11B 9	—	—	ASTM	A519	4130	G41300		75/55 [515/380]	Tube	1Cr-0.2Mo
11B 9	—	—	ASTM	A519	8630	G86300		75/55 [515/380]	Tube	0.5Ni-0.5Cr-0.2Mo
11C 1	3.3	3.3	ASTM/ASME	A/SA-859	A Cl. 1	K20747		65/55 [450/380]	Forgings	1Ni-1Cu-0.75Cr-Mo-Nb
11C 1	3.3	3.3	ASTM/ASME	A/SA-859	A Cl. 2	K20747		75/65 [515/450]	Forgings	1Ni-1Cu-0.75Cr-Mo-Nb
12A 1	3.3	3.3	ASTM	A710	A Cl. 2	K20747	≤2 [≤51]	72/60 [495/415]	Plate	1Ni-1Cu-0.75Cr-Mo-Nb
12A 1	3.3	3.3	ASTM	A710	A Cl. 2	K20747	>2 [>51]	60/50 [415/345]	Plate	1Ni-1Cu-0.75Cr-Mo-Nb
12B 1	3.3	3.3	ASTM	A710	A Cl. 3	K20747	≤2 [≤51]	85/75 [585/515]	Plate	1Ni-1Cu-0.75Cr-Mo-Nb
12B 1	3.3	3.3	ASTM	A710	A Cl. 3	K20747	>2 [>51]	75/60 [515/415]	Plate	1Ni-1Cu-0.75Cr-Mo-Nb
12C 1	3.3	3.3	ASTM	A710	A Cl. 1	K20747	≤0.75 [≤19]	90/80 [620/550]	Plate	1Ni-1Cu-0.75Cr-Mo-Nb
15E 1	6.4	6.4	ASTM/ASME	A/SA-182	F91	K90901		85/60 [585/415]	Forgings	9Cr-1Mo-V
15E 1	6.4	6.4	ASTM/ASME	A/SA-182	F92	K92460		90/64 [620/440]	Forgings	9Cr-2W
15E 1	6.4	6.4	ASTM	A199	T91	K90901		85/60 [585/415]	Seamless Tube	9Cr-1Mo-V
15E 1	6.4	6.4	ASTM/ASME	A/SA-213	T91	K90901		85/60 [585/415]	Seamless Tube	9Cr-1Mo-V
15E 1	6.4	6.4	ASTM/ASME	A/SA-213	T92	K92460		90/64 [620/440]	Seamless Tube	9Cr-2W
15E 1	6.4	6.4	ASTM	A217	C12A	J84090		85/60 [585/415]	Castings	9Cr-1Mo-V
15E 1	6.4	6.4	ASTM/ASME	A/SA-234	WP91	K90901		85/60 [585/415]	Piping Fittings	9Cr-1Mo-V

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
15E	1	6.4	ASTM/ASME	A/SA-335	P91	K90901		85/60 [585/415]	Seamless Pipe	9Cr-1Mo-V
15E	1	6.4	ASTM/ASME	A/SA-335	P92	K92460		90/64 [620/440]	Seamless Pipe	9Cr-2W
15E	1	6.4	ASTM/ASME	A/SA-336	F91	K90901		85/60 [585/415]	Forgings	9Cr-1Mo-V
15E	1	6.4	ASTM	A356	I2A	J84090		85/60 [585/415]	Castings	9Cr-1Mo-V
15E	1	6.4	ASTM/ASME	A/SA-369	FP91	K90901		85/60 [585/415]	Forged Pipe	9Cr-1Mo-V
15E	1	6.4	ASTM/ASME	A/SA-369	FP92	K92460		90/64 [620/440]	Forged Pipe	9Cr-2W
15E	1	5.4	ASTM/ASME	A/SA-387	91, Cl. 2	K90901		85/60 [585/415]	Plate	9Cr-1Mo-V
15E	1	6.4	ASTM/ASME	A/SA-691	91	K91560		85/60 [585/415]	Fusion Welded Pipe	9Cr-1Mo-V
1A	4	—	ASTM	A615	40	—		60/40 [415/275]	Rebar	C
1A	4	—	ASTM	A615	60	—		90/60 [620/415]	Rebar	C
1A	4	1.3	ASTM	A706	60	—		80/60 [550/415]	Rebar	C
1A	4	—	CSA	G30.18	300R	—		60/40 [415/275]	Rebar	C
1A	4	—	CSA	G30.18	400R	—		78.5/58 [540/400]	Rebar	C
1A	4	11.1	CSA	G30.18	400W	—		78.5/58 [540/400]	Rebar	C
1A	4	—	CSA	G30.18	500R	—		98/72.5 [675/500]	Rebar	C
1A	4	11.1	CSA	G30.18	500W	—		90.5/72.5 [625/500]	Rebar	C
3	1	1.1	ASTM	A161	T1	K11522		55/30 [380/205]	Tube	C-0.5Mo
3	1	1.1	ASTM/ASME	A/SA-204	A	K11820		65/37 [450/255]	Plate	C-0.5Mo
3	1	1.1	ASTM/ASME	A/SA-209	T1	K11522		55/30 [380/205]	Seamless Tube	C-0.5Mo
3	1	1.1	ASTM/ASME	A/SA-209	T1a	K12023		60/32 [415/220]	Seamless Tube	C-0.5Mo
3	1	1.1	ASTM/ASME	A/SA-209	T1b	K11422		53/28 [365/195]	Seamless Tube	C-0.5Mo
3	1	4.2	ASTM/ASME	A/SA-213	T2	K11547		60/30 [415/205]	Seamless Tube	0.5Cr-0.5Mo
3	1	1.1	ASTM/ASME	A/SA-217	WC1	J12524		65/35 [450/240]	Castings	C-0.5Mo
3	1	11.2	ASTM/ASME	A/SA-234	WP1	K12821		55/30 [380/205]	Piping Fittings	C-0.5Mo
3	1	1.1	ASTM/ASME	A/SA-250	T1	K11522		55/30 [380/205]	E.R.W. Tube	C-0.5Mo
3	1	1.1	ASTM/ASME	A/SA-250	T1a	K12023		60/32 [415/220]	E.R.W. Tube	C-0.5Mo
3	1	1.1	ASTM/ASME	A/SA-250	T1b	K11422		53/28 [365/195]	E.R.W. Tube	C-0.5Mo
3	1	4.2	ASTM/ASME	A/SA-250	T2	K11547		60/30 [415/205]	E.R.W. Tube	0.5Cr-0.5Mo
3	1	1.1	ASTM/ASME	A/SA-335	P1	K11522		55/30 [380/205]	Seamless Pipe	C-0.5Mo

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
3	1	—	ASTM/ASME	A/SA-335	P15	K11578		60/30 [415/205]	Seamless Pipe	1.5Si-0.5Mo
3	1	4.2	ASTM/ASME	A/SA-335	P2	K11547		55/30 [380/205]	Seamless Pipe	0.5Cr-0.5Mo
3	1	1.1	ASTM/ASME	A/SA-352	LC1	J12522		65/35 [450/240]	Castings	C-0.5Mo
3	1	1.1	ASTM	A356	2	J12523		65/35 [450/240]	Castings	C-0.5Mo
3	1	1.1	ASTM/ASME	A/SA-369	FP1	K11522		55/30 [380/205]	Forged Pipe	C-0.5Mo
3	1	4.2	ASTM/ASME	A/SA-369	FP2	K11547		55/30 [380/205]	Forged Pipe	0.5Cr-0.5Mo
3	1	4.2	ASTM/ASME	A/SA-387	2, Cl. 1	K12143		55/33 [380/230]	Plate	0.5Cr-0.5Mo
3	1	1.1	ASTM/ASME	A/SA-426	CP1	J12521		65/35 [450/240]	Centrifugal Cast Pipe	C-0.5Mo
3	1	1.1	ASTM/ASME	A/SA-426	CP15	J11522		60/30 [415/205]	Centrifugal Cast Pipe	C-0.5Mo-Si
3	1	4.2	ASTM/ASME	A/SA-426	CP2	J11547		60/30 [415/205]	Centrifugal Cast Pipe	0.5Cr-0.5Mo
3	1	1.4	ASTM	A588	A	K11430		70/50 [485/345]	Shapes	Mn-0.5Cr-0.3Cu-Si-V
3	1	1.4	ASTM	A588	A	K11430	>5 and ≤8 [>125 and ≤200]	63/42 [435/290]	Plate & Bar	Mn-0.5Cr-0.3Cu-Si-V
3	1	1.4	ASTM	A588	A	K11430	>4 and ≤5 [>100 and ≤125]	67/46 [460/315]	Plate & Bar	Mn-0.5Cr-0.3Cu-Si-V
3	1	1.4	ASTM	A588	A	K11430	≤4 [≤100]	70/50 [485/345]	Plate & Bar	Mn-0.5Cr-0.3Cu-Si-V
3	1	1.4	ASTM	A588	B	K12043		70/50 [485/345]	Shapes	Mn-0.6Cr-0.3Cu-Si-V
3	1	1.4	ASTM	A588	B	K12043	>5 and ≤8 [>125 and ≤200]	63/42 [435/290]	Plate & Bar	Mn-0.6Cr-0.3Cu-Si-V
3	1	1.4	ASTM	A588	B	K12043	>4 and ≤5 [>100 and ≤125]	67/46 [460/315]	Plate & Bar	Mn-0.6Cr-0.3Cu-Si-V
3	1	1.4	ASTM	A588	B	K12043	≤4 [≤100]	70/50 [485/345]	Plate & Bar	Mn-0.6Cr-0.3Cu-Si-V
3	1	1.4	ASTM	A588	C	K11538	>5 and ≤8 [>125 and ≤200]	63/42 [435/290]	Plate & Bar	Mn-0.4Cr-0.4Cu-Si-V
3	1	1.4	ASTM	A588	C	K11538	≤4 [≤100]	70/50 [485/345]	Plate & Bar	Mn-0.4Cr-0.4Cu-Si-V
3	1	1.4	ASTM	A588	C	K11538	>4 and ≤5 [>100 and ≤125]	67/46 [460/315]	Plate & Bar	Mn-0.4Cr-0.4Cu-Si-V
3	1	1.4	ASTM	A588	C	K11538		70/50 [485/345]	Shapes	Mn-0.4Cr-0.4Cu-Si-V
3	1	1.4	ASTM	A588	K	—	>4 and ≤5 [>100 and ≤125]	67/46 [460/315]	Plate & Bar	Mn-0.6Cr-0.4Cu-Si-Nb

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
3	1	1.4	ASTM	A588	K	—	>5 and ≤8 [>125 and ≤200]	63/42 [435/290]	Plate & Bar	Mn-0.6Cr-0.4Cu-Si-Nb
3	1	1.4	ASTM	A588	K	—	≤4 [≤100]	70/50 [485/345]	Plate & Bar	Mn-0.6Cr-0.4Cu-Si-Nb
3	1	1.4	ASTM	A588	K	—		70/50 [485/345]	Shapes	Mn-0.6Cr-0.4Cu-Si-Nb
3	1	11.1	ASTM	A595	C	K11526		70/60 [485/415]	Welded Tube	Low C
3	1	1.1	ASTM/ASME	A/SA-672	L65	K11820		65/37 [450/255]	Fusion Welded Pipe	C-0.5Mo
3	1	4.2	ASTM/ASME	A/SA-691	0.5Cr, Cl. 1	K12143		55/33 [380/230]	Fusion Welded Pipe	0.5Cr-0.5Mo
3	1	1.1	ASTM/ASME	A/SA-691	CM-65	K11820		65/37 [450/255]	Fusion Welded Pipe	C-0.5Mo
3	1	—	ASTM	A707	L6, Cl. 1	K02902		60/42 [415/290]	Forgings	2Mn-0.3Mo-Cb
3	1	—	ASTM	A707	L6, Cl. 2	K02902		66/52 [455/360]	Forgings	2Mn-0.3Mo-Cb
3	1	1.4	AS/NZS	3678	WR350	—		65/50 [450/340]	Plate	C-Mn-Cr-Ni-Cu
3	1	1.4	AS/NZS	3678	WR350L0	—		65/50 [450/340]	Plate	C-Mn-Cr-Ni-Cu
3	2	1.1	ASTM/ASME	A/SA-182	F1	K12822		70/40 [485/275]	Forgings	C-0.5Mo
3	2	4.2	ASTM/ASME	A/SA-182	F2	K12122		70/40 [485/275]	Forgings	0.5Cr-0.5Mo
3	2	1.1	ASTM/ASME	A/SA-204	B	K12020		70/40 [485/275]	Plate	C-0.5Mo
3	2	1.2	ASTM/ASME	A/SA-204	C	K12320		75/43 [515/295]	Plate	C-0.5Mo
3	2	1.1	ASTM/ASME	A/SA-336	F1	K12520		70/40 [485/275]	Forgings	C-0.5Mo
3	2	4.2	ASTM/ASME	A/SA-387	2, Cl. 2	K12143		70/45 [485/310]	Plate	0.5Cr-0.5Mo
3	2	1.1	ASTM/ASME	A/SA-672	H75	K12021		75/45 [515/310]	Fusion Welded Pipe	Mn-0.5Mo
3	2	1.2	ASTM/ASME	A/SA-672	L70	K12020		70/40 [485/275]	Fusion Welded Pipe	C-0.5Mo
3	2	1.2	ASTM/ASME	A/SA-672	L75	K12320		75/43 [515/295]	Fusion Welded Pipe	C-0.5Mo
3	2	4.2	ASTM/ASME	A/SA-691	0.5Cr, Cl. 2	K12143		70/45 [485/310]	Fusion Welded Pipe	0.5Cr-0.5Mo
3	2	1.2	ASTM/ASME	A/SA-691	CM-70	K12020		70/40 [485/275]	Fusion Welded Pipe	C-0.5Mo
3	2	1.2	ASTM/ASME	A/SA-691	CM-75	K12320		75/43 [515/295]	Fusion Welded Pipe	C-0.5Mo
3	2	—	ASTM	A707	L6, Cl. 3	K02902		75/60 [515/415]	Forgings	2Mn-0.3Mo-Cb
3	2	4.2	ASTM	A871	60	—		75/60 [515/415]	Plate	C-Mn-Ni-Cr-Cu-V
3	3	4.1	ASTM	A108	8620 CW	G86200		— [—]	Bar	0.5Ni-0.5Cr-Mo
3	3	2.1	ASTM/ASME	A/SA-487	2, Cl. A	J13005		85/53 [585/365]	Castings	Mn-0.25Mo-V
3	3	2.1	ASTM/ASME	A/SA-487	2, Cl. B	J13005		90/65 [620/450]	Castings	Mn-0.25Mo-V

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
3	3.1	ASTM/ASME	A/SA-487	4, Cl. A	J13047		90/60 [620/415]	Castings	0.5Ni-0.5Cr-0.25Mo-V
3	3.1	ASTM/ASME	A/SA-487	4, Cl. C	J13047		90/60 [620/415]	Castings	0.5Ni-0.5Cr-0.25Mo-V
3	3.1	ASTM/ASME	A/SA-508	2, Cl. 1	K12766		80/50 [550/345]	Forgings	0.75Ni-0.5Mo-0.3Cr-V
3	3.1	ASTM/ASME	A/SA-508	2, Cl. 2	K12766		90/65 [620/450]	Forgings	0.75Ni-0.5Mo-0.3Cr-V
3	3.1	ASTM/ASME	A/SA-508	3, Cl. 1	K12042		80/50 [550/345]	Forgings	0.75Ni-0.5Mo-Cr-V
3	3.1	ASTM/ASME	A/SA-508	3, Cl. 2	K12042		90/65 [620/450]	Forgings	0.75Ni-0.5Mo-Cr-V
3	3.1	ASTM/ASME	A/SA-508	4N, Cl. 3	K22375		90/70 [620/485]	Forgings	3.5Ni-1.75Cr-0.5Mo-V
3	3.1	ASTM/ASME	A/SA-533	A, Cl. 1	K12521		80/50 [550/345]	Plate	Mn-0.5Mo
3	3.1	ASTM/ASME	A/SA-533	A, Cl. 2	K12521		90/70 [620/485]	Plate	Mn-0.5Mo
3	3.1	ASTM/ASME	A/SA-533	B, Cl. 1	K12539		80/50 [550/345]	Plate	Mn-0.5Mo-0.5Ni
3	3.1	ASTM/ASME	A/SA-533	B, Cl. 2	K12539		90/70 [620/485]	Plate	Mn-0.5Mo-0.5Ni
3	3.1	ASTM/ASME	A/SA-533	C, Cl. 1	K12554		80/50 [550/345]	Plate	Mn-0.5Mo-0.75Ni
3	3.1	ASTM/ASME	A/SA-533	C, Cl. 2	K12554		90/70 [620/485]	Plate	Mn-0.5Mo-0.75Ni
3	3.1	ASTM/ASME	A/SA-533	D, Cl. 1	K12529		80/50 [550/345]	Plate	Mn-0.5Mo-0.25Ni
3	3.1	ASTM/ASME	A/SA-533	D, Cl. 2	K12529		90/70 [620/485]	Plate	Mn-0.5Mo-0.25Ni
3	3.1	ASTM/ASME	A/SA-533	E, Cl. 1	K12554		80/50 [550/345]	Plate	Mn-0.5Mo-0.75Ni
3	3.1	ASTM/ASME	A/SA-533	E, Cl. 2	K12554		90/70 [620/485]	Plate	Mn-0.5Mo-0.75Ni
3	4.2	ASTM/ASME	A/SA-541	2, Cl. 1	K12765		80/50 [550/345]	Forgings	0.75Ni-0.5Mo-0.3Cr-V
3	4.2	ASTM/ASME	A/SA-541	2, Cl. 2	K12765		90/65 [620/450]	Forgings	0.75Ni-0.5Mo-0.3Cr-V
3	4.1	ASTM/ASME	A/SA-541	3, Cl. 1	K12045		80/50 [550/345]	Forgings	0.5Ni-0.5Mo-V
3	4.1	ASTM/ASME	A/SA-541	3, Cl. 2	K12045		90/65 [620/450]	Forgings	0.5Ni-0.5Mo-V
3	3.1	ASTM/ASME	A/SA-543	B, Cl. 3	K42339		90/70 [620/485]	Plate	3Ni-1.75Cr-0.5Mo
3	3.1	ASTM/ASME	A/SA-543	C, Cl. 3	—		90/70 [620/485]	Plate	2.75Ni-1.5Cr-0.5Mo
3	1.2	ASTM/ASME	A/SA-672	H80	K12022		80/50 [550/345]	Fusion Welded Pipe	Mn-0.5Mo
3	3.1	ASTM/ASME	A/SA-672	J80	—		80/50 [550/345]	Fusion Welded Pipe	Mn-0.5Mo-0.75Ni
3	3.1	ASTM/ASME	A/SA-672	J90	—		90/70 [620/485]	Fusion Welded Pipe	Mn-0.5Mo-0.75Ni
3	4.2	ASTM	A871	65	—		80/65 [550/450]	Plate	C-Mn-Ni-Cr-Cu-V
3	4	ASTM	A707	L6, Cl. 4	K02902		90/75 [620/515]	Forgings	2Mn-0.3Mo-Cb
4	1	ASTM/ASME	A/SA-182	F11, Cl. 1	K11597		60/30 [415/205]	Forgings	1.25Cr-0.5Mo-Si

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
4	1	5.1	ASTM/ASME A/SA-182	F11, Cl. 2	K11572		70/40 [485/275]	Forgings	1.25Cr-0.5Mo-Si
4	1	5.1	ASTM/ASME A/SA-182	F11, Cl. 3	K11572		75/45 [515/310]	Forgings	1.25Cr-0.5Mo-Si
4	1	5.1	ASTM/ASME A/SA-182	F12, Cl. 1	K11562		60/32 [415/220]	Forgings	1Cr-0.5Mo
4	1	5.1	ASTM/ASME A/SA-182	F12, Cl. 2	K11564		70/40 [485/275]	Forgings	1Cr-0.5Mo
4	1	5.1	ASTM A199	TI1	K11597		60/25 [415/170]	Seamless Tube	1.25Cr-0.5Mo-Si
4	1	4.2	ASTM/ASME A/SA-202	A	K11742		75/45 [515/310]	Plate	0.5Cr-1.25Mn-Si
4	1	4.2	ASTM/ASME A/SA-202	B	K12542		85/47 [585/325]	Plate	0.5Cr-1.25Mn-Si
4	1	5.1	ASTM/ASME A/SA-213	TI1	K11597		60/30 [415/205]	Seamless Tube	1.25Cr-0.5Mo-Si
4	1	5.1	ASTM/ASME A/SA-213	TI2	K11562		60/32 [415/220]	Seamless Tube	1Cr-0.5Mo
4	1	9.1	ASTM/ASME A/SA-217	WC4	J12082		70/40 [485/275]	Castings	1Ni-0.5Cr-0.5Mo
4	1	4.2	ASTM/ASME A/SA-217	WC5	J22000		70/40 [485/275]	Castings	0.75Ni-1Mo-0.75Cr
4	1	5.1	ASTM/ASME A/SA-217	WC6	J12072		70/40 [485/275]	Castings	1.25Cr-0.5Mo
4	1	5.1	ASTM/ASME A/SA-234	WP11, Cl. 1	—		60/30 [415/205]	Piping Fittings	1.25Cr-0.5Mo-Si
4	1	5.1	ASTM/ASME A/SA-234	WP11, Cl. 2	—		70/40 [485/275]	Piping Fittings	1.25Cr-0.5Mo-Si
4	1	5.1	ASTM/ASME A/SA-234	WP11, Cl. 3	—		75/45 [515/310]	Piping Fittings	1.25Cr-0.5Mo-Si
4	1	5.1	ASTM/ASME A/SA-234	WP12, Cl. 1	K12062		60/32 [415/220]	Piping Fittings	1Cr-0.5Mo
4	1	5.1	ASTM/ASME A/SA-234	WP12, Cl. 2	K12062		70/40 [485/275]	Piping Fittings	1Cr-0.5Mo
4	1	5.1	ASTM/ASME A/SA-250	TI1	K11597		60/30 [415/205]	E.R.W. Tube	1.25Cr-0.5Mo-Si
4	1	5.1	ASTM/ASME A/SA-250	TI2	K11562		60/32 [415/220]	E.R.W. Tube	1Cr-0.5Mo
4	1	5.1	ASTM/ASME A/SA-335	P11	K11597		60/30 [415/205]	Seamless Pipe	1.25Cr-0.5Mo-Si
4	1	5.1	ASTM/ASME A/SA-335	P12	K11562		60/32 [415/220]	Seamless Pipe	1Cr-0.5Mo
4	1	5.1	ASTM/ASME A/SA-336	F11, Cl. 1	K11597		60/30 [415/205]	Forgings	1.25Cr-0.5Mo-Si
4	1	5.1	ASTM/ASME A/SA-336	F11, Cl. 2	K11572		70/40 [485/275]	Forgings	1.25Cr-0.5Mo-Si
4	1	5.1	ASTM/ASME A/SA-336	F11, Cl. 3	K11572		75/45 [515/310]	Forgings	1.25Cr-0.5Mo-Si
4	1	5.1	ASTM/ASME A/SA-336	F12	K11564		70/40 [485/275]	Forgings	1Cr-0.5Mo
4	1	5.1	ASTM A356	6	J12073		70/45 [485/310]	Castings	1.25Cr-0.5Mo
4	1	6.2	ASTM A356	8	J11697		80/50 [550/345]	Castings	1Cr-1Mo-V
4	1	6.2	ASTM A356	9	J21610		85/60 [585/415]	Castings	1Cr-1Mo-V
4	1	5.1	ASTM/ASME A/SA-369	FP11	K11597		60/30 [415/205]	Forged Pipe	1.25Cr-0.5Mo-Si

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO Group 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Steel and Steel Alloys</b>									
4	1	5.1	ASTM/ASME A/SA-369	FP12	K11562		60/32 [415/220]	Forged Pipe	1Cr-0.5Mo
4	1	5.1	ASTM/ASME A/SA-387	11, Cl. 1	K11789		60/35 [415/240]	Plate	1.25Cr-0.5Mo-Si
4	1	5.1	ASTM/ASME A/SA-387	11, Cl. 2	K11789		75/45 [515/310]	Plate	1.25Cr-0.5Mo-Si
4	1	5.1	ASTM/ASME A/SA-387	12, Cl. 1	K11757		55/33 [380/230]	Plate	1Cr-0.5Mo
4	1	5.1	ASTM/ASME A/SA-387	12, Cl. 2	K11757		65/40 [450/275]	Plate	1Cr-0.5Mo
4	1	6.2	ASTM A389	C23	J12080		70/40 [485/275]	Castings	1.25Cr-0.5Mo-V
4	1	6.2	ASTM A389	C24	J12092		80/50 [550/345]	Castings	1Cr-1Mo-V
4	1	6.2	ASTM A405	P24	K11591		80/50 [550/345]	Seamless Pipe	1.25Cr-Mo
4	1	5.1	ASTM/ASME A/SA-426	CP11	J12072		70/40 [485/275]	Centrifugal Cast Pipe	1.25Cr-0.5Mo
4	1	5.1	ASTM/ASME A/SA-426	CP12	J11562		60/30 [415/205]	Centrifugal Cast Pipe	1Cr-0.5Mo
4	1	5.2	ASTM/ASME A/SA-541	11, Cl. 4	K11572		80/50 [550/345]	Forgings	1.25Cr-0.5Mo-Si
4	1	5.1	ASTM/ASME A/SA-691	1.25CR, Cl. 1	K11789		60/35 [415/240]	Fusion Welded Pipe	1.25Cr-0.5Mo-Si
4	1	5.1	ASTM/ASME A/SA-691	1.25CR, Cl. 2	K11789		75/45 [515/310]	Fusion Welded Pipe	1.25Cr-0.5Mo-Si
4	1	5.1	ASTM/ASME A/SA-691	1CR, Cl. 1	K11757		55/33 [380/230]	Fusion Welded Pipe	1Cr-0.5Mo
4	1	5.1	ASTM/ASME A/SA-691	1CR, Cl. 2	K11757		65/40 [450/275]	Fusion Welded Pipe	1Cr-0.5Mo
4	1	5.1	ASTM/ASME A/SA-739	B11	K11797		70/45 [485/310]	Bar	1.25Cr-0.5Mo
4	2	4.1	ASTM/ASME A/SA-333	4	K11267		60/35 [415/240]	Seamless & Welded Pipe	0.75Cr-0.75Ni-Cu-Al
4	2	5.1	ASTM/ASME A/SA-423	1	K11535		60/37 [415/255]	Seamless & Welded Tube	0.75Cr-0.5Ni-Cu
4	2	5.1	ASTM/ASME A/SA-423	2	K11540		60/37 [415/255]	Seamless & Welded Tube	0.75Ni-0.5Cu-Mo
4	3	—	ASTM A148	90-60	D50600		90/60 [620/415]	Castings	C
45	8.2	ASTM/ASME A/SA-240	—	—	S31277		112/52 [770/360]	Plate, Sheet, & Strip	27Ni-22Cr-7Mo-Mn-Cu
45	8.2	ASTM/ASME A/SA-240	S31277	S31277	S31277		112/52 [770/360]	Plate, Sheet, & Strip	27Ni-22Cr-7Mo-Mn-Cu
45	8.2	ASTM/ASME A/SA-351	CN3MN	J94651	J94651		80/38 [550/260]	Castings	46Fe-24Ni-21Cr-6Mo-Cu-N
45	45	ASTM/ASME A/SA-351	HT30	N08603	N08603		65/28 [450/195]	Castings	35Ni-15Cr-0.5Mo
5A	1	5.2	ASTM/ASME A/SA-182	F21	K31545		75/45 [515/310]	Forgings	3Cr-1Mo
5A	1	5.2	ASTM/ASME A/SA-182	F22, Cl. 1	K21590		60/30 [415/205]	Forgings	2.25Cr-1Mo
5A	1	5.2	ASTM/ASME A/SA-182	F22, Cl. 3	K21590		75/45 [515/310]	Forgings	2.25Cr-1Mo
5A	1	—	ASTM A199	T21	K31545		60/25 [415/170]	Seamless Tube	3Cr-1Mo
5A	1	5.2	ASTM A199	T22	K21590		60/25 [415/170]	Seamless Tube	2.25Cr-1Mo

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
5A	1	—	ASTM	A199	T4	K31509		60/25 [415/170]	Seamless Tube	2.25Cr-0.5Mo-0.75Si
5A	1	—	ASTM	A200	T21	K31545		60/25 [415/170]	Tube	3Cr-1Mo
5A	1	5.2	ASTM	A200	T22	K21590		60/25 [415/170]	Tube	2.25Cr-1Mo
5A	1	—	ASTM	A200	T4	K31509		60/25 [415/170]	Tube	2.25Cr-0.5Mo-0.75Si
5A	1	5.2	ASTM/ASME	A/SA-213	T21	K31545		60/30 [415/205]	Seamless Tube	3Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-213	T22	K21590		60/30 [415/205]	Seamless Tube	2.25Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-217	WC9	J21890		70/40 [485/275]	Castings	2.25Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-234	WP22, Cl. 1	K21590		60/30 [415/205]	Piping Fittings	2.25Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-234	WP22, Cl. 3	K21590		75/45 [515/310]	Piping Fittings	2.25Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-250	T22	K21590		60/30 [415/205]	E.R.W. Tube	2.25Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-335	P21	K31545		60/30 [415/205]	Seamless Pipe	3Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-335	P22	K21590		60/30 [415/205]	Seamless Pipe	2.25Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-336	F21, Cl. 1	K31545		60/30 [415/205]	Forgings	3Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-336	F21, Cl. 3	K31545		75/45 [515/310]	Forgings	3Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-336	F22, Cl. 1	K21590		60/30 [415/205]	Forgings	2.25Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-336	F22, Cl. 3	K21590		75/45 [515/310]	Forgings	2.25Cr-1Mo
5A	1	5.2	ASTM	A356	10	J22090		85/55 [585/380]	Castings	2.25Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-369	FP21	K31545		60/30 [415/205]	Forged Pipe	3Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-369	FP22	K21590		60/30 [415/205]	Forged Pipe	2.25Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-387	21, Cl. 1	K31545		60/30 [415/205]	Plate	3Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-387	21, Cl. 2	K31545		75/45 [515/310]	Plate	3Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-387	22, Cl. 1	K21590		60/30 [415/205]	Plate	2.25Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-387	22, Cl. 2	K21590		75/45 [515/310]	Plate	2.25Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-426	CP21	J31545		60/30 [415/205]	Centrifugal Cast Pipe	3Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-426	CP22	J21890		70/40 [485/275]	Centrifugal Cast Pipe	2.25Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-691	2.25CR, Cl. 1	K21590		60/30 [415/205]	Fusion Welded Pipe	2.25Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-691	2.25CR, Cl. 2	K21590		75/45 [515/310]	Fusion Welded Pipe	2.25Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-691	3CR, Cl. 1	K31545		60/30 [415/205]	Fusion Welded Pipe	3Cr-1Mo
5A	1	5.2	ASTM/ASME	A/SA-691	3CR, Cl. 2	K31545		75/45 [515/310]	Fusion Welded Pipe	3Cr-1Mo

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
5A	1	5.2	ASTM/ASME	A/SA-739	B22	K21390		75/45 [515/310]	Bar	2.25Cr-1Mo
5B	1	5.3	ASTM/ASME	A/SA-182	F5	K41545		70/40 [485/275]	Forgings	5Cr-0.5Mo
5B	1	5.3	ASTM/ASME	A/SA-182	F5a	K42544		90/65 [620/450]	Forgings	5Cr-0.5Mo
5B	1	5.4	ASTM/ASME	A/SA-182	F9	K90941		85/55 [585/380]	Forgings	9Cr-1Mo
5B	1	5.3	ASTM	A199	T5	K41545		60/25 [415/170]	Seamless Tube	5Cr-0.5Mo
5B	1	5.4	ASTM	A199	T9	K81590		60/25 [415/170]	Seamless Tube	9Cr-1Mo
5B	1	5.3	ASTM/ASME	A/SA-213	T5	K41545		60/30 [415/205]	Seamless Tube	5Cr-0.5Mo
5B	1	5.3	ASTM/ASME	A/SA-213	T5b	K51545		60/30 [415/205]	Seamless Tube	5Cr-0.5Mo-Si
5B	1	5.3	ASTM/ASME	A/SA-213	T5c	K41245		60/30 [415/205]	Seamless Tube	5Cr-0.5Mo-Ti
5B	1	5.4	ASTM/ASME	A/SA-213	T9	K90941		60/30 [415/205]	Seamless Tube	9Cr-1Mo
5B	1	5.4	ASTM/ASME	A/SA-217	C12	J82090		90/60 [620/415]	Castings	9Cr-1Mo
5B	1	5.3	ASTM/ASME	A/SA-217	C5	J42045		90/60 [620/415]	Castings	5Cr-0.5Mo
5B	1	5.3	ASTM/ASME	A/SA-234	WP5, Cl. 1	K41545		60/30 [415/205]	Piping Fittings	5Cr-0.5Mo
5B	1	5.3	ASTM/ASME	A/SA-234	WP5, Cl. 3	K41545		75/45 [515/310]	Piping Fittings	5Cr-0.5Mo
5B	1	5.4	ASTM/ASME	A/SA-234	WP9, Cl. 1	K90941		60/30 [415/205]	Piping Fittings	9Cr-1Mo
5B	1	5.4	ASTM/ASME	A/SA-234	WP9, Cl. 3	K90941		75/45 [515/310]	Piping Fittings	9Cr-1Mo
5B	1	5.3	ASTM/ASME	A/SA-335	P5	K41545		60/30 [415/205]	Seamless Pipe	5Cr-0.5Mo
5B	1	5.3	ASTM/ASME	A/SA-335	P5b	K51545		60/30 [415/205]	Seamless Pipe	5Cr-0.5Mo-Si
5B	1	5.3	ASTM/ASME	A/SA-335	P5c	K41245		60/30 [415/205]	Seamless Pipe	5Cr-0.5Mo-Ti
5B	1	5.4	ASTM/ASME	A/SA-335	P9	K90941		60/30 [415/205]	Seamless Pipe	9Cr-1Mo
5B	1	5.3	ASTM/ASME	A/SA-336	F5	K41545		60/36 [415/250]	Forgings	5Cr-0.5Mo
5B	1	5.3	ASTM/ASME	A/SA-336	F5A	K42544		80/50 [550/345]	Forgings	5Cr-0.5Mo
5B	1	5.4	ASTM/ASME	A/SA-336	F9	K90941		85/55 [585/380]	Forgings	9Cr-1Mo
5B	1	5.3	ASTM/ASME	A/SA-369	FP5	K41545		60/30 [415/205]	Forged Pipe	5Cr-0.5Mo
5B	1	5.4	ASTM/ASME	A/SA-369	FP9	K90941		60/30 [415/205]	Forged Pipe	9Cr-1Mo
5B	1	5.3	ASTM/ASME	A/SA-387	5, Cl. 1	K41545		60/30 [415/205]	Plate	5Cr-0.5Mo
5B	1	5.3	ASTM/ASME	A/SA-387	5, Cl. 2	K41545		75/45 [515/310]	Plate	5Cr-0.5Mo
5B	1	5.4	ASTM/ASME	A/SA-387	9, Cl. 1	K90941		60/30 [415/205]	Plate	9Cr-1Mo
5B	1	5.4	ASTM/ASME	A/SA-387	9, Cl. 2	K90941		75/45 [515/310]	Plate	9Cr-1Mo

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
5B	1	5.3	ASTM/ASME	A/SA-426	CP5	J42045		90/60 [620/415]	Centrifugal Cast Pipe	5Cr-0.5Mo
5B	1	5.3	ASTM/ASME	A/SA-426	CP5b	J51545		60/30 [415/205]	Centrifugal Cast Pipe	5Cr-1.5Si-0.5Mo
5B	1	5.4	ASTM/ASME	A/SA-426	CP9	J82090		90/60 [620/415]	Centrifugal Cast Pipe	9Cr-1Mo
5B	1	5.3	ASTM/ASME	A/SA-691	5CR, Cl. 1	K41545		60/30 [415/205]	Fusion Welded Pipe	5Cr-0.5Mo
5B	1	5.3	ASTM/ASME	A/SA-691	5CR, Cl. 2	K41545		75/45 [515/310]	Fusion Welded Pipe	5Cr-0.5Mo
5C	1	6.2	ASTM/ASME	A/SA-182	F22V	K31835		85/60 [585/415]	Forgings	2.25Cr-1Mo-V
5C	1	6.2	ASTM/ASME	A/SA-182	F3V	K31830		85/60 [585/415]	Forgings	3Cr-1Mo-V-Ti-B
5C	1	6.2	ASTM/ASME	A/SA-182	F3VCb	K31390		85/60 [585/415]	Forgings	3Cr-1Mo-0.25V-Cb-Ca
5C	1	6.2	ASTM/ASME	A/SA-336	F22V	K31835		85/60 [585/415]	Forgings	2.25Cr-1Mo-V
5C	1	6.2	ASTM/ASME	A/SA-336	F3V	K31830		85/60 [585/415]	Forgings	3Cr-1Mo-V-Ti-B
5C	1	6.2	ASTM/ASME	A/SA-336	F3VCb	K31390		85/60 [585/415]	Forgings	3Cr-1Mo-0.25V-Cb-Ca
5C	1	5.2	ASTM/ASME	A/SA-487	8, Cl. A	J22091		85/55 [585/380]	Castings	2.25Cr-1Mo
5C	1	5.2	ASTM/ASME	A/SA-508	22, Cl. 3	K21590		85/55 [585/380]	Forgings	2.25Cr-1Mo
5C	1	6.2	ASTM/ASME	A/SA-508	3V	K31830		85/60 [585/415]	Forgings	3Cr-1Mo-V-Ti-B
5C	1	6.2	ASTM/ASME	A/SA-508	3VCb	K31390		85/60 [585/415]	Forgings	3Cr-1Mo-0.25V-Cb-Ca
5C	1	5.2	ASTM/ASME	A/SA-541	22, Cl. 3	K21390		85/55 [585/380]	Forgings	2.25Cr-1Mo
5C	1	5.2	ASTM/ASME	A/SA-541	22V	K31835		85/60 [585/415]	Forgings	2.25Cr-1Mo-V
5C	1	6.2	ASTM/ASME	A/SA-541	3V	K31830		85/60 [585/415]	Forgings	3Cr-1Mo-V-Ti-B
5C	1	6.2	ASTM/ASME	A/SA-541	3VCb	K31390		85/60 [585/415]	Forgings	3Cr-1Mo-0.25V-Cb-Ca
5C	1	5.2	ASTM/ASME	A/SA-542	A, Cl. 4	K21590		85/55 [585/380]	Plate	2.25Cr-1Mo
5C	1	5.2	ASTM/ASME	A/SA-542	A, Cl. 4a	K21590		85/60 [585/415]	Plate	2.25Cr-1Mo
5C	1	5.2	ASTM/ASME	A/SA-542	B, Cl. 4	K21590		85/55 [585/380]	Plate	2.25Cr-1Mo
5C	1	5.2	ASTM/ASME	A/SA-542	B, Cl. 4a	K21590		85/60 [585/415]	Plate	2.25Cr-1Mo
5C	1	6.2	ASTM/ASME	A/SA-542	C, Cl. 4	K31830		85/55 [585/380]	Plate	3Cr-1Mo-V-Ti-B
5C	1	6.2	ASTM/ASME	A/SA-542	C, Cl. 4a	K31830		85/60 [585/415]	Plate	3Cr-1Mo-V-Ti-B
5C	1	6.3	ASTM/ASME	A/SA-542	D, Cl. 4a	K31835		85/60 [585/415]	Plate	2.25Cr-1Mo-V
5C	1	6.2	ASTM/ASME	A/SA-542	E, Cl. 4a	K31390		85/60 [585/415]	Plate	3Cr-1Mo-0.25V-Cb-Ca
5C	1	6.2	ASTM/ASME	A/SA-832	21V	K31830		85/60 [585/415]	Plate	3Cr-1Mo-V-Ti-B
5C	1	6.2	ASTM/ASME	A/SA-832	22V	K31835		85/60 [585/415]	Plate	2.25Cr-1Mo-V

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
5C	1	6.2	ASTM/ASME	A/SA-832	23V	—		85/60 [585/415]	Plate	3Cr-1Mo-0.25V-Cb-Ca
5C	3	5.2	ASTM/ASME	A/SA-542	A, Cl. 3	K21590		95/75 [655/515]	Plate	2.25Cr-1Mo
5C	3	5.2	ASTM/ASME	A/SA-542	B, Cl. 3	K21590		95/75 [655/515]	Plate	2.25Cr-1Mo
5C	3	6.2	ASTM/ASME	A/SA-542	C, Cl. 3	K31830		95/75 [655/515]	Plate	3Cr-1Mo-V-Ti-B
5C	4	5.2	ASTM/ASME	A/SA-487	8, Cl. B	J22091		105/85 [725/585]	Castings	2.25Cr-1Mo
5C	4	5.2	ASTM/ASME	A/SA-487	8, Cl. C	J22091		100/75 [690/515]	Castings	2.25Cr-1Mo
5C	4	5.2	ASTM/ASME	A/SA-541	22, Cl. 4	K21390		105/85 [725/585]	Forgings	2.25Cr-1Mo
5C	4	5.2	ASTM/ASME	A/SA-542	A, Cl. 1	K21590		105/85 [725/585]	Plate	2.25Cr-1Mo
5C	4	5.2	ASTM/ASME	A/SA-542	B, Cl. 1	K21590		105/85 [725/585]	Plate	2.25Cr-1Mo
5C	4	6.2	ASTM/ASME	A/SA-542	C, Cl. 1	K31830		105/85 [725/585]	Plate	3Cr-1Mo-V-Ti-B
5C	5	5.2	ASTM/ASME	A/SA-541	22, Cl. 5	K21390		115/100 [795/690]	Forgings	2.25Cr-1Mo
5C	5	5.2	ASTM/ASME	A/SA-542	A, Cl. 2	K21590		115/100 [795/690]	Plate	2.25Cr-1Mo
5C	5	5.2	ASTM/ASME	A/SA-542	B, Cl. 2	K21590		115/100 [795/690]	Plate	2.25Cr-1Mo
5C	5	6.2	ASTM/ASME	A/SA-542	C, Cl. 2	K31830		115/100 [795/690]	Plate	3Cr-1Mo-V-Ti-B
6	1	7.2	ASTM/ASME	A/SA-182	F6a, Cl. 1	S41000		70/40 [485/275]	Forgings	13Cr
6	1	7.2	ASTM/ASME	A/SA-240	410	S41000		65/30 [450/205]	Plate, Sheet, & Strip	13Cr
6	1	7.2	ASTM/ASME	A/SA-268	TP410	S41000		60/30 [415/205]	Seamless & Welded Tube	13Cr
6	1	7.2	ASTM/ASME	A/SA-276	TP410	S41000		70/40 [485/275]	Bar	13Cr
6	1	7.1	ASTM	A473	403	S40300		70/40 [485/275]	Forgings	12Cr
6	1	7.2	ASTM	A473	410	S41000		70/40 [485/275]	Forgings	13Cr
6	1	7.1	ASTM/ASME	A/SA-479	403	S40300		70/40 [485/275]	Bars & Shapes	12Cr
6	1	7.2	ASTM/ASME	A/SA-479	410	S41000		70/40 [485/275]	Bars & Shapes	13Cr
6	1	7.2	ASTM/ASME	A/SA-479	XM-30	S41040		70/40 [485/275]	Bars & Shapes	13Cr-Cb
6	2	7.2	ASTM/ASME	A/SA-182	F429	S42900		60/35 [415/240]	Forgings	15Cr
6	2	7.2	ASTM/ASME	A/SA-240	429	S42900		65/30 [450/205]	Plate, Sheet, & Strip	15Cr
6	2	7.2	ASTM/ASME	A/SA-268	TP429	S42900		60/35 [415/240]	Seamless & Welded Tube	15Cr
6	2	7.2	ASTM	A473	420	S42000		70/35 [485/240]	Forgings	13Cr
6	2	7.2	ASTM	A473	429	S42900		65/35 [450/240]	Forgings	15Cr
6	3	7.2	ASTM/ASME	A/SA-182	F6a, Cl. 2	S41000		85/55 [585/380]	Forgings	13Cr

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
6	3	ASTM/ASME	A/SA-182	F6a, Cl. 3	S41000		110/85 [760/585]	Forgings	13Cr
6	3	ASTM/ASME	A/SA-182	F6a, Cl. 4	S41000		130/110 [895/760]	Forgings	13Cr
6	3	ASTM/ASME	A/SA-182	F6b	S41026		110/90 [760/620]	Forgings	13Cr-0.5Mo
6	3	ASTM/ASME	A/SA-217	CA15	J91150		90/65 [620/450]	Castings	13Cr
6	3	ASTM/ASME	A/SA-336	F6	S41000		85/55 [585/380]	Forgings	13Cr
6	3	ASTM	A351	CA15	J91150		90/- [620/-]	Castings	13Cr
6	3	ASTM/ASME	A/SA-426	CPCA15	J91150		90/65 [620/450]	Centrifugal Cast Pipe	13Cr
6	3	ASTM/ASME	A/SA-487	CA15 Cl. B	J91171		90/65 [620/450]	Castings	13Cr
6	3	ASTM/ASME	A/SA-487	CA15 Cl. C	J91150		90/60 [620/415]	Castings	13Cr
6	3	ASTM/ASME	A/SA-487	CA15 Cl. D	J91171		100/75 [690/515]	Castings	13Cr
6	3	ASTM/ASME	A/SA-487	CA15M Cl. A	J91151		90/65 [620/450]	Castings	13Cr-Mo
6	3	ASTM	A743	CA15	J91150		90/65 [620/450]	Castings	13Cr
6	3	ASTM	A743	CA15M	J91151		90/65 [620/450]	Castings	13Cr-Mo
6	4	ASTM/ASME	A/SA-182	F6NM	S41500		115/90 [795/620]	Forgings	13Cr-4.5Ni-Mo
6	4	ASTM/ASME	A/SA-240	S41500	S41500		115/90 [795/620]	Plate, Sheet, & Strip	13Cr-4.5Ni-Mo
6	4	ASTM/ASME	A/SA-268	S41500	S41500		115/90 [795/620]	Seamless & Welded Tube	13Cr-4.5Ni-Mo
6	4	ASTM/ASME	A/SA-352	CA6NM	J91540		110/80 [760/550]	Castings	13Cr-4Ni
6	4	ASTM	A473	414	S41400		65/35 [450/240]	Forgings	12.5Cr-2Ni-Si
6	4	ASTM/ASME	A/SA-479	414	S41400		115/90 [795/620]	Bars & Shapes	12.5Cr-2Ni-Si
6	4	ASTM/ASME	A/SA-479	S41500	S41500		115/90 [795/620]	Bars & Shapes	13Cr-4.5Ni-Mo
6	4	ASTM/ASME	A/SA-487	CA6NM, Cl. A	J91540		110/80 [760/550]	Castings	13Cr-4Ni
6	4	ASTM/ASME	A/SA-487	CA6NM, Cl. B	J91540		100/75 [690/515]	Castings	13Cr-4Ni
6	4	ASTM/ASME	A/SA-731	S41500	S41500		115/90 [795/620]	Seamless & Welded Pipe	13Cr-4.5Ni-Mo
6	4	ASTM	A743	CA40	J91153		100/70 [690/485]	Castings	13Cr
6	4	ASTM	A743	CA6NM	J91540		110/80 [760/550]	Castings	13Cr-4Ni
6	4	ASTM	A743	CB6	J91804		115/85 [795/585]	Castings	17Cr-5Ni
6	4	ASTM/ASME	A/SA-815	S41500	S41500		110/90 [760/620]	Fittings	13Cr-4.5Ni-Mo
7	1	ASTM/ASME	A/SA-240	405	S40500		60/25 [415/170]	Plate, Sheet, & Strip	12Cr-1Al
7	1	ASTM/ASME	A/SA-240	409	S40910		55/25 [380/170]	Plate, Sheet, & Strip	11Cr-Ti

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
7	1	7.1	ASTM/ASME A/SA-240	409	S40920		55/25 [380/170]	Plate, Sheet, & Strip	11Cr-Ti
7	1	7.1	ASTM/ASME A/SA-240	409	S40930		55/25 [380/170]	Plate, Sheet, & Strip	11Cr-Ti
7	1	7.2	ASTM/ASME A/SA-240	410S	S41008		60/30 [415/205]	Plate, Sheet, & Strip	13Cr
7	1	7.1	ASTM/ASME A/SA-268	S40800	S40800		55/30 [380/205]	Seamless & Welded Tube	12Cr-Ti
7	1	7.1	ASTM/ASME A/SA-268	TP405	S40500		60/30 [415/205]	Seamless & Welded Tube	12Cr-1Al
7	1	7.1	ASTM/ASME A/SA-268	TP409	S40900		55/25 [380/170]	Seamless & Welded Tube	11Cr-Ti
7	1	7.1	ASTM A473	405	S40500		60/30 [415/205]	Forgings	12Cr-1Al
7	1	7.1	ASTM/ASME A/SA-479	405	S40500		60/25 [415/170]	Bars & Shapes	12Cr-1Al
7	1	7.1	ASTM A743	CC50	J92615		55/— [380/—]	Castings	28Cr-3Ni
7	1	7.2	ASTM/ASME A/SA-1010	40	S41003		66/40 [455/275]	Plate, Sheet, & Strip	12Cr-1Ni
7	1	7.2	ASTM/ASME A/SA-1010	50	S41003		70/50 [485/350]	Plate, Sheet, & Strip	12Cr-1Ni
7	2	7.1	ASTM/ASME A/SA-182	F430	S43000		60/35 [415/240]	Forgings	17Cr
7	2	7.1	ASTM/ASME A/SA-240	430	S43000		65/30 [450/205]	Plate, Sheet, & Strip	17Cr
7	2	7.1	ASTM/ASME A/SA-240	439	S43035		60/30 [415/205]	Plate, Sheet, & Strip	18Cr-Ti
7	2	7.1	ASTM/ASME A/SA-240	S43932	S43932		60/30 [415/205]	Plate, Sheet, & Strip	18Cr-Ti-Cb
7	2	7.1	ASTM/ASME A/SA-240	S44400	S44400		60/40 [415/275]	Plate, Sheet, & Strip	18Cr-2Mo
7	2	7.1	ASTM/ASME A/SA-268	18Cr-2Mo	S44400		60/40 [415/275]	Seamless & Welded Tube	18Cr-2Mo
7	2	7.1	ASTM/ASME A/SA-268	TP430	S43000		60/35 [415/240]	Seamless & Welded Tube	17Cr
7	2	7.1	ASTM/ASME A/SA-268	TP430Ti	S43036		60/35 [415/240]	Seamless & Welded Tube	18Cr-Ti
7	2	7.1	ASTM/ASME A/SA-268	TP439	S43035		60/30 [415/205]	Seamless & Welded Tube	18Cr-Ti
7	2	7.1	ASTM A473	430	S43000		70/35 [485/240]	Forgings	17Cr
7	2	7.1	ASTM/ASME A/SA-479	430	S43000		70/40 [485/275]	Bars & Shapes	17Cr
7	2	7.1	ASTM/ASME A/SA-479	439	S43035		70/40 [485/275]	Bars & Shapes	18Cr-Ti
7	2	7.1	ASTM/ASME A/SA-479	S44400	S44400		60/45 [415/310]	Bars & Shapes	18Cr-2Mo
7	2	7.1	ASTM/ASME A/SA-731	18Cr-2Mo	S44400		60/40 [415/275]	Seamless & Welded Pipe	18Cr-2Mo
7	2	7.1	ASTM/ASME A/SA-731	TP439	S43035		60/30 [415/205]	Seamless & Welded Pipe	18Cr-Ti
7	2	7.1	ASTM/ASME A/SA-803	TP439	S43035		60/30 [415/205]	Welded Tube	18Cr-Ti
8	1	8.1	ASTM A167	302B	S30215		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-8Ni-2Si
8	1	8.1	ASTM/ASME A/SA-182	F304	S30400		75/30 [515/205]	Forgings	18Cr-8Ni

(Continued)



**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	1	8.1	ASTM/ASME A/SA-182	F304	S30400	>5 [>127]	70/30 [485/205]	Forgings	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-182	F304H	S30409	>5 [>127]	70/30 [485/205]	Forgings	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-182	F304H	S30409		75/30 [515/205]	Forgings	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-182	F304L	S30403		70/25 [485/170]	Forgings	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-182	F304L	S30403	>5 [>127]	65/25 [450/170]	Forgings	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-182	F304LN	S30453		75/30 [515/205]	Forgings	18Cr-8Ni-N
8	1	8.1	ASTM/ASME A/SA-182	F304LN	S30453	>5 [>127]	70/30 [485/205]	Forgings	18Cr-8Ni-N
8	1	8.1	ASTM/ASME A/SA-182	F304N	S30451		80/35 [550/240]	Forgings	18Cr-8Ni-N
8	1	8.1	ASTM/ASME A/SA-182	F316	S31600		75/30 [515/205]	Forgings	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-182	F316	S31600	>5 [>127]	70/30 [485/205]	Forgings	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-182	F316H	S31609		75/30 [515/205]	Forgings	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-182	F316H	S31609	>5 [>127]	70/30 [485/205]	Forgings	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-182	F316L	S31603		70/25 [485/170]	Forgings	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-182	F316L	S31603	>5 [>127]	65/25 [450/170]	Forgings	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-182	F316LN	S31653	>5 [>127]	70/30 [485/205]	Forgings	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME A/SA-182	F316LN	S31653		75/30 [515/205]	Forgings	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME A/SA-182	F316N	S31651		80/35 [550/240]	Forgings	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME A/SA-182	F317	S31700	>5 [>127]	70/30 [485/205]	Forgings	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME A/SA-182	F317	S31700		75/30 [515/205]	Forgings	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME A/SA-182	F317L	S31703	>5 [>127]	65/25 [450/170]	Forgings	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME A/SA-182	F317L	S31703		70/25 [485/170]	Forgings	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME A/SA-182	F321	S32100		75/30 [515/205]	Forgings	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME A/SA-182	F321	S32100	>5 [>127]	70/30 [485/205]	Forgings	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME A/SA-182	F321H	S32109		75/30 [515/205]	Forgings	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME A/SA-182	F321H	S32109	>5 [>127]	70/30 [485/205]	Forgings	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME A/SA-182	F347	S34700		75/30 [515/205]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-182	F347	S34700	>5 [>127]	70/30 [485/205]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-182	F347H	S34709	>5 [>127]	70/30 [485/205]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-182	F347H	S34709		75/30 [515/205]	Forgings	18Cr-10Ni-Cb

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	1	8.1	ASTM/ASME	A/SA-182	F348	S34800		75/30 [515/205]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-182	F348	S34800	>5 [>127]	70/30 [485/205]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-182	F348H	S34809	>5 [>127]	70/30 [485/205]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-182	F348H	S34809		75/30 [515/205]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-182	F46	S30600		78/35 [540/240]	Forgings	18Cr-15Ni-4Si
8	1	8.1	ASTM/ASME	A/SA-213	S32615	S32615		80/32 [550/220]	Seamless Tube	18Cr-20Ni-5.5Si
8	1	8.1	ASTM/ASME	A/SA-213	TP304	S30400		75/30 [515/205]	Seamless Tube	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-213	TP304H	S30409		75/30 [515/205]	Seamless Tube	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-213	TP304L	S30403		70/25 [485/170]	Seamless Tube	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-213	TP304LN	S30453		75/30 [515/205]	Seamless Tube	18Cr-8Ni-N
8	1	8.1	ASTM/ASME	A/SA-213	TP304N	S30451		80/35 [550/240]	Seamless Tube	18Cr-8Ni-N
8	1	8.1	ASTM/ASME	A/SA-213	TP316	S31600		75/30 [515/205]	Seamless Tube	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-213	TP316H	S31609		75/30 [515/205]	Seamless Tube	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-213	TP316L	S31603		70/25 [485/170]	Seamless Tube	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-213	TP316LN	S31653		75/30 [515/205]	Seamless Tube	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME	A/SA-213	TP316N	S31651		80/35 [550/240]	Seamless Tube	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM	A213	TP316Ti	S31635		75/30 [515/205]	Seamless Tube	16Cr-12Ni-2Mo-Ti
8	1	8.1	ASTM	A213	TP317	S31700		75/30 [515/205]	Seamless Tube	18Cr-13Ni-3Mo
8	1	8.1	ASTM	A213	TP317L	S31703		75/30 [515/205]	Seamless Tube	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME	A/SA-213	TP321	S32100		75/30 [515/205]	Seamless Tube	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME	A/SA-213	TP321H	S32109		75/30 [515/205]	Seamless Tube	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME	A/SA-213	TP347	S34700		75/30 [515/205]	Seamless Tube	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-213	TP347H	S34709		75/30 [515/205]	Seamless Tube	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-213	TP347HFG	S34710		80/30 [550/205]	Seamless Tube	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-213	TP347LN	S34751		75/30 [515/205]	Seamless Tube	18Cr-10Ni-Cb-N
8	1	8.1	ASTM/ASME	A/SA-213	TP348	S34800		75/30 [515/205]	Seamless Tube	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-213	TP348H	S34809		75/30 [515/205]	Seamless Tube	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-213	XM-15	S38100		75/30 [515/205]	Seamless Tube	18Cr-18Ni-2Si
8	1	8.1	ASTM/ASME	A/SA-240	301	S30100		75/30 [515/205]	Plate, Sheet, & Strip	17Cr-7Ni

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	1	8.1	ASTM/ASME A/SA-240	302	S30200		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-240	304	S30400		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-240	304H	S30409		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-240	304L	S30403		70/25 [485/170]	Plate, Sheet, & Strip	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-240	304LN	S30453		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-8Ni-N
8	1	8.1	ASTM/ASME A/SA-240	304N	S30451		80/35 [550/240]	Plate, Sheet, & Strip	18Cr-8Ni-N
8	1	8.1	ASTM/ASME A/SA-240	305	S30500		70/25 [485/170]	Plate, Sheet, & Strip	18Cr-11Ni
8	1	8.1	ASTM/ASME A/SA-240	316	S31600		75/30 [515/205]	Plate, Sheet, & Strip	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-240	316Cb	S31640		75/30 [515/205]	Plate, Sheet, & Strip	16Cr-12Ni-2Mo-Cb
8	1	8.1	ASTM/ASME A/SA-240	316H	S31609		75/30 [515/205]	Plate, Sheet, & Strip	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-240	316L	S31603		70/25 [485/170]	Plate, Sheet, & Strip	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-240	316LN	S31653		75/30 [515/205]	Plate, Sheet, & Strip	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME A/SA-240	316N	S31651		80/35 [550/240]	Plate, Sheet, & Strip	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME A/SA-240	316Ti	S31635		75/30 [515/205]	Plate, Sheet, & Strip	16Cr-12Ni-2Mo-Ti
8	1	8.1	ASTM/ASME A/SA-240	317	S31700		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME A/SA-240	317L	S31703		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME A/SA-240	321	S32100		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME A/SA-240	321H	S32109		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME A/SA-240	347	S34700		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-240	347H	S34709		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-240	348	S34800		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-240	348H	S34809		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-240	S30600	S30600		78/35 [540/240]	Plate, Sheet, & Strip	18Cr-15Ni-4Si
8	1	8.1	ASTM/ASME A/SA-240	S30601	S30601		78/37 [540/255]	Plate, Sheet, & Strip	17.5Cr-17.5Ni-5.3Si
8	1	8.1	ASTM/ASME A/SA-240	S31753	S31753		80/35 [550/240]	Plate, Sheet, & Strip	18Cr-13Ni-3Mo-N
8	1	8.1	ASTM/ASME A/SA-240	S32615	S32615		80/32 [550/220]	Plate, Sheet, & Strip	18Cr-20Ni-5.5Si
8	1	8.1	ASTM/ASME A/SA-240	XM-15	S38100		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-18Ni-2Si
8	1	8.1	ASTM/ASME A/SA-240	XM-21	S30452		85/40 [585/275]	Plate	18Cr-8Ni-N
8	1	8.1	ASTM/ASME A/SA-240	XM-21	S30452		90/50 [620/345]	Sheet & Strip	18Cr-8Ni-N

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	1	8.1	ASTM/ASME	A/SA-249	TP XM-15	S38100		75/30 [515/205]	Welded Tube	18Cr-18Ni-2Si
8	1	8.1	ASTM/ASME	A/SA-249	TP304	S30400		75/30 [515/205]	Welded Tube	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-249	TP304H	S30409		75/30 [515/205]	Welded Tube	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-249	TP304L	S30403		70/25 [485/170]	Welded Tube	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-249	TP304LN	S30453		75/30 [515/205]	Welded Tube	18Cr-8Ni-N
8	1	8.1	ASTM/ASME	A/SA-249	TP304N	S30451		80/35 [550/240]	Welded Tube	18Cr-8Ni-N
8	1	8.1	ASTM/ASME	A/SA-249	TP316	S31600		75/30 [515/205]	Welded Tube	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-249	TP316H	S31609		75/30 [515/205]	Welded Tube	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-249	TP316L	S31603		70/25 [485/170]	Welded Tube	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-249	TP316LN	S31653		75/30 [515/205]	Welded Tube	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME	A/SA-249	TP316N	S31651		80/35 [550/240]	Welded Tube	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME	A/SA-249	TP317	S31700		75/30 [515/205]	Welded Tube	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME	A/SA-249	TP317L	S31703		75/30 [515/205]	Welded Tube	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME	A/SA-249	TP321	S32100		75/30 [515/205]	Welded Tube	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME	A/SA-249	TP321H	S32109		75/30 [515/205]	Welded Tube	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME	A/SA-249	TP347	S34700		75/30 [515/205]	Welded Tube	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-249	TP347H	S34709		75/30 [515/205]	Welded Tube	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-249	TP348	S34800		75/30 [515/205]	Welded Tube	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-249	TP348H	S34809		75/30 [515/205]	Welded Tube	18Cr-10Ni-Cb
8	1	8.1	ASTM	A269	TP304	S30400		-/- [-/-]	Seamless & Welded Tube	18Cr-8Ni
8	1	8.1	ASTM	A269	TP304L	S30403		-/- [-/-]	Seamless & Welded Tube	18Cr-8Ni
8	1	8.1	ASTM	A269	TP304LN	S30453		75/30 [515/205]	Seamless & Welded Tube	18Cr-8Ni-N
8	1	8.1	ASTM	A269	TP316	S31600		-/- [-/-]	Seamless & Welded Tube	16Cr-12Ni-2Mo
8	1	8.1	ASTM	A269	TP316L	S31603		-/- [-/-]	Seamless & Welded Tube	16Cr-12Ni-2Mo
8	1	8.1	ASTM	A269	TP316LN	S31653		75/30 [515/205]	Seamless & Welded Tube	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM	A269	TP317	S31700		75/30 [515/205]	Seamless & Welded Tube	18Cr-13Ni-3Mo
8	1	8.1	ASTM	A269	TP321	S32100		75/30 [515/205]	Seamless & Welded Tube	18Cr-10Ni-Ti
8	1	8.1	ASTM	A269	TP347	S34700		75/30 [515/205]	Seamless & Welded Tube	18Cr-10Ni-Cb
8	1	8.1	ASTM	A269	TP348	S34800		75/30 [515/205]	Seamless & Welded Tube	18Cr-10Ni-Cb

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	1	8.1	ASTM	A270	TP304	S30400		75/30 [515/205]	Seamless & Welded Tube	18Cr-8Ni
8	1	8.1	ASTM	A271	TP304	S30400		75/30 [515/205]	Seamless Tube	18Cr-8Ni
8	1	8.1	ASTM	A271	TP304H	S30409		75/30 [515/205]	Seamless Tube	18Cr-8Ni
8	1	8.1	ASTM	A271	TP316	S31600		75/30 [515/205]	Seamless Tube	16Cr-12Ni-2Mo
8	1	8.1	ASTM	A271	TP316H	S31609		75/30 [515/205]	Seamless Tube	16Cr-12Ni-2Mo
8	1	8.1	ASTM	A271	TP321	S32100		75/30 [515/205]	Seamless Tube	18Cr-10Ni-Ti
8	1	8.1	ASTM	A271	TP321H	S32109		75/30 [515/205]	Seamless Tube	18Cr-10Ni-Ti
8	1	8.1	ASTM	A271	TP347	S34700		75/30 [515/205]	Seamless Tube	18Cr-10Ni-Cb
8	1	8.1	ASTM	A271	TP347H	S34709		75/30 [515/205]	Seamless Tube	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-276	TP304	S30400		75/30 [515/205]	Bar	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-276	TP304L	S30403		70/25 [485/170]	Bar	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-276	TP316	S31600		75/30 [515/205]	Bar	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-276	TP316L	S31603		70/25 [485/170]	Bar	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-312	S30600	S30600		78/35 [540/240]	Seamless & Welded Pipe	18Cr-15Ni-4Si
8	1	8.1	ASTM/ASME	A/SA-312	S32615	S32615		80/32 [550/220]	Seamless & Welded Pipe	18Cr-20Ni-5.5Si
8	1	8.1	ASTM/ASME	A/SA-312	TP XM-15	S38100		75/30 [515/205]	Seamless & Welded Pipe	18Cr-18Ni-2Si
8	1	8.1	ASTM/ASME	A/SA-312	TP304	S30400		75/30 [515/205]	Seamless & Welded Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-312	TP304H	S30409		75/30 [515/205]	Seamless & Welded Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-312	TP304L	S30403		70/25 [485/170]	Seamless & Welded Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-312	TP304LN	S30453		75/30 [515/205]	Seamless & Welded Pipe	18Cr-8Ni-N
8	1	8.1	ASTM/ASME	A/SA-312	TP304N	S30451		80/35 [550/240]	Seamless & Welded Pipe	18Cr-8Ni-N
8	1	8.1	ASTM/ASME	A/SA-312	TP316	S31600		75/30 [515/205]	Seamless & Welded Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-312	TP316H	S31609		75/30 [515/205]	Seamless & Welded Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-312	TP316L	S31603		70/25 [485/170]	Seamless & Welded Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-312	TP316LN	S31653		75/30 [515/205]	Seamless & Welded Pipe	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME	A/SA-312	TP316N	S31651		80/35 [550/240]	Seamless & Welded Pipe	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM	A312	TP316Ti	S31635		75/30 [515/205]	Seamless & Welded Pipe	16Cr-12Ni-2Mo-Ti
8	1	8.1	ASTM/ASME	A/SA-312	TP317	S31700		75/30 [515/205]	Seamless & Welded Pipe	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME	A/SA-312	TP317L	S31703		75/30 [515/205]	Seamless & Welded Pipe	18Cr-13Ni-3Mo

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	1	8.1	ASTM/ASME A/SA-312	TP321	S32100	≤0.375 [≤10]	75/30 [515/205]	Seamless Pipe	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME A/SA-312	TP321	S32100	>0.375 [>10]	70/25 [485/170]	Seamless Pipe	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME A/SA-312	TP321H	S32109	>0.375 [>10]	70/25 [485/170]	Seamless Pipe	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME A/SA-312	TP321H	S32109	≤0.375 [≤10]	75/30 [515/205]	Seamless Pipe	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME A/SA-312	TP347	S34700		75/30 [515/205]	Seamless & Welded Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-312	TP347H	S34709		75/30 [515/205]	Seamless & Welded Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-312	TP347LN	S34751		75/30 [515/205]	Seamless & Welded Pipe	18Cr-10Ni-Cb-N
8	1	8.1	ASTM/ASME A/SA-312	TP348	S34800		75/30 [515/205]	Seamless & Welded Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-312	TP348H	S34809		75/30 [515/205]	Seamless & Welded Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-336	F304	S30400		70/30 [485/205]	Forgings	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-336	F304H	S30409		70/30 [485/205]	Forgings	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-336	F304L	S30403		65/25 [450/170]	Forgings	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-336	F304LN	S30453		70/30 [485/205]	Forgings	18Cr-8Ni-N
8	1	8.1	ASTM/ASME A/SA-336	F304N	S30451		80/35 [550/240]	Forgings	18Cr-8Ni-N
8	1	8.1	ASTM/ASME A/SA-336	F316	S31600		70/30 [485/205]	Forgings	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-336	F316H	S31609		70/30 [485/205]	Forgings	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-336	F316L	S31603		65/25 [450/170]	Forgings	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-336	F316LN	S31653		70/30 [485/205]	Forgings	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME A/SA-336	F316N	S31651		80/35 [550/240]	Forgings	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME A/SA-336	F321	S32100		70/30 [485/205]	Forgings	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME A/SA-336	F321H	S32109		70/30 [485/205]	Forgings	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME A/SA-336	F347	S34700		70/30 [485/205]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-336	F347H	S34709		70/30 [485/205]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-336	F348	S34800		70/30 [485/205]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-336	F348H	S34809		65/25 [450/170]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-336	F46	S30600		78/32 [540/220]	Forgings	18Cr-15Ni-4Si
8	1	8.1	ASTM/ASME A/SA-351	CF10	J92590		70/30 [485/205]	Castings	19Cr-9Ni-0.5Mo
8	1	8.1	ASTM/ASME A/SA-351	CF10M	J92901		70/30 [485/205]	Castings	19Cr-9Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-351	CF10MC	J92971		70/30 [485/205]	Castings	16Cr-14Ni-2Mo

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	1	8.1	ASTM/ASME A/SA-351	CF3	J92500		70/30 [485/205]	Castings	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-351	CF3A	J92500		77/35 [530/240]	Castings	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-351	CF3M	J92800		70/30 [485/205]	Castings	18Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-351	CF8	J92600		70/30 [485/205]	Castings	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-351	CF8A	J92600		77/35 [530/240]	Castings	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-351	CF8C	J92710		70/30 [485/205]	Castings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-351	CF8M	J92900		70/30 [485/205]	Castings	18Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-351	CG8M	J93000		75/35 [515/240]	Castings	19Cr-10Ni-3Mo
8	1	8.1	ASTM/ASME A/SA-358	304	S30400		75/30 [515/205]	Fusion Welded Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-358	304H	S30409		75/30 [515/205]	Fusion Welded Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-358	304L	S30403		70/25 [485/170]	Fusion Welded Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-358	304LN	S30453		75/30 [515/205]	Fusion Welded Pipe	18Cr-8Ni-N
8	1	8.1	ASTM/ASME A/SA-358	304N	S30451		80/35 [550/240]	Fusion Welded Pipe	18Cr-8Ni-N
8	1	8.1	ASTM/ASME A/SA-358	316	S31600		75/30 [515/205]	Fusion Welded Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-358	316H	S31609		75/30 [515/205]	Fusion Welded Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-358	316L	S31603		70/25 [485/170]	Fusion Welded Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-358	316LN	S31653		75/30 [515/205]	Fusion Welded Pipe	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME A/SA-358	316N	S31651		80/35 [550/240]	Fusion Welded Pipe	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME A/SA-358	321	S32100		75/30 [515/205]	Fusion Welded Pipe	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME A/SA-358	347	S34700		75/30 [515/205]	Fusion Welded Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-358	348	S34800		75/30 [515/205]	Fusion Welded Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-376	16-8-2H	S16800		75/30 [515/205]	Seamless Pipe	16Cr-8Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-376	TP304	S30400	≥0.812 [≥21]	70/30 [485/205]	Seamless Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-376	TP304	S30400	<0.812 [<21]	75/30 [515/205]	Seamless Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-376	TP304H	S30409		75/30 [515/205]	Seamless Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-376	TP304LN	S30453		75/30 [515/205]	Seamless Pipe	18Cr-8Ni-N
8	1	8.1	ASTM/ASME A/SA-376	TP304N	S30451		80/35 [550/240]	Seamless Pipe	18Cr-8Ni-N
8	1	8.1	ASTM/ASME A/SA-376	TP316	S31600		75/30 [515/205]	Seamless Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-376	TP316H	S31609		75/30 [515/205]	Seamless Pipe	16Cr-12Ni-2Mo

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	1	8.1	ASTM/ASME	A/SA-376	TP316LN	S31653		75/30 [515/205]	Seamless Pipe	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME	A/SA-376	TP316N	S31651		80/35 [550/240]	Seamless Pipe	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME	A/SA-376	TP321	S32100	≤0.375 [≤10]	75/30 [515/205]	Seamless Pipe	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME	A/SA-376	TP321	S32100	>0.375 [>10]	70/25 [485/170]	Seamless Pipe	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME	A/SA-376	TP321H	S32109	≤0.375 [≤10]	75/30 [515/205]	Seamless Pipe	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME	A/SA-376	TP321H	S32109	>0.375 [>10]	70/25 [485/170]	Seamless Pipe	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME	A/SA-376	TP347	S34700		75/30 [515/205]	Seamless Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-376	TP347H	S34709		75/30 [515/205]	Seamless Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-376	TP348	S34800		75/30 [515/205]	Seamless Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-403	WP304	S30400		75/30 [515/205]	Wrought Piping Fittings	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-403	WP304H	S30409		75/30 [515/205]	Wrought Piping Fittings	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-403	WP304L	S30403		70/25 [485/170]	Wrought Piping Fittings	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-403	WP304LN	S30453		75/30 [515/205]	Wrought Piping Fittings	18Cr-8Ni-N
8	1	8.1	ASTM/ASME	A/SA-403	WP304N	S30451		80/35 [550/240]	Wrought Piping Fittings	18Cr-8Ni-N
8	1	8.1	ASTM/ASME	A/SA-403	WP316	S31600		75/30 [515/205]	Wrought Piping Fittings	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-403	WP316H	S31609		75/30 [515/205]	Wrought Piping Fittings	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-403	WP316L	S31603		70/25 [485/170]	Wrought Piping Fittings	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-403	WP316LN	S31653		75/30 [515/205]	Wrought Piping Fittings	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME	A/SA-403	WP316N	S31651		80/35 [550/240]	Wrought Piping Fittings	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME	A/SA-403	WP317	S31700		75/30 [515/205]	Wrought Piping Fittings	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME	A/SA-403	WP317L	S31703		75/30 [515/205]	Wrought Piping Fittings	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME	A/SA-403	WP321	S32100		75/30 [515/205]	Wrought Piping Fittings	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME	A/SA-403	WP321H	S32109		75/30 [515/205]	Wrought Piping Fittings	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME	A/SA-403	WP347	S34700		75/30 [515/205]	Wrought Piping Fittings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-403	WP347H	S34709		75/30 [515/205]	Wrought Piping Fittings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-403	WP348	S34800		75/30 [515/205]	Wrought Piping Fittings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-403	WP348H	S34809		75/30 [515/205]	Wrought Piping Fittings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-409	TP304	S30400		75/30 [515/205]	Welded Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-409	TP304L	S30403		70/25 [485/170]	Welded Pipe	18Cr-8Ni

(Continued)



**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	1	8.1	ASTM/ASME A/SA-409	TP316	S31600		75/30 [515/205]	Welded Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-409	TP316L	S31603		70/25 [485/170]	Welded Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-409	TP317	S31700		75/30 [515/205]	Welded Pipe	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME A/SA-409	TP321	S32100		75/30 [515/205]	Welded Pipe	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME A/SA-409	TP347	S34700		75/30 [515/205]	Welded Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-409	TP348	S34800		75/30 [515/205]	Welded Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM A430	FP16-8-2H	S16800		70/30 [485/205]	Forged Pipe	16Cr-8Ni-2Mo
8	1	8.1	ASTM A430	FP304	S30400		70/30 [485/205]	Forged Pipe	18Cr-8Ni
8	1	8.1	ASTM A430	FP304H	S30409		70/30 [485/205]	Forged Pipe	18Cr-8Ni
8	1	8.1	ASTM A430	FP304N	S30451		75/35 [515/240]	Forged Pipe	18Cr-8Ni-N
8	1	8.1	ASTM A430	FP316	S31600		70/30 [485/205]	Forged Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM A430	FP316H	S31609		70/30 [485/205]	Forged Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM A430	FP316N	S31651		75/35 [515/240]	Forged Pipe	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM A430	FP321	S32100		70/30 [485/205]	Forged Pipe	18Cr-10Ni-Ti
8	1	8.1	ASTM A430	FP321H	S32109		70/30 [485/205]	Forged Pipe	18Cr-10Ni-Ti
8	1	8.1	ASTM A430	FP347	S34700		70/30 [485/205]	Forged Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM A430	FP347H	S34709		70/30 [485/205]	Forged Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-451	CPF10MC	J92971		70/30 [485/205]	Centrifugal Cast Pipe	16Cr-14Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-451	CPF3	J92500		70/30 [485/205]	Centrifugal Cast Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-451	CPF3A	J92500		77/35 [530/240]	Centrifugal Cast Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-451	CPF3M	J92800		70/30 [485/205]	Centrifugal Cast Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-451	CPF8	J92600		70/30 [485/205]	Centrifugal Cast Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-451	CPF8A	J92600		77/35 [530/240]	Centrifugal Cast Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-451	CPF8C	J92710		70/30 [485/205]	Centrifugal Cast Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-451	CPF8M	J92900		70/30 [485/205]	Centrifugal Cast Pipe	18Cr-12Ni-2Mo
8	1	8.1	ASTM A452	TP304H	S30409		75/30 [515/205]	Centrifugal Cast Pipe	18Cr-8Ni
8	1	8.1	ASTM A452	TP316H	S31609		75/30 [515/205]	Centrifugal Cast Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM A452	TP347H	S34709		75/30 [515/205]	Centrifugal Cast Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM A473	302	S30200		75/30 [515/205]	Forgings	18Cr-8Ni

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	1	8.1	ASTM	A473	302B	S30215		75/30 [515/205]	Forgings	18Cr-8Ni-2Si
8	1	8.1	ASTM	A473	303	S30300		75/30 [515/205]	Forgings	18Cr-8Ni-S
8	1	8.1	ASTM	A473	303Se	S30323		75/30 [515/205]	Forgings	18Cr-8Ni-Se
8	1	8.1	ASTM	A473	304	S30400	>5 [>127]	70/30 [485/205]	Forgings	18Cr-8Ni
8	1	8.1	ASTM	A473	304	S30400	≤5 [≤127]	75/30 [515/205]	Forgings	18Cr-8Ni
8	1	8.1	ASTM	A473	304L	S30403		65/25 [450/170]	Forgings	18Cr-8Ni
8	1	8.1	ASTM	A473	305	S30500		75/30 [515/205]	Forgings	18Cr-11Ni
8	1	8.1	ASTM	A473	316	S31600	>5 [>127]	70/30 [485/205]	Forgings	16Cr-12Ni-2Mo
8	1	8.1	ASTM	A473	316	S31600	≤5 [≤127]	75/30 [515/205]	Forgings	16Cr-12Ni-2Mo
8	1	8.1	ASTM	A473	316L	S31603		65/25 [450/170]	Forgings	16Cr-12Ni-2Mo
8	1	8.1	ASTM	A473	317	S31700		75/30 [515/205]	Forgings	18Cr-13Ni-3Mo
8	1	8.1	ASTM	A473	321	S32100		75/30 [515/205]	Forgings	18Cr-10Ni-Ti
8	1	8.1	ASTM	A473	347	S34700		75/30 [515/205]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM	A473	348	S34800		75/30 [515/205]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-479	302	S30200		75/30 [515/205]	Bars & Shapes	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-479	304	S30400		75/30 [515/205]	Bars & Shapes	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-479	304H	S30409		75/30 [515/205]	Bars & Shapes	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-479	304L	S30403		70/25 [485/170]	Bars & Shapes	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-479	304LN	S30453		75/30 [515/205]	Bars & Shapes	18Cr-8Ni-N
8	1	8.1	ASTM/ASME	A/SA-479	304N	S30451		80/35 [550/240]	Bars & Shapes	18Cr-8Ni-N
8	1	8.1	ASTM/ASME	A/SA-479	316	S31600		75/30 [515/205]	Bars & Shapes	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-479	316Cb	S31640		75/30 [515/205]	Bars & Shapes	16Cr-12Ni-2Mo-Cb
8	1	8.1	ASTM/ASME	A/SA-479	316H	S31609		75/30 [515/205]	Bars & Shapes	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-479	316L	S31603		70/25 [485/170]	Bars & Shapes	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-479	316LN	S31653		75/30 [515/205]	Bars & Shapes	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME	A/SA-479	316N	S31651		80/35 [550/240]	Bars & Shapes	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME	A/SA-479	316Ti	S31635		75/30 [515/205]	Bars & Shapes	16Cr-12Ni-2Mo-Ti
8	1	8.1	ASTM/ASME	A/SA-479	321	S32100		75/30 [515/205]	Bars & Shapes	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME	A/SA-479	321H	S32109		75/30 [515/205]	Bars & Shapes	18Cr-10Ni-Ti

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	1	8.1	ASTM/ASME	A/SA-479	347	S34700		75/30 [515/205]	Bars & Shapes	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-479	347H	S34709		75/30 [515/205]	Bars & Shapes	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-479	348	S34800		75/30 [515/205]	Bars & Shapes	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-479	348H	S34809		75/30 [515/205]	Bars & Shapes	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-479	S30600	S30600		78/35 [540/240]	Bars & Shapes	18Cr-15Ni-4Si
8	1	8.1	ASTM/ASME	A/SA-479	S32615	S32615		80/32 [550/220]	Bars & Shapes	18Cr-20Ni-5.5Si
8	1	8.1	ASTM	A511	MT 302	S30200		75/30 [515/205]	Seamless Tube	18Cr-8Ni
8	1	8.1	ASTM	A511	MT 304	S30400		75/30 [515/205]	Seamless Tube	18Cr-8Ni
8	1	8.1	ASTM	A511	MT 304L	S30403		75/30 [515/205]	Seamless Tube	18Cr-8Ni
8	1	8.1	ASTM	A511	MT 316	S31600		75/30 [515/205]	Seamless Tube	16Cr-12Ni-2Mo
8	1	8.1	ASTM	A511	MT 316L	S31603		75/30 [515/205]	Seamless Tube	16Cr-12Ni-2Mo
8	1	8.1	ASTM	A511	MT 317	S31700		75/30 [515/205]	Seamless Tube	18Cr-13Ni-3Mo
8	1	8.1	ASTM	A511	MT 321	S32100		75/30 [515/205]	Seamless Tube	18Cr-10Ni-Ti
8	1	8.1	ASTM	A511	MT 347	S34700		75/30 [515/205]	Seamless Tube	18Cr-10Ni-Cb
8	1	8.1	ASTM	A554	MT 302	S30200		75/30 [515/205]	Welded Tube	18Cr-8Ni
8	1	8.1	ASTM	A554	MT 304	S30400		75/30 [515/205]	Welded Tube	18Cr-8Ni
8	1	8.1	ASTM	A554	MT 304L	S30403		70/25 [485/170]	Welded Tube	18Cr-8Ni
8	1	8.1	ASTM	A554	MT 316	S31600		75/30 [515/205]	Welded Tube	16Cr-12Ni-2Mo
8	1	8.1	ASTM	A554	MT 316L	S31603		70/25 [485/170]	Welded Tube	16Cr-12Ni-2Mo
8	1	8.1	ASTM	A554	MT 317	S31700		75/30 [515/205]	Welded Tube	18Cr-13Ni-3Mo
8	1	8.1	ASTM	A554	MT 321	S32100		75/30 [515/205]	Welded Tube	18Cr-10Ni-Ti
8	1	8.1	ASTM	A554	MT 347	S34700		75/30 [515/205]	Welded Tube	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-666	302	S30200		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-666	304	S30400		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-666	304L	S30403		70/25 [485/170]	Plate, Sheet, & Strip	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-666	304LN	S30453		75/30 [515/205]	Plate, Sheet, & Strip	18Cr-8Ni-N
8	1	8.1	ASTM/ASME	A/SA-666	304N	S30451		80/35 [550/240]	Plate, Sheet, & Strip	18Cr-8Ni-N
8	1	8.1	ASTM/ASME	A/SA-666	316	S31600		75/30 [515/205]	Plate, Sheet, & Strip	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-666	316L	S31603		70/25 [485/170]	Plate, Sheet, & Strip	16Cr-12Ni-2Mo

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO Group	15608 Group Number	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	8.1	1	ASTM/ASME	A/SA-666	316N	S31651		80/35 [550/240]	Plate, Sheet, & Strip	16Cr-12Ni-2Mo-N
8	8.1	1	ASTM/ASME	A/SA-688	TP304	S30400		75/30 [515/205]	Welded Tube	18Cr-8Ni
8	8.1	1	ASTM/ASME	A/SA-688	TP304L	S30403		70/25 [485/170]	Welded Tube	18Cr-8Ni
8	8.1	1	ASTM/ASME	A/SA-688	TP304LN	S30453		75/30 [515/205]	Welded Tube	18Cr-8Ni-N
8	8.1	1	ASTM/ASME	A/SA-688	TP304N	S30451		80/35 [550/240]	Welded Tube	18Cr-8Ni-N
8	8.1	1	ASTM/ASME	A/SA-688	TP316	S31600		75/30 [515/205]	Welded Tube	16Cr-12Ni-2Mo
8	8.1	1	ASTM/ASME	A/SA-688	TP316L	S31603		70/25 [485/170]	Welded Tube	16Cr-12Ni-2Mo
8	8.1	1	ASTM/ASME	A/SA-688	TP316LN	S31653		75/30 [515/205]	Welded Tube	16Cr-12Ni-2Mo-N
8	8.1	1	ASTM/ASME	A/SA-688	TP316N	S31651		80/35 [550/240]	Welded Tube	16Cr-12Ni-2Mo-N
8	8.1	1	ASTM	A743	CF10SMnN	J92972		85/42 [585/290]	Castings	17Cr-9Ni-8Mn-4Si-N
8	8.2	1	ASTM	A743	CF16F	J92701		70/30 [485/205]	Castings	20Cr-11Ni-0.3Se
8	8.1	1	ASTM	A743	CF3	J92500		70/30 [485/205]	Castings	18Cr-8Ni
8	8.1	1	ASTM	A743	CF3M	J92800		70/30 [485/205]	Castings	18Cr-12Ni-2Mo
8	8.2	1	ASTM	A743	CF3MIN	J92804		75/37 [515/255]	Castings	20Cr-11Ni-3Mo-N
8	8.1	1	ASTM	A743	CF8	J92600		70/30 [485/205]	Castings	18Cr-8Ni
8	8.1	1	ASTM	A743	CF8C	J92710		70/30 [485/205]	Castings	18Cr-10Ni-Cb
8	8.1	1	ASTM	A743	CF8M	J92900		70/30 [485/205]	Castings	18Cr-12Ni-2Mo
8	8.2	1	ASTM	A743	CG3M	J92999		75/35 [515/240]	Castings	19Cr-11Ni-4Mo
8	8.1	1	ASTM	A743	CG8M	J93000		75/35 [515/240]	Castings	19Cr-10Ni-3Mo
8	8.1	1	ASTM	A774	304L	S30403		70/25 [485/170]	Wrought Piping Fittings	18Cr-8Ni
8	8.1	1	ASTM	A774	316L	S31603		70/25 [485/170]	Wrought Piping Fittings	16Cr-12Ni-2Mo
8	8.1	1	ASTM	A774	321	S32100		75/30 [515/205]	Wrought Piping Fittings	18Cr-10Ni-Ti
8	8.1	1	ASTM	A774	347	S34700		75/30 [515/205]	Wrought Piping Fittings	18Cr-10Ni-Cb
8	8.1	1	ASTM	A774	F317L	S31703		75/30 [515/205]	Wrought Piping Fittings	18Cr-13Ni-3Mo
8	8.1	1	ASTM	A778	304L	S30403		70/25 [485/170]	Welded Unannealed Tube	18Cr-8Ni
8	8.1	1	ASTM	A778	316L	S31603		70/25 [485/170]	Welded Unannealed Tube	16Cr-12Ni-2Mo
8	8.1	1	ASTM	A778	321	S32100		75/30 [515/205]	Welded Unannealed Tube	18Cr-10Ni-Ti
8	8.1	1	ASTM	A778	347	S34700		75/30 [515/205]	Welded Unannealed Tube	18Cr-10Ni-Cb
8	8.1	1	ASTM	A778	F317L	S31703		75/30 [515/205]	Welded Unannealed Tube	18Cr-13Ni-3Mo

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	1	8.1	ASTM/ASME A/SA-813	TP304	S30400		75/30 [515/205]	Welded Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-813	TP304H	S30409		75/30 [515/205]	Welded Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-813	TP304L	S30403		70/25 [485/170]	Welded Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-813	TP304LN	S30453		75/30 [515/205]	Welded Pipe	18Cr-8Ni-N
8	1	8.1	ASTM/ASME A/SA-813	TP304N	S30451		80/35 [550/240]	Welded Pipe	18Cr-8Ni-N
8	1	8.1	ASTM/ASME A/SA-813	TP316	S31600		75/30 [515/205]	Welded Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-813	TP316H	S31609		75/30 [515/205]	Welded Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-813	TP316L	S31603		70/25 [485/170]	Welded Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-813	TP316LN	S31653		75/30 [515/205]	Welded Pipe	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME A/SA-813	TP316N	S31651		80/35 [550/240]	Welded Pipe	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME A/SA-813	TP317	S31700		75/30 [515/205]	Welded Pipe	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME A/SA-813	TP317L	S31703		75/30 [515/205]	Welded Pipe	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME A/SA-813	TP321	S32100		75/30 [515/205]	Welded Pipe	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME A/SA-813	TP321H	S32109		75/30 [515/205]	Welded Pipe	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME A/SA-813	TP347	S34700		75/30 [515/205]	Welded Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-813	TP347H	S34709		75/30 [515/205]	Welded Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-813	TP348	S34800		75/30 [515/205]	Welded Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-813	TP348H	S34809		75/30 [515/205]	Welded Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME A/SA-813	TPXM-15	S38100		75/30 [515/205]	Welded Pipe	18Cr-18Ni-2Si
8	1	8.1	ASTM/ASME A/SA-814	TP304	S30400		75/30 [515/205]	Cold Worked Welded Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-814	TP304H	S30409		75/30 [515/205]	Cold Worked Welded Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-814	TP304L	S30403		70/25 [485/170]	Cold Worked Welded Pipe	18Cr-8Ni
8	1	8.1	ASTM/ASME A/SA-814	TP304LN	S30453		75/30 [515/205]	Cold Worked Welded Pipe	18Cr-8Ni-N
8	1	8.1	ASTM/ASME A/SA-814	TP304N	S30451		80/35 [550/240]	Cold Worked Welded Pipe	18Cr-8Ni-N
8	1	8.1	ASTM/ASME A/SA-814	TP316	S31600		75/30 [515/205]	Cold Worked Welded Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-814	TP316H	S31609		75/30 [515/205]	Cold Worked Welded Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-814	TP316L	S31603		70/25 [485/170]	Cold Worked Welded Pipe	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME A/SA-814	TP316LN	S31653		75/30 [515/205]	Cold Worked Welded Pipe	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME A/SA-814	TP316N	S31651		80/35 [550/240]	Cold Worked Welded Pipe	16Cr-12Ni-2Mo-N

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	1	8.1	ASTM/ASME	A/SA-814	TP317	S31700		75/30 [515/205]	Cold Worked Welded Pipe	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME	A/SA-814	TP317L	S31703		75/30 [515/205]	Cold Worked Welded Pipe	18Cr-13Ni-3Mo
8	1	8.1	ASTM/ASME	A/SA-814	TP321	S32100		75/30 [515/205]	Cold Worked Welded Pipe	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME	A/SA-814	TP321H	S32109		75/30 [515/205]	Cold Worked Welded Pipe	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME	A/SA-814	TP347	S34700		75/30 [515/205]	Cold Worked Welded Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-814	TP347H	S34709		75/30 [515/205]	Cold Worked Welded Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-814	TP348	S34800		75/30 [515/205]	Cold Worked Welded Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-814	TP348H	S34809		75/30 [515/205]	Cold Worked Welded Pipe	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-814	TPXM-15	S38100		75/30 [515/205]	Cold Worked Welded Pipe	18Cr-18Ni-2Si
8	1	8.1	ASTM/ASME	A/SA-965	F304	S30400		70/30 [485/205]	Forgings	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-965	F304H	S30409		70/30 [485/205]	Forgings	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-965	F304L	S30403		65/25 [450/170]	Forgings	18Cr-8Ni
8	1	8.1	ASTM/ASME	A/SA-965	F304LN	S30453		70/30 [485/205]	Forgings	18Cr-8Ni-N
8	1	8.1	ASTM/ASME	A/SA-965	F304N	S30451		80/35 [550/240]	Forgings	18Cr-8Ni-N
8	1	8.1	ASTM/ASME	A/SA-965	F316	S31600		70/30 [485/205]	Forgings	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-965	F316H	S31609		70/30 [485/205]	Forgings	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-965	F316L	S31603		65/25 [450/170]	Forgings	16Cr-12Ni-2Mo
8	1	8.1	ASTM/ASME	A/SA-965	F316LN	S31653		70/30 [485/205]	Forgings	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME	A/SA-965	F316N	S31651		80/35 [550/240]	Forgings	16Cr-12Ni-2Mo-N
8	1	8.1	ASTM/ASME	A/SA-965	F321	S32100		70/30 [485/205]	Forgings	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME	A/SA-965	F321H	S32109		70/30 [485/205]	Forgings	18Cr-10Ni-Ti
8	1	8.1	ASTM/ASME	A/SA-965	F347	S34700		70/30 [485/205]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-965	F347H	S34709		70/30 [485/205]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-965	F348	S34800		70/30 [485/205]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-965	F348H	S34809		70/30 [485/205]	Forgings	18Cr-10Ni-Cb
8	1	8.1	ASTM/ASME	A/SA-965	F46	S30600		78/32 [540/220]	Forgings	18Cr-15Ni-4Si
8	2	8.2	ASTM	A167	308	S30800		75/30 [515/205]	Plate, Sheet, & Strip	20Cr-10Ni
8	2	8.2	ASTM	A167	309	S30900		75/30 [515/205]	Plate, Sheet, & Strip	23Cr-12Ni
8	2	8.2	ASTM	A167	310	S31000		75/30 [515/205]	Plate, Sheet, & Strip	25Cr-20Ni

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	2	8.1	ASTM/ASME A/SA-182	F10	S33100		80/30 [550/205]	Forgings	20Ni-8Cr
8	2	8.2	ASTM/ASME A/SA-182	F310	S31000		75/30 [515/205]	Forgings	25Cr-20Ni
8	2	8.2	ASTM/ASME A/SA-182	F310	S31000	>5 [>127]	70/30 [485/205]	Forgings	25Cr-20Ni
8	2	8.2	ASTM/ASME A/SA-182	F310MoLN	S31050		78/37 [540/255]	Forgings	25Cr-22Ni-2Mo-N
8	2	8.2	ASTM/ASME A/SA-182	F45	S30815		87/45 [600/310]	Forgings	21Cr-11Ni-N
8	2	8.2	ASTM/ASME A/SA-213	310	S31000		75/30 [515/205]	Seamless Tube	25Cr-20Ni
8	2	8.2	ASTM/ASME A/SA-213	S30815	S30815		87/45 [600/310]	Seamless Tube	21Cr-11Ni-N
8	2	8.2	ASTM/ASME A/SA-213	TP309Cb	S30940		75/30 [515/205]	Seamless Tube	23Cr-12Ni-Cb
8	2	8.2	ASTM/ASME A/SA-213	TP309H	S30909		75/30 [515/205]	Seamless Tube	23Cr-12Ni
8	2	8.2	ASTM/ASME A/SA-213	TP309HCb	S30941		75/30 [515/205]	Seamless Tube	23Cr-12Ni-Cb
8	2	8.2	ASTM/ASME A/SA-213	TP309S	S30908		75/30 [515/205]	Seamless Tube	23Cr-12Ni
8	2	8.2	ASTM/ASME A/SA-213	TP310Cb	S31040		75/30 [515/205]	Seamless Tube	25Cr-20Ni-Cb
8	2	8.2	ASTM/ASME A/SA-213	TP310H	S31009		75/30 [515/205]	Seamless Tube	25Cr-20Ni
8	2	8.2	ASTM/ASME A/SA-213	TP310HCb	S31041		75/30 [515/205]	Seamless Tube	25Cr-20Ni-Cb
8	2	8.2	ASTM/ASME A/SA-213	TP310MoLN	S31050	>0.25 [>6]	78/37 [540/255]	Seamless Tube	25Cr-22Ni-2Mo-N
8	2	8.2	ASTM/ASME A/SA-213	TP310MoLN	S31050	≤0.25 [≤6]	84/39 [580/270]	Seamless Tube	25Cr-22Ni-2Mo-N
8	2	8.2	ASTM/ASME A/SA-213	TP310S	S31008		75/30 [515/205]	Seamless Tube	25Cr-20Ni
8	2	8.2	ASTM/ASME A/SA-240	309Cb	S30940		75/30 [515/205]	Plate, Sheet, & Strip	23Cr-12Ni-Cb
8	2	8.2	ASTM/ASME A/SA-240	309H	S30909		75/30 [515/205]	Plate, Sheet, & Strip	23Cr-12Ni
8	2	8.2	ASTM/ASME A/SA-240	309HCb	S30941		75/30 [515/205]	Plate, Sheet, & Strip	23Cr-12Ni-Cb
8	2	8.2	ASTM/ASME A/SA-240	309S	S30908		75/30 [515/205]	Plate, Sheet, & Strip	23Cr-12Ni
8	2	8.2	ASTM/ASME A/SA-240	310Cb	S31040		75/30 [515/205]	Plate, Sheet, & Strip	25Cr-20Ni-Cb
8	2	8.2	ASTM/ASME A/SA-240	310H	S31009		75/30 [515/205]	Plate, Sheet, & Strip	25Cr-20Ni
8	2	8.2	ASTM/ASME A/SA-240	310HCb	S31041		75/30 [515/205]	Plate, Sheet, & Strip	25Cr-20Ni-Cb
8	2	8.2	ASTM/ASME A/SA-240	310MoLN	S31050	≤0.25 [≤6]	84/39 [580/270]	Plate, Sheet, & Strip	25Cr-22Ni-2Mo-N
8	2	8.2	ASTM/ASME A/SA-240	310MoLN	S31050	>0.25 [>6]	78/37 [540/255]	Plate, Sheet, & Strip	25Cr-22Ni-2Mo-N
8	2	8.2	ASTM/ASME A/SA-240	310S	S31008		75/30 [515/205]	Plate, Sheet, & Strip	25Cr-20Ni
8	2	8.2	ASTM/ASME A/SA-240	S30815	S30815		87/45 [600/310]	Plate, Sheet, & Strip	21Cr-11Ni-N
8	2	8.2	ASTM/ASME A/SA-249	S30815	S30815		87/45 [600/310]	Welded Tube	21Cr-11Ni-N

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	2	8.2	ASTM/ASME	A/SA-249	TP309	S30900		75/30 [515/205]	Welded Tube	23Cr-12Ni
8	2	8.2	ASTM/ASME	A/SA-249	TP309Cb	S30940		75/30 [515/205]	Welded Tube	23Cr-12Ni-Cb
8	2	8.2	ASTM/ASME	A/SA-249	TP309H	S30909		75/30 [515/205]	Welded Tube	23Cr-12Ni
8	2	8.2	ASTM/ASME	A/SA-249	TP309HCb	S30941		75/30 [515/205]	Welded Tube	23Cr-12Ni-Cb
8	2	8.2	ASTM/ASME	A/SA-249	TP309S	S30908		75/30 [515/205]	Welded Tube	23Cr-12Ni
8	2	8.2	ASTM/ASME	A/SA-249	TP310Cb	S31040		75/30 [515/205]	Welded Tube	25Cr-20Ni-Cb
8	2	8.2	ASTM/ASME	A/SA-249	TP310H	S31009		75/30 [515/205]	Welded Tube	25Cr-20Ni
8	2	8.2	ASTM/ASME	A/SA-249	TP310HCb	S31041		75/30 [515/205]	Welded Tube	25Cr-20Ni-Cb
8	2	8.2	ASTM/ASME	A/SA-249	TP310MoLN	S31050	≤0.25 [≤6]	84/39 [580/270]	Welded Tube	25Cr-22Ni-2Mo-N
8	2	8.2	ASTM/ASME	A/SA-249	TP310MoLN	S31050	>0.25 [>6]	78/37 [540/255]	Welded Tube	25Cr-22Ni-2Mo-N
8	2	8.2	ASTM/ASME	A/SA-249	TP310S	S31008		75/30 [515/205]	Welded Tube	25Cr-20Ni
8	2	8.2	ASTM	A297	HE	J93403		85/40 [585/275]	Castings	28Cr-10Ni-2Mn-2Si
8	2	8.2	ASTM	A297	HF	J92603		70/35 [485/240]	Castings	21Cr-10Ni-2Mn-2Si
8	2	8.2	ASTM	A297	HH	J93503		75/35 [515/240]	Castings	26Cr-13Ni-2Mn-2Si
8	2	8.2	ASTM	A297	HI	J94003		70/35 [485/240]	Castings	28Cr-16Ni-2Mn-2Si
8	2	8.2	ASTM	A297	HK	J94224		65/35 [450/240]	Castings	26Cr-20Ni-2Mn-2Si
8	2	8.2	ASTM/ASME	A/SA-312	S30815	S30815		87/45 [600/310]	Seamless & Welded Pipe	21Cr-11Ni-N
8	2	8.2	ASTM/ASME	A/SA-312	TP309Cb	S30940		75/30 [515/205]	Seamless & Welded Pipe	23Cr-12Ni-Cb
8	2	8.2	ASTM/ASME	A/SA-312	TP309H	S30909		75/30 [515/205]	Seamless & Welded Pipe	23Cr-12Ni
8	2	8.2	ASTM/ASME	A/SA-312	TP309HCb	S30941		75/30 [515/205]	Seamless & Welded Pipe	23Cr-12Ni-Cb
8	2	8.2	ASTM/ASME	A/SA-312	TP309S	S30908		75/30 [515/205]	Seamless & Welded Pipe	23Cr-12Ni
8	2	8.2	ASTM/ASME	A/SA-312	TP310Cb	S31040		75/30 [515/205]	Seamless & Welded Pipe	25Cr-20Ni-Cb
8	2	8.2	ASTM/ASME	A/SA-312	TP310H	S31009		75/30 [515/205]	Seamless & Welded Pipe	25Cr-20Ni
8	2	8.2	ASTM/ASME	A/SA-312	TP310HCb	S31041		75/30 [515/205]	Seamless & Welded Pipe	25Cr-20Ni-Cb
8	2	8.2	ASTM/ASME	A/SA-312	TP310MoLN	S31050	≤0.25 [≤6]	84/39 [580/270]	Seamless & Welded Pipe	25Cr-22Ni-2Mo-N
8	2	8.2	ASTM/ASME	A/SA-312	TP310MoLN	S31050	>0.25 [>6]	78/37 [540/255]	Seamless & Welded Pipe	25Cr-22Ni-2Mo-N
8	2	8.2	ASTM/ASME	A/SA-312	TP310S	S31008		75/30 [515/205]	Seamless & Welded Pipe	25Cr-20Ni
8	2	8.2	ASTM/ASME	A/SA-336	F310	S31000		75/30 [515/205]	Forgings	25Cr-20Ni
8	2	8.2	ASTM/ASME	A/SA-351	CE20N	J92802		80/40 [550/275]	Castings	25Cr-8Ni-N

(Continued)



**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	2	ASTM/ASME	A/SA-351	CH10	J93401		70/30 [485/205]	Castings	25Cr-12Ni
8	2	ASTM/ASME	A/SA-351	CH20	J93402		70/30 [485/205]	Castings	25Cr-12Ni
8	2	ASTM/ASME	A/SA-351	CH8	J93400		65/28 [450/195]	Castings	25Cr-12Ni
8	2	ASTM/ASME	A/SA-351	CK20	J94202		65/28 [450/195]	Castings	25Cr-20Ni
8	2	ASTM/ASME	A/SA-351	HK30	J94203		65/35 [450/240]	Castings	25Cr-20Ni-0.5Mo
8	2	ASTM/ASME	A/SA-351	HK40	J94204		62/35 [425/240]	Castings	25Cr-20Ni-0.5Mo
8	2	ASTM/ASME	A/SA-358	309	S30900		75/30 [515/205]	Fusion Welded Pipe	23Cr-12Ni
8	2	ASTM/ASME	A/SA-358	309Cb	S30940		75/30 [515/205]	Fusion Welded Pipe	23Cr-12Ni-Cb
8	2	ASTM/ASME	A/SA-358	309S	S30908		75/30 [515/205]	Fusion Welded Pipe	23Cr-12Ni
8	2	ASTM/ASME	A/SA-358	310	S31000		75/30 [515/205]	Fusion Welded Pipe	23Cr-12Ni
8	2	ASTM/ASME	A/SA-358	310Cb	S31040		75/30 [515/205]	Fusion Welded Pipe	25Cr-20Ni-Cb
8	2	ASTM/ASME	A/SA-358	310S	S31008		75/30 [515/205]	Fusion Welded Pipe	25Cr-20Ni
8	2	ASTM/ASME	A/SA-358	S30815	S30815		87/45 [600/310]	Fusion Welded Pipe	21Cr-11Ni-N
8	2	ASTM/ASME	A/SA-403	WP309	S30900		75/30 [515/205]	Wrought Piping Fittings	23Cr-12Ni
8	2	ASTM/ASME	A/SA-403	WP310	S31000		75/30 [515/205]	Wrought Piping Fittings	23Cr-12Ni
8	2	ASTM/ASME	A/SA-403	WP310S	S31008		75/30 [515/205]	Wrought Piping Fittings	25Cr-20Ni
8	2	ASTM/ASME	A/SA-409	S30815	S30815		87/45 [600/310]	Welded Pipe	21Cr-11Ni-N
8	2	ASTM/ASME	A/SA-409	TP309Cb	S30940		75/30 [515/205]	Welded Pipe	23Cr-12Ni-Cb
8	2	ASTM/ASME	A/SA-409	TP309S	S30908		75/30 [515/205]	Welded Pipe	23Cr-12Ni
8	2	ASTM/ASME	A/SA-409	TP310Cb	S31040		75/30 [515/205]	Welded Pipe	25Cr-20Ni-Cb
8	2	ASTM/ASME	A/SA-409	TP310S	S31008		75/30 [515/205]	Welded Pipe	25Cr-20Ni
8	2	ASTM/ASME	A/SA-451	CPE20N	J92802		80/40 [550/275]	Centrifugal Cast Pipe	25Cr-8Ni-N
8	2	ASTM/ASME	A/SA-451	CPH10	J93402		70/30 [485/205]	Centrifugal Cast Pipe	25Cr-12Ni
8	2	ASTM/ASME	A/SA-451	CPH20	J93402		70/30 [485/205]	Centrifugal Cast Pipe	25Cr-12Ni
8	2	ASTM/ASME	A/SA-451	CPH8	J93400		65/28 [450/195]	Centrifugal Cast Pipe	25Cr-12Ni
8	2	ASTM/ASME	A/SA-451	CPK20	J94202		65/28 [450/195]	Centrifugal Cast Pipe	25Cr-20Ni
8	2	ASTM	A473	308	S30800		75/30 [515/205]	Forgings	20Cr-10Ni
8	2	ASTM	A473	309	S30900		75/30 [515/205]	Forgings	23Cr-12Ni
8	2	ASTM	A473	309S	S30908		75/30 [515/205]	Forgings	23Cr-12Ni

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	2	8.2	ASTM	A473	310	S31000		75/30 [515/205]	Forgings	25Cr-20Ni
8	2	8.2	ASTM	A473	310S	S31008		75/30 [515/205]	Forgings	25Cr-20Ni
8	2	8.2	ASTM	A473	314	S31400		75/30 [515/205]	Forgings	25Cr-21Ni-S
8	2	8.2	ASTM	A473	S30815	S30815		87/45 [600/310]	Forgings	21Cr-11Ni-N
8	2	8.2	ASTM/ASME	A/SA-479	309Cb	S30940		75/30 [515/205]	Bars & Shapes	23Cr-12Ni-Cb
8	2	8.2	ASTM/ASME	A/SA-479	309S	S30908		75/30 [515/205]	Bars & Shapes	23Cr-12Ni
8	2	8.2	ASTM/ASME	A/SA-479	310Cb	S31040		75/30 [515/205]	Bars & Shapes	25Cr-20Ni-Cb
8	2	8.2	ASTM/ASME	A/SA-479	310S	S31008		75/30 [515/205]	Bars & Shapes	25Cr-20Ni
8	2	8.2	ASTM/ASME	A/SA-479	S30815	S30815		87/45 [600/310]	Bars & Shapes	21Cr-11Ni-N
8	2	8.2	ASTM	A511	MT 309S	S30908		75/30 [515/205]	Seamless Tube	23Cr-12Ni
8	2	8.2	ASTM	A511	MT 310S	S31008		75/30 [515/205]	Seamless Tube	25Cr-20Ni
8	2	8.2	ASTM	A554	MT 309S	S30908		75/30 [515/205]	Welded Tube	23Cr-12Ni
8	2	8.2	ASTM	A554	MT 309S-Cb	S30940		75/30 [515/205]	Welded Tube	23Cr-12Ni-Cb
8	2	8.2	ASTM	A554	MT 310S	S31008		75/30 [515/205]	Welded Tube	25Cr-20Ni
8	2	8.2	ASTM	A743	CE30	J93423		80/40 [550/275]	Castings	29Cr-9Ni-2Mn-2Si
8	2	8.2	ASTM	A743	CF20	J92602		70/30 [485/205]	Castings	20Cr-10Ni
8	2	8.2	ASTM	A743	CG12	J93001		70/28 [485/195]	Castings	22Cr-12Ni
8	2	8.2	ASTM	A743	CH10	J93401		70/30 [485/205]	Castings	25Cr-12Ni
8	2	8.2	ASTM	A743	CH20	J93402		70/30 [485/205]	Castings	25Cr-12Ni
8	2	8.2	ASTM	A743	CN3M	J94652		63/25 [435/170]	Castings	25Ni-21Cr-5Mo
8	2	8.2	ASTM/ASME	A/SA-813	S30815	S30815		87/45 [600/310]	Welded Pipe	21Cr-11Ni-N
8	2	8.2	ASTM/ASME	A/SA-813	TP309Cb	S30940		75/30 [515/205]	Welded Pipe	23Cr-12Ni-Cb
8	2	8.2	ASTM/ASME	A/SA-813	TP309S	S30908		75/30 [515/205]	Welded Pipe	23Cr-12Ni
8	2	8.2	ASTM/ASME	A/SA-813	TP310Cb	S31040		75/30 [515/205]	Welded Pipe	25Cr-20Ni-Cb
8	2	8.2	ASTM/ASME	A/SA-813	TP310S	S31008		75/30 [515/205]	Welded Pipe	25Cr-20Ni
8	2	8.2	ASTM/ASME	A/SA-814	S30815	S30815		87/45 [600/310]	Cold Worked Welded Pipe	21Cr-11Ni-N
8	2	8.2	ASTM/ASME	A/SA-814	TP309Cb	S30940		75/30 [515/205]	Cold Worked Welded Pipe	23Cr-12Ni-Cb
8	2	8.2	ASTM/ASME	A/SA-814	TP309S	S30908		75/30 [515/205]	Cold Worked Welded Pipe	23Cr-12Ni
8	2	8.2	ASTM/ASME	A/SA-814	TP310Cb	S31040		75/30 [515/205]	Cold Worked Welded Pipe	25Cr-20Ni-Cb

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	2	ASTM/ASME	A/SA-814	TP310S	S31008		75/30 [515/205]	Cold Worked Welded Pipe	25Cr-20Ni
8	2	ASTM/ASME	A/SA-965	F310	S31000		75/30 [515/205]	Forgings	25Cr-20Ni
8	3	ASTM/ASME	A/SA-182	FXM-11	S21904		90/50 [620/345]	Forgings	21Cr-6Ni-9Mn
8	3	ASTM/ASME	A/SA-182	FXM-19	S20910		100/55 [690/380]	Forgings	22Cr-13Ni-5Mn
8	3	ASTM/ASME	A/SA-213	TP201	S20100		95/38 [655/260]	Seamless Tube	17Cr-4Ni-6Mn
8	3	ASTM/ASME	A/SA-213	TP202	S20200		90/45 [620/310]	Seamless Tube	18Cr-5Ni-9Mn
8	3	ASTM/ASME	A/SA-213	TP310HCbN	S31042		95/43 [655/295]	Seamless Tube	25Cr-20Ni-Cb-N
8	3	ASTM/ASME	A/SA-213	XM-19	S20910		100/55 [690/380]	Seamless Tube	22Cr-13Ni-5Mn
8	3	ASTM/ASME	A/SA-240	—	S20400		95/48 [655/330]	Plate, Sheet, & Strip	16Cr-9Mn-2Ni-N
8	3	ASTM/ASME	A/SA-240	201-1	S20100		75/38 [515/260]	Plate, Sheet, & Strip	17Cr-4Ni-6Mn
8	3	ASTM/ASME	A/SA-240	201-2	S20100		95/45 [655/310]	Plate, Sheet, & Strip	17Cr-4Ni-6Mn
8	3	ASTM/ASME	A/SA-240	201LN	S20153		95/45 [655/310]	Plate, Sheet, & Strip	16Cr-4Ni-6Mn
8	3	ASTM/ASME	A/SA-240	202	S20200		90/38 [620/260]	Plate, Sheet, & Strip	18Cr-5Ni-9Mn
8	3	ASTM/ASME	A/SA-240	S21800	S21800		95/50 [655/345]	Plate, Sheet, & Strip	18Cr-8Ni-4Si-N
8	3	ASTM/ASME	A/SA-240	XM-17	S21600		90/50 [620/345]	Plate	19Cr-8Mn-6Ni-Mo-N
8	3	ASTM/ASME	A/SA-240	XM-17	S21600		100/60 [690/415]	Sheet & Strip	19Cr-8Mn-6Ni-Mo-N
8	3	ASTM/ASME	A/SA-240	XM-18	S21603		90/50 [620/345]	Plate	19Cr-8Mn-6Ni-Mo-N
8	3	ASTM/ASME	A/SA-240	XM-18	S21603		100/60 [690/415]	Sheet & Strip	19Cr-8Mn-6Ni-Mo-N
8	3	ASTM/ASME	A/SA-240	XM-19	S20910		105/60 [725/415]	Sheet & Strip	22Cr-13Ni-5Mn
8	3	ASTM/ASME	A/SA-240	XM-19	S20910		100/55 [690/380]	Plate	22Cr-13Ni-5Mn
8	3	ASTM/ASME	A/SA-240	XM-29	S24000		100/55 [690/380]	Plate, Sheet, & Strip	18Cr-3Ni-12Mn
8	3	ASTM/ASME	A/SA-249	TP 201	S20100		95/38 [655/260]	Welded Tube	17Cr-4Ni-6Mn
8	3	ASTM/ASME	A/SA-249	TP 202	S20200		90/38 [620/260]	Welded Tube	18Cr-5Ni-9Mn
8	3	ASTM/ASME	A/SA-249	TP XM-19	S20910		100/55 [690/380]	Welded Tube	22Cr-13Ni-5Mn
8	3	ASTM/ASME	A/SA-249	TP XM-29	S24000		100/55 [690/380]	Welded Tube	18Cr-3Ni-12Mn
8	3	ASTM	A269	TPXM-10	S21900		90/50 [620/345]	Seamless & Welded Tube	20Cr-6Ni-9Mn
8	3	ASTM	A269	TPXM-11	S21904		90/50 [620/345]	Seamless & Welded Tube	21Cr-6Ni-9Mn
8	3	ASTM	A269	TPXM-15	S38100		90/50 [620/345]	Seamless & Welded Tube	18Cr-18Ni-2Si
8	3	ASTM	A269	TPXM-19	S20910		100/55 [690/380]	Seamless & Welded Tube	22Cr-13Ni-5Mn

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	3	8.3	ASTM	A269	TPXM-29	S24000		100/55 [690/380]	Seamless & Welded Tube	18Cr-3Ni-12Mn
8	3	8.3	ASTM/ASME	A/SA-312	TP XM-11	S21904		90/50 [620/345]	Seamless & Welded Pipe	21Cr-6Ni-9Mn
8	3	8.3	ASTM/ASME	A/SA-312	TP XM-19	S20910		100/55 [690/380]	Seamless & Welded Pipe	22Cr-13Ni-5Mn
8	3	8.3	ASTM/ASME	A/SA-312	TP XM-29	S24000		100/55 [690/380]	Seamless & Welded Pipe	18Cr-3Ni-12Mn
8	3	8.3	ASTM/ASME	A/SA-336	FXM-11	S21904		90/50 [620/345]	Forgings	21Cr-6Ni-9Mn
8	3	8.3	ASTM/ASME	A/SA-336	FXM-19	S20910		100/55 [690/380]	Forgings	22Cr-13Ni-5Mn
8	3	8.3	ASTM/ASME	A/SA-351	CG6MMIN	J93790		85/42 [585/290]	Castings	22Cr-12Ni-5Mn
8	3	8.3	ASTM/ASME	A/SA-358	XM-19	S20910		100/55 [690/380]	Fusion Welded Pipe	22Cr-13Ni-5Mn
8	3	8.3	ASTM/ASME	A/SA-358	XM-29	S24000		100/55 [690/380]	Fusion Welded Pipe	18Cr-3Ni-12Mn
8	3	8.3	ASTM/ASME	A/SA-403	WPXM-19	S20910		100/55 [690/380]	Wrought Piping Fittings	22Cr-13Ni-5Mn
8	3	8.3	ASTM	A473	201	S20100		75/30 [515/205]	Forgings	17Cr-4Ni-6Mn
8	3	8.3	ASTM	A473	202	S20200		90/45 [620/310]	Forgings	18Cr-5Ni-9Mn
8	3	8.3	ASTM	A473	XM-10	S21900		90/50 [620/345]	Forgings	20Cr-6Ni-9Mn
8	3	8.3	ASTM	A473	XM-11	S21904		90/50 [620/345]	Forgings	21Cr-6Ni-9Mn
8	3	8.1	ASTM/ASME	A/SA-479	S21800	S21800		95/50 [655/345]	Bars & Shapes	18Cr-8Ni-4Si-N
8	3	8.3	ASTM/ASME	A/SA-479	XM-11	S21904		90/50 [620/345]	Bars & Shapes	21Cr-6Ni-9Mn
8	3	8.3	ASTM/ASME	A/SA-479	XM-17	S21600		90/50 [620/345]	Bars & Shapes	19Cr-8Mn-6Ni-Mo-N
8	3	8.3	ASTM/ASME	A/SA-479	XM-18	S21603		90/50 [620/345]	Bars & Shapes	19Cr-8Mn-6Ni-Mo-N
8	3	8.3	ASTM/ASME	A/SA-479	XM-19	S20910		100/55 [690/380]	Bars & Shapes	22Cr-13Ni-5Mn
8	3	8.3	ASTM/ASME	A/SA-479	XM-29	S24000		100/55 [690/380]	Bars & Shapes	18Cr-3Ni-12Mn
8	3	8.3	ASTM/ASME	A/SA-666	201-1	S20100		75/38 [515/260]	Plate, Sheet, & Strip	17Cr-4Ni-6Mn
8	3	8.3	ASTM/ASME	A/SA-666	201-2	S20100		95/45 [655/310]	Plate, Sheet, & Strip	17Cr-4Ni-6Mn
8	3	8.3	ASTM/ASME	A/SA-666	XM-11	S21904		90/50 [620/345]	Plate, Sheet, & Strip	21Cr-6Ni-9Mn
8	3	8.3	ASTM/ASME	A/SA-688	XM-29	S24000		100/55 [690/380]	Welded Tube	18Cr-3Ni-12Mn
8	3	8.3	ASTM/ASME	A/SA-813	TPXM-11	S21904		90/50 [620/345]	Welded Pipe	21Cr-6Ni-9Mn
8	3	8.3	ASTM/ASME	A/SA-813	TPXM-19	S20910		100/55 [690/380]	Welded Pipe	22Cr-13Ni-5Mn
8	3	8.3	ASTM/ASME	A/SA-813	TPXM-29	S24000		100/55 [690/380]	Welded Pipe	18Cr-3Ni-12Mn
8	3	8.3	ASTM/ASME	A/SA-814	TPXM-11	S21904		90/50 [620/345]	Cold Worked Welded Pipe	21Cr-6Ni-9Mn
8	3	8.3	ASTM/ASME	A/SA-814	TPXM-19	S20910		100/55 [690/380]	Cold Worked Welded Pipe	22Cr-13Ni-5Mn

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	3	8.3	ASTM/ASME	A/SA-814	TPXM-29	S24000		100/55 [690/380]	Cold Worked Welded Pipe	18Cr-3Ni-12Mn
8	3	8.3	ASTM/ASME	A/SA-965	FXM-11	S21904		90/50 [620/345]	Forgings	21Cr-6Ni-9Mn
8	3	8.3	ASTM/ASME	A/SA-965	FXM-19	S20910		100/55 [690/380]	Forgings	22Cr-13Ni-5Mn
8	4	8.2	ASTM/ASME	A/SA-182	—	S32053		93/43 [640/295]	Forgings	23Cr-25Ni-5.5Mo-N
8	4	8.2	ASTM/ASME	A/SA-182	F44	S31254		94/44 [650/305]	Forgings	20Cr-18Ni-6Mo
8	4	8.3	ASTM/ASME	A/SA-182	F49	S34565		115/60 [795/415]	Forgings	24Cr-17Ni-6Mn-4.5Mo-N
8	4	8.3	ASTM/ASME	A/SA-213	S34565	S34565		115/60 [795/415]	Seamless Tube	24Cr-17Ni-6Mn-4.5Mo-N
8	4	8.1	ASTM/ASME	A/SA-213	TP317LM	S31725		75/30 [515/205]	Seamless Tube	19Cr-15Ni-4Mo
8	4	8.1	ASTM/ASME	A/SA-213	TP317LMN	S31726		80/35 [550/240]	Seamless Tube	19Cr-15.5Ni-4Mo
8	4	8.2	ASTM/ASME	A/SA-240	—	S32053		93/43 [640/295]	Plate, Sheet, & Strip	23Cr-25Ni-5.5Mo-N
8	4	8.2	ASTM/ASME	A/SA-240	S31254	S31254		95/45 [655/310]	Plate	20Cr-18Ni-6Mo
8	4	8.2	ASTM/ASME	A/SA-240	S31254	S31254		100/45 [690/310]	Sheet & Strip	20Cr-18Ni-6Mo
8	4	8.1	ASTM/ASME	A/SA-240	S31725	S31725		75/30 [515/205]	Plate, Sheet, & Strip	19Cr-15Ni-4Mo
8	4	8.1	ASTM/ASME	A/SA-240	S31726	S31726		80/35 [550/240]	Plate, Sheet, & Strip	19Cr-15.5Ni-4Mo
8	4	8.3	ASTM/ASME	A/SA-240	S34565	S34565		115/60 [795/415]	Plate, Sheet, & Strip	24Cr-17Ni-6Mn-4.5Mo-N
8	4	8.2	ASTM/ASME	A/SA-249	—	S32053		93/43 [640/295]	Welded Tube	23Cr-25Ni-5.5Mo-N
8	4	8.2	ASTM/ASME	A/SA-249	S31254	S31254	≤0.1875 [≤5]	98/45 [675/310]	Welded Tube	20Cr-18Ni-6Mo
8	4	8.2	ASTM/ASME	A/SA-249	S31254	S31254	>0.1875 [>5]	95/45 [655/310]	Welded Tube	20Cr-18Ni-6Mo
8	4	8.1	ASTM/ASME	A/SA-249	S31725	S31725		75/30 [515/205]	Welded Tube	19Cr-15Ni-4Mo
8	4	8.1	ASTM/ASME	A/SA-249	S31726	S31726		80/35 [550/240]	Welded Tube	19Cr-15.5Ni-4Mo
8	4	8.2	ASTM/ASME	A/SA-312	—	S32053		93/43 [640/295]	Seamless & Welded Pipe	23Cr-25Ni-5.5Mo-N
8	4	8.2	ASTM/ASME	A/SA-312	S31254	S31254	>0.1875 [>5]	95/45 [655/310]	Seamless & Welded Pipe	20Cr-18Ni-6Mo
8	4	8.2	ASTM/ASME	A/SA-312	S31254	S31254	≤0.1875 [≤5]	98/45 [675/310]	Seamless & Welded Pipe	20Cr-18Ni-6Mo
8	4	8.1	ASTM/ASME	A/SA-312	S31725	S31725		75/30 [515/205]	Seamless & Welded Pipe	19Cr-15Ni-4Mo
8	4	8.1	ASTM/ASME	A/SA-312	S31726	S31726		80/35 [550/240]	Seamless & Welded Pipe	19Cr-15.5Ni-4Mo
8	4	8.3	ASTM/ASME	A/SA-312	S34565	S34565		115/60 [795/415]	Seamless & Welded Pipe	24Cr-17Ni-6Mn-4.5Mo-N
8	4	8.2	ASTM/ASME	A/SA-351	CK3MCuN	J93254		80/38 [550/260]	Castings	20Cr-18Ni-6Mo
8	4	8.2	ASTM/ASME	A/SA-358	—	S32053		93/43 [640/295]	Fusion Welded Pipe	23Cr-25Ni-5.5Mo-N
8	4	8.2	ASTM/ASME	A/SA-358	S31254	S31254		94/45 [650/310]	Fusion Welded Tube	20Cr-18Ni-6Mo

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
8	4	8.1	ASTM/ASME	A/SA-358	S31725	S31725		75/30 [515/205]	Fusion Welded Pipe	19Cr-15Ni-4Mo
8	4	8.1	ASTM/ASME	A/SA-358	S31726	S31726		80/35 [550/240]	Fusion Welded Pipe	19Cr-15.5Ni-4Mo
8	4	8.1	ASTM/ASME	A/SA-376	S31725	S31725		75/30 [515/205]	Seamless Pipe	19Cr-15Ni-4Mo
8	4	8.1	ASTM/ASME	A/SA-376	S31726	S31726		80/35 [550/240]	Seamless Pipe	19Cr-15.5Ni-4Mo
8	4	8.3	ASTM/ASME	A/SA-376	S34565	S34565		115/60 [795/415]	Seamless Pipe	24Cr-17Ni-6Mn-4.5Mo-N
8	4	8.2	ASTM/ASME	A/SA-403	—	S31254		94/44 [650/305]	Wrought Piping Fittings	20Cr-18Ni-6Mo
8	4	8.2	ASTM/ASME	A/SA-403	—	S32053		93/43 [640/295]	Wrought Piping Fittings	23Cr-25Ni-5.5Mo-N
8	4	8.3	ASTM/ASME	A/SA-403	S34565	S34565		115/60 [795/415]	Wrought Piping Fittings	24Cr-17Ni-6Mn-4.5Mo-N
8	4	8.2	ASTM/ASME	A/SA-409	—	S32053		93/43 [640/295]	Welded Pipe	23Cr-25Ni-5.5Mo-N
8	4	8.2	ASTM/ASME	A/SA-409	S31254	S31254		94/44 [650/305]	Welded Pipe	20Cr-18Ni-6Mo
8	4	8.1	ASTM/ASME	A/SA-409	S31725	S31725		75/30 [515/205]	Welded Pipe	19Cr-15Ni-4Mo
8	4	8.1	ASTM/ASME	A/SA-409	S31726	S31726		80/35 [550/240]	Welded Pipe	19Cr-15.5Ni-4Mo
8	4	8.3	ASTM/ASME	A/SA-409	S34565	S34565		115/60 [795/415]	Welded Pipe	24Cr-17Ni-6Mn-4.5Mo-N
8	4	8.2	ASTM/ASME	A/SA-479	—	S32053		93/43 [640/295]	Bars & Shapes	23Cr-25Ni-5.5Mo-N
8	4	8.2	ASTM/ASME	A/SA-479	S31254	S31254		95/44 [655/305]	Bars & Shapes	20Cr-18Ni-6Mo
8	4	8.1	ASTM/ASME	A/SA-479	S31725	S31725		75/30 [515/205]	Bars & Shapes	19Cr-15Ni-4Mo
8	4	8.1	ASTM/ASME	A/SA-479	S31726	S31726		80/35 [550/240]	Bars & Shapes	19Cr-15.5Ni-4Mo
8	4	8.3	ASTM/ASME	A/SA-479	S34565	S34565		115/60 [795/415]	Bars & Shapes	24Cr-17Ni-6Mn-4.5Mo-N
8	4	8.2	ASTM	A743	CK3MCuN	J93254		80/38 [550/260]	Castings	20Cr-18Ni-6Mo
8	4	8.2	ASTM/ASME	A/SA-813	—	S32053		93/43 [640/295]	Welded Pipe	23Cr-25Ni-5.5Mo-N
8	4	8.2	ASTM/ASME	A/SA-813	S31254	S31254		94/44 [650/305]	Welded Pipe	20Cr-18Ni-6Mo
8	4	8.2	ASTM/ASME	A/SA-814	—	S32053		93/43 [640/295]	Cold Worked Welded Pipe	23Cr-25Ni-5.5Mo-N
8	4	8.2	ASTM/ASME	A/SA-814	S31254	S31254		94/44 [650/305]	Cold Worked Welded Pipe	20Cr-18Ni-6Mo
9A	1	9.1	ASTM/ASME	A/SA-182	FR	K22035		63/46 [435/315]	Forgings	2Ni-1Cu
9A	1	9.1	ASTM/ASME	A/SA-203	A	K21703		65/37 [450/255]	Plate	2.5Ni
9A	1	9.1	ASTM/ASME	A/SA-203	B	K22103		70/40 [485/275]	Plate	2.5Ni
9A	1	9.1	ASTM/ASME	A/SA-234	WPR	K22035		63/46 [435/315]	Piping Fittings	2Ni-1Cu
9A	1	9.1	ASTM/ASME	A/SA-333	7	K21903		65/35 [450/240]	Seamless & Welded Pipe	2.5Ni
9A	1	9.1	ASTM/ASME	A/SA-333	9	K22035		63/46 [435/315]	Seamless & Welded Pipe	2Ni-1Cu

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Ferrous Alloys (see C.1, I2.2.1, and I3)**

Material Group Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
9A	1	9.1	ASTM/ASME A/SA-334	7	K21903		65/35 [450/240]	Welded Tube	2.5Ni
9A	1	9.1	ASTM/ASME A/SA-334	9	K22035		63/46 [435/315]	Welded Tube	2Ni-1Cu
9A	1	9.1	ASTM/ASME A/SA-350	LF5, Cl. 1	K13050		60/30 [415/205]	Forgings	1.5Ni
9A	1	9.1	ASTM/ASME A/SA-350	LF5, Cl. 2	K13050		70/37.5 [485/260]	Forgings	1.5Ni
9A	1	9.1	ASTM/ASME A/SA-350	LF9	K22036		63/46 [435/315]	Forgings	2Ni-1Cu
9A	1	9.1	ASTM/ASME A/SA-352	LC2	J22500		70/40 [485/275]	Castings	2.5Ni
9A	1	9.1	ASTM/ASME A/SA-420	WPL9	K22035		63/46 [435/315]	Piping Fittings	2Ni-1Cu
9A	1	9.1	ASTM A714	V	K22035		65/46 [450/315]	Seamless & Welded Pipe	2Ni-1Cu
9A	1	9.1	ASTM A714	V, E	K22035		65/46 [450/315]	Seamless & Welded Pipe	2Ni-1Cu
9B	1	9.2	ASTM/ASME A/SA-203	D	K31718		65/37 [450/255]	Plate	3.5Ni
9B	1	9.2	ASTM/ASME A/SA-203	E	K32018		70/40 [485/275]	Plate	3.5Ni
9B	1	9.2	ASTM/ASME A/SA-203	F	—	>2 [>51]	75/50 [515/345]	Plate	3.5Ni
9B	1	9.2	ASTM/ASME A/SA-203	F	—	≤2 [≤51]	80/55 [550/380]	Plate	3.5Ni
9B	1	9.2	ASTM/ASME A/SA-333	3	K31918		65/35 [450/240]	Seamless & Welded Pipe	3.5Ni
9B	1	9.2	ASTM/ASME A/SA-334	3	K31918		65/35 [450/240]	Welded Tube	3.5Ni
9B	1	9.2	ASTM/ASME A/SA-350	LF3	K32025		70/37.5 [485/260]	Forgings	3.5Ni
9B	1	9.3	ASTM/ASME A/SA-352	LC3	J31550		70/40 [485/275]	Castings	3.5Ni
9B	1	9.2	ASTM/ASME A/SA-420	WPL3	K31918		65/35 [450/240]	Piping Fittings	3.5Ni
9B	1	—	ASTM A707	L7, Cl. 1	K32218		60/42 [415/290]	Forgings	3.5Ni
9B	1	—	ASTM A707	L7, Cl. 2	K32218		66/52 [455/360]	Forgings	3.5Ni
9B	1	—	ASTM A707	L8, Cl. 1	K42247		60/42 [415/290]	Forgings	3.5Ni-1.8Cr-0.5Mo-0.3Mn
9B	1	—	ASTM A707	L8, Cl. 2	K42247		66/52 [455/360]	Forgings	3.5Ni-1.8Cr-0.5Mo-0.3Mn
9B	1	—	ASTM A707	L8, Cl. 3	K42247		75/60 [515/415]	Forgings	3.5Ni-1.8Cr-0.5Mo-0.3Mn
9B	1	—	ASTM A707	L8, Cl. 4	K42247		90/75 [620/515]	Forgings	3.5Ni-1.8Cr-0.5Mo-0.3Mn
9B	1	9.2	ASTM/ASME A/SA-765	III	K32026		70/37.5 [485/260]	Forgings	3.5Ni
9C	1	9.3	ASTM/ASME A/SA-352	LC4	J41500		70/40 [485/275]	Castings	4.5Ni

**Table C.2**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Specification	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
21	21	ASTM/ASME	B/SB-209	1060	A91060		8/2.5 [55/17]	Plate & Sheet	99.60Al
21	21	ASTM/ASME	B/SB-209	1100	A91100		11/3.5 [76/24]	Plate & Sheet	99.0Al-Cu
21	22.1	ASTM/ASME	B/SB-209	3003	A93003		14/5 [97/34]	Plate & Sheet	Al-Mn-Cu
21	22.2	ASTM/ASME	B/SB-209	5050	A95050		18/6 [125/41]	Plate & Sheet	Al-1.5Mg
21	—	ASTM/ASME	B/SB-209	Alclad 3003	—	≥0.5 and ≤3 [≥13 and ≤76]	14/5 [97/34]	Plate & Sheet	Al-Mn-Cu
21	—	ASTM/ASME	B/SB-209	Alclad 3003	—	>0.05 and <0.5 [>1.3 and <13]	13/4.5 [90/31]	Plate & Sheet	Al-Mn-Cu
21	—	ASTM/ASME	B/SB-209	Alclad 3003	A83003	≥0.5 [≥13]	14/5 [97/34]	Plate & Sheet	Al-Mn-Cu
21	—	ASTM/ASME	B/SB-209	Alclad 3003	A83003	<0.5 [<13]	13/4.5 [90/31]	Plate & Sheet	Al-Mn-Cu
21	21	ASTM/ASME	B/SB-210	1060	A91060		8.5/2.5 [59/17]	Seamless Tube	99.60Al
21	21	ASTM	B210	1100	A91100		11/3.5 [76/24]	Seamless Tube	99.0Al-Cu
21	22.1	ASTM/ASME	B/SB-210	3003	A93003		14/5 [97/34]	Seamless Tube	Al-Mn-Cu
21	22.1	ASTM	B210	3102	A93102		12/4 [82/28]	Seamless Tube	Al-0.3Mg
21	—	ASTM	B210	3303	A93303		14/5 [97/34]	Seamless Tube	Al-Mn
21	22.2	ASTM	B210	5050	A95050		18/6 [125/41]	Seamless Tube	Al-1.5Mg
21	—	ASTM/ASME	B/SB-210	Alclad 3003	—		13/4.5 [90/31]	Seamless Tube	Al-Mn-Cu
21	—	ASTM	B210	Alclad 3003	A83003		13/4.5 [90/31]	Seamless Tube	Al-Mn-Cu
21	—	ASTM	B210	Alclad 3102	—		10/3.5 [69/24]	Seamless Tube	Al-0.3Mg
21	—	ASTM	B210	Alclad 3303	—		13/4.5 [90/31]	Seamless Tube	Al-Mn
21	21	ASTM/ASME	B/SB-211	1060	A91060		8/2.5 [55/17]	Bar, Rod, & Wire	99.60Al
21	21	ASTM/ASME	B/SB-211	1100	A91100		11/3 [76/21]	Bar, Rod, & Wire	99.0Al-Cu
21	22.1	ASTM/ASME	B/SB-211	3003	A93003		14/5 [97/34]	Bar, Rod, & Wire	Al-Mn-Cu
21	21	ASTM/ASME	B/SB-221	1060	A91060		8.5/2.5 [59/17]	Bar, Rod, & Shapes	99.60Al
21	21	ASTM/ASME	B/SB-221	1100	A91100		11/3 [76/21]	Bar, Rod, & Shapes	99.0Al-Cu
21	22.1	ASTM/ASME	B/SB-221	3003	A93003		14/5 [97/34]	Bar, Rod, & Shapes	Al-Mn-Cu
21	22.1	ASTM/ASME	B/SB-221	3102	A93102		12/4 [82/28]	Bar, Rod, & Shapes	Al-0.3Mg
21	—	ASTM/ASME	B/SB-221	Alclad 3003	A83003		13/4.5 [90/31]	Bar, Rod, & Shapes	Al-Mn-Cu
21	21	ASTM	B230	1350	A91350		8/— [55/—]	Wire	99.50Al

(Continued)



**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Specification	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
21	21	ASTM/ASME	B/SB-234	1060	A91060		8.5/2.5 [59/17]	Seamless Tube	99.60Al
21	22.1	ASTM/ASME	B/SB-234	3003	A93003		14/5 [97/34]	Seamless Tube	Al-Mn-Cu
21	—	ASTM/ASME	B/SB-234	Alclad 3003	—		13/4.5 [90/31]	Seamless Tube	Al-Mn-Cu
21	—	ASTM/ASME	B/SB-234	Alclad 3003	A83003		13/4.5 [90/31]	Seamless Tube	Al-Mn-Cu
21	21	ASTM	B236	1350	A91350		8/— [55/—]	Bar	99.50Al
21	21	ASTM/ASME	B/SB-241	1060	A91060		8.5/2.5 [59/17]	Seamless Pipe & Tube	99.60Al
21	21	ASTM/ASME	B/SB-241	1100	A91100		11/3 [76/21]	Seamless Pipe & Tube	99.0Al-Cu
21	22.1	ASTM/ASME	B/SB-241	3003	A93003		14/5 [97/34]	Seamless Pipe & Tube	Al-Mn-Cu
21	—	ASTM/ASME	B/SB-241	Alclad 3003	—		13/4.5 [90/31]	Seamless Pipe & Tube	Al-Mn-Cu
21	—	ASTM/ASME	B/SB-241	Alclad 3003	A83003		13/4.5 [90/31]	Seamless Pipe & Tube	Al-Mn-Cu
21	21	ASTM/ASME	B/SB-247	1100	A91100		11/4 [76/28]	Forgings	99.0Al-Cu
21	22.1	ASTM/ASME	B/SB-247	3003	A93003		14/5 [97/34]	Forgings	Al-Mn-Cu
21	21	ASTM	B313	1100	A91100		11/3.5 [76/24]	Welded Tube	99.0Al-Cu
21	22.1	ASTM	B313	3003	A93003		14/5 [97/34]	Welded Tube	Al-Mn-Cu
21	22.2	ASTM	B313	5050	A95050		18/6 [125/41]	Welded Tube	Al-1.5Mg
21	21	ASTM	B324	1350	A91350		8.5/— [59/—]	Wire	99.50Al
21	21	ASTM	B345	1060	A91060		8.5/2.5 [59/17]	Seamless Pipe & Tube	99.60Al
21	22.1	ASTM	B345	3003	A93003		14/5 [97/34]	Seamless Pipe & Tube	Al-Mn-Cu
21	—	ASTM	B345	Alclad 3003	A83003		13/4.5 [90/31]	Seamless Pipe & Tube	Al-Mn-Cu
21	—	ASTM	B361	WP Alclad 3003	A83003		13/4.5 [90/31]	Fittings	Al-Mn-Cu
21	21	ASTM	B361	WP1060	A91060		8.5/2.5 [59/17]	Fittings	99.60Al
21	21	ASTM	B361	WP1100	A91100		11/3 [76/21]	Fittings	99.0Al-Cu
21	22.1	ASTM	B361	WP3003	A93003		14/5 [97/34]	Fittings	Al-Mn-Cu
21	21	ASTM	B483	1060	A91060		8.5/2.5 [59/17]	Tube	99.60Al
21	21	ASTM	B483	1100	A91100		11/3.5 [76/24]	Tube	99.0Al-Cu
21	21	ASTM	B483	1435	A91435		9.5/3 [66/21]	Tube	99.35Al-Fe
21	22.1	ASTM	B483	3003	A93003		14/5 [97/34]	Tube	Al-Mn-Cu
21	22.1	ASTM	B483	3102	A93102		11/3.5 [76/24]	Tube	Al-0.3Mg
21	22.2	ASTM	B483	5050	A95050		18/6 [125/41]	Tube	Al-1.5Mg

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Specification	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Aluminum and Aluminum Base Alloys</b>									
21	21	ASTM	B491	1050	A91050		8/2.5 [55/17]	Extruded Tube	99.5Al-Fe
21	21	ASTM	B491	1100	A91100		11/3 [76/21]	Extruded Tube	99.0Al-Cu
21	21	ASTM	B491	1200	A91200		11/9.5 [76/66]	Extruded Tube	99.0Al-Si-Fe
21	21	ASTM	B491	1235	A91235		9/3 [62/21]	Extruded Tube	99.5Al-Fe
21	22.1	ASTM	B491	3003	A93003		14/5 [97/34]	Extruded Tube	Al-Mn-Cu
21	22.1	ASTM	B491	3102	A93102		11/3.5 [76/24]	Extruded Tube	Al-0.3Mg
21	21	ASTM	B547	1100	A91100		11/3.5 [76/24]	Welded Tube	99.0Al-Cu
21	22.1	ASTM	B547	3003	A93003		14/5 [97/34]	Welded Tube	Al-Mn-Cu
21	22.2	ASTM	B547	5050	A95050		18/6 [125/41]	Welded Tube	Al-1.5Mg
21	—	ASTM	B547	Alclad 3003	A83003		13/4.5 [90/31]	Welded Tube	Al-Mn-Cu
21	21	ASTM	B609	1350	A91350		8.5/— [59/—]	Wire	99.50Al
22	22.2	ASTM/ASME	B/SB-209	3004	A93004		22/8.5 [150/59]	Plate & Sheet	Al-Mn-Mg
22	22.2	ASTM/ASME	B/SB-209	3005	A93005		17/6.5 [115/45]	Plate & Sheet	Al-Mn-Mg
22	22.2	ASTM/ASME	B/SB-209	3105	A93105		14/5 [97/34]	Plate & Sheet	Al-Mn-Mg
22	22.2	ASTM/ASME	B/SB-209	5005	A95005		15/5 [105/34]	Plate & Sheet	Al-1.5Mg
22	22.2	ASTM/ASME	B/SB-209	5010	A95010		15/5 [105/34]	Plate & Sheet	Al-0.4Mg-0.2Mn
22	22.3	ASTM/ASME	B/SB-209	5052	A95052		25/9.5 [170/66]	Plate & Sheet	Al-2.5Mg
22	22.4	ASTM/ASME	B/SB-209	5154	A95154		30/11 [205/76]	Plate & Sheet	Al-3.5Mg
22	22.3	ASTM/ASME	B/SB-209	5252	A95252		25/9.5 [170/66]	Plate & Sheet	Al-2.5Mg
22	22.4	ASTM/ASME	B/SB-209	5254	A95254		30/11 [205/76]	Plate & Sheet	Al-3.5Mg
22	22.3	ASTM/ASME	B/SB-209	5454	A95454		31/12 [215/83]	Plate & Sheet	Al-2.7Mg-Mn
22	22.2	ASTM/ASME	B/SB-209	5457	A95457		16/— [110/—]	Plate & Sheet	Al-1Mg-0.3Mn
22	22.3	ASTM/ASME	B/SB-209	5652	A95652		25/9.5 [170/66]	Plate & Sheet	Al-2.5Mg
22	—	ASTM/ASME	B/SB-209	Alclad 3004	—		≥0.5 [≥13]	Plate & Sheet	Al-Mn-Mg
22	—	ASTM/ASME	B/SB-209	Alclad 3004	—		<0.5 [<13]	Plate & Sheet	Al-Mn-Mg
22	—	ASTM/ASME	B/SB-209	Alclad 3004	—		>0.05 and <0.5 [≥1.3 and <13]	Plate & Sheet	Al-Mn-Mg
22	—	ASTM/ASME	B/SB-209	Alclad 3004	—		≥0.5 and ≤3 [≥13 and ≤76]	Plate & Sheet	Al-Mn-Mg

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Specification	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
22	22.2	ASTM	B210	5005	A95005		15/5 [105/34]	Seamless Tube	Al-1.5Mg
22	22.3	ASTM/ASME	B/SB-210	5052	A95052		25/10 [170/69]	Seamless Tube	Al-2.5Mg
22	22.4	ASTM/ASME	B/SB-210	5154	A95154		30/11 [205/76]	Seamless Tube	Al-3.5Mg
22	22.3	ASTM/ASME	B/SB-211	5052	A95052		25/9.5 [170/66]	Bar, Rod, & Wire	Al-2.5Mg
22	22.4	ASTM/ASME	B/SB-211	5154	A95154		30/11 [205/76]	Bar, Rod, & Wire	Al-3.5Mg
22	22.2	ASTM/ASME	B/SB-221	3004	A93004		23/8.5 [160/59]	Bar, Rod, & Shapes	Al-Mn-Mg
22	22.3	ASTM/ASME	B/SB-221	5052	A95052		25/10 [170/69]	Bar, Rod, & Shapes	Al-2.5Mg
22	22.4	ASTM/ASME	B/SB-221	5154	A95154		30/11 [205/76]	Bar, Rod, & Shapes	Al-3.5Mg
22	22.3	ASTM/ASME	B/SB-221	5454	A95454		31/12 [215/83]	Bar, Rod, & Shapes	Al-2.7Mg-Mn
22	22.3	ASTM/ASME	B/SB-234	5052	A95052		25/10 [170/69]	Seamless Tube	Al-2.5Mg
22	22.3	ASTM/ASME	B/SB-234	5454	A95454		31/12 [215/83]	Seamless Tube	Al-2.7Mg-Mn
22	22.3	ASTM/ASME	B/SB-241	5052	A95052		25/10 [170/69]	Seamless Pipe & Tube	Al-2.5Mg
22	22.3	ASTM/ASME	B/SB-241	5454	A95454		31/12 [215/83]	Seamless Pipe & Tube	Al-2.7Mg-Mn
22	22.2	ASTM	B313	3004	A93004		22/8.5 [150/59]	Welded Tube	Al-Mn-Mg
22	22.2	ASTM	B313	3005	A93005		17/6.5 [115/45]	Welded Tube	Al-Mn-Mg
22	22.3	ASTM	B313	5052	A95052		25/9.5 [170/66]	Welded Tube	Al-2.5Mg
22	22.4	ASTM	B313	5154	A95154		30/11 [205/76]	Welded Tube	Al-3.5Mg
22	—	ASTM	B313	Alclad 3004	—		21/8 [145/55]	Welded Tube	Al-Mn-Mg
22	22.3	ASTM	B361	5154	A95154		30/11 [205/76]	Fittings	Al-3.5Mg
22	22.2	ASTM	B396	5005	A95005		15/5 [105/34]	Wire	Al-1.5Mg
22	22.2	ASTM	B483	5005	A95005		15/5 [105/34]	Tube	Al-1.5Mg
22	22.3	ASTM	B483	5052	A95052		25/9.5 [170/66]	Tube	Al-2.5Mg
22	22.2	ASTM	B547	3004	A93004		22/8.5 [150/59]	Welded Tube	Al-Mn-Mg
22	22.3	ASTM	B547	5052	A95052		25/9.5 [170/66]	Welded Tube	Al-2.5Mg
22	22.4	ASTM	B547	5154	A95154		30/11 [205/76]	Welded Tube	Al-3.5Mg
22	22.3	ASTM	B547	5454	A95454		31/12 [215/83]	Welded Tube	Al-2.7Mg-Mn
22	—	ASTM	B547	Alclad 3004	—		21/8 [145/55]	Welded Tube	Al-Mn-Mg
23	23.1	ASTM/ASME	B/SB-209	6061	A96061		24/- [165/-]	Plate & Sheet	Al-Mg-Si-Cu
23	—	ASTM/ASME	B/SB-209	Alclad 6061	—		24/- [165/-]	Plate & Sheet	Al-Mg-Si-Cu

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Specification	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Aluminum and Aluminum Base Alloys</b>									
23	—	ASTM/ASME	B/SB-209	Alclad 6061	A86061	<0.5 [ $<13$ ]	23/- [160/-]	Plate & Sheet	Al-Mg-Si-Cu
23	—	ASTM/ASME	B/SB-209	Alclad 6061	A86061	$\geq 0.5$ [ $\geq 13$ ]	24/- [165/-]	Plate & Sheet	Al-Mg-Si-Cu
23	23.1	ASTM/ASME	B/SB-210	6061	A96061		24/- [165/-]	Seamless Tube	Al-Mg-Si-Cu
23	23.1	ASTM/ASME	B/SB-210	6063	A96063		17/- [115/-]	Seamless Tube	Al-Mg-Si
23	23.1	ASTM/ASME	B/SB-211	6061	A96061		24/- [165/-]	Bar, Rod, & Wire	Al-Mg-Si-Cu
23	23.1	ASTM/ASME	B/SB-221	6005	A96005		24/- [165/-]	Bar, Rod, & Shapes	Al-Si-Mg
23	23.1	ASTM/ASME	B/SB-221	6005A	A96005		24/- [165/-]	Bar, Rod, & Shapes	Al-Si-Mg
23	23.1	ASTM/ASME	B/SB-221	6061	A96061		24/- [165/-]	Bar, Rod, & Shapes	Al-Mg-Si-Cu
23	23.1	ASTM/ASME	B/SB-221	6063	A96063		17/- [115/-]	Bar, Rod, & Shapes	Al-Mg-Si
23	23.1	ASTM/ASME	B/SB-221	6105	A96105		24/- [165/-]	Bar, Rod, & Shapes	Al-Si-Mg
23	23.1	ASTM/ASME	B/SB-221	6162	A96162		24/- [165/-]	Bar, Rod, & Shapes	Al-Si-Mg
23	23.1	ASTM/ASME	B/SB-221	6351	A96351		24/- [165/-]	Bar, Rod, & Shapes	Al-Si-Mg-Mn
23	23.1	ASTM/ASME	B/SB-221	6463	A96463		17/- [115/-]	Bar, Rod, & Shapes	Al-Si-Mg
23	23.1	ASTM/ASME	B/SB-234	6061	A96061		24/- [165/-]	Seamless Tube	Al-Mg-Si-Cu
23	23.1	ASTM/ASME	B/SB-241	6061	A96061		24/- [165/-]	Seamless Pipe & Tube	Al-Mg-Si-Cu
23	23.1	ASTM/ASME	B/SB-241	6063	A96063		17/- [115/-]	Seamless Pipe & Tube	Al-Mg-Si
23	23.1	ASTM/ASME	B/SB-241	6162	A96162		24/- [165/-]	Seamless Pipe & Tube	Al-Si-Mg
23	23.1	ASTM/ASME	B/SB-241	6351	A96351		24/- [165/-]	Seamless Pipe & Tube	Al-Si-Mg-Mn
23	23.1	ASTM/ASME	B/SB-247	6061	A96061		24/- [165/-]	Forgings	Al-Mg-Si-Cu
23	23.1	ASTM/ASME	B/SB-247	6151	A96151		24/- [165/-]	Forgings	Al-Mg-Si-Cr
23	23.1	ASTM/ASME	B/SB-308	6061	A96061		24/- [165/-]	Shapes	Al-Mg-Si-Cu
23	23.1	ASTM	B313	6061	A96061		24/- [165/-]	Welded Tube	Al-Mg-Si-Cu
23	23.1	ASTM	B317	6101	A96101		11/- [76/-]	Bar, Rod, Shapes, & Tube	Al-Mg-Si
23	23.1	ASTM	B345	6061	A96061		24/- [165/-]	Seamless Pipe & Tube	Al-Mg-Si-Cu
23	23.1	ASTM	B345	6063	A96063		17/- [115/-]	Seamless Pipe & Tube	Al-Mg-Si
23	23.1	ASTM	B345	6351	A96351		24/- [165/-]	Seamless Pipe & Tube	Al-Si-Mg-Mn
23	23.1	ASTM	B361	WP6061	A96061		24/- [165/-]	Fittings	Al-Mg-Si-Cu
23	23.1	ASTM	B361	WP6063	A96063		17/- [115/-]	Fittings	Al-Mg-Si
23	23.1	ASTM	B429	6061	A96061		24/- [165/-]	Pipe & Tube	Al-Mg-Si-Cu

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Specification	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Aluminum and Aluminum Base Alloys</b>									
23	23.1	ASTM	B429	6063	A96063		17/- [115/-]	Pipe & Tube	Al-Mg-Si
23	23.1	ASTM	B483	6061	A96061		24/- [165/-]	Tube	Al-Mg-Si-Cu
23	23.1	ASTM	B483	6063	A96063		17/- [115/-]	Tube	Al-Mg-Si
23	23.1	ASTM	B491	6063	A96063		17/- [115/-]	Extruded Tube	Al-Mg-Si
23	23.1	ASTM	B547	6061	A96061		24/- [165/-]	Welded Tube	Al-Mg-Si-Cu
23	23.1	ISO	209	6082, T4, T6	A96082		24/- [165/-]	Bar, Rod, Shapes, & Tube	Al-1Si-Mg-Mn
24	26	ASTM/ASME	B/SB-209	2014	A92014		35/- [240/-]	Plate & Sheet	Al-4.5Cu-1Si-0.8Mn-0.6Mg
24	26	ASTM/ASME	B/SB-209	2219	A92219		35/- [240/-]	Plate & Sheet	Al-6Cu-0.3Mn-Ti-Zr
24	—	ASTM/ASME	B/SB-209	Alclad 2014	A82014		35/- [240/-]	Plate & Sheet	Al-4.5Cu-1Si-0.8Mn-0.6Mg
24	—	ASTM/ASME	B/SB-209	Alclad 2219	A82219		35/- [240/-]	Plate & Sheet	Al-6Cu-0.3Mn-Ti-Zr
24	26	ASTM	B210	2014	A92014		35/- [240/-]	Seamless Tube	Al-4.5Cu-1Si-0.8Mn-0.6Mg
24	26	ASTM/ASME	B/SB-211	2014	A92014		35/- [240/-]	Bar, Rod, & Wire	Al-4.5Cu-1Si-0.8Mn-0.6Mg
24	26	ASTM/ASME	B/SB-211	2219	A92219		35/- [240/-]	Bar, Rod, & Wire	Al-6Cu-0.3Mn-Ti-Zr
24	26	ASTM/ASME	B/SB-221	2014	A92014		35/- [240/-]	Bar, Rod, & Shapes	Al-4.5Cu-1Si-0.8Mn-0.6Mg
24	26	ASTM/ASME	B/SB-221	2219	A92219		35/- [240/-]	Bar, Rod, & Shapes	Al-6Cu-0.3Mn-Ti-Zr
24	26	ASTM/ASME	B/SB-241	2014	A92014		35/- [240/-]	Seamless Pipe & Tube	Al-4.5Cu-1Si-0.8Mn-0.6Mg
24	26	ASTM/ASME	B/SB-241	2219	A92219		35/- [240/-]	Seamless Pipe & Tube	Al-6Cu-0.3Mn-Ti-Zr
24	26	ASTM/ASME	B/SB-247	2014	A92014		35/- [240/-]	Forgings	Al-4.5Cu-1Si-0.8Mn-0.6Mg
24	26	ASTM/ASME	B/SB-247	2219	A92219		35/- [240/-]	Forgings	Al-6Cu-0.3Mn-Ti-Zr
25	22.4	ASTM/ASME	B/SB-209	5083	A95083	>0.05 and ≤1.5 [>1.3 and ≤38]	40/18 [275/125]	Plate & Sheet	Al-4.4Mg-Mn
25	22.4	ASTM/ASME	B/SB-209	5083	A95083	>7 and ≤8 [>178 and ≤203]	36/14 [250/97]	Plate & Sheet	Al-4.4Mg-Mn
25	22.4	ASTM/ASME	B/SB-209	5083	A95083	>5 and ≤7 [>127 and ≤178]	37/15 [255/105]	Plate & Sheet	Al-4.4Mg-Mn
25	22.4	ASTM/ASME	B/SB-209	5083	A95083	>1.5 and ≤3 [>38 and ≤76]	39/17 [270/115]	Plate & Sheet	Al-4.4Mg-Mn
25	22.4	ASTM/ASME	B/SB-209	5083	A95083	>3 and ≤5 [>76 and ≤127]	38/16 [260/110]	Plate & Sheet	Al-4.4Mg-Mn
25	22.4	ASTM/ASME	B/SB-209	5086	A95086		35/14 [240/97]	Plate & Sheet	Al-4.0Mg-Mn

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Specification	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Aluminum and Aluminum Base Alloys</b>									
25	22.4	ASTM/ASME	B/SB-209	5456	A95456	>5 and ≤7 >127 and ≤178]	39/16 [270/110]	Plate & Sheet	Al-5.1Mg-Mn
25	22.4	ASTM/ASME	B/SB-209	5456	A95456	>7 and ≤8 >178 and ≤203]	38/15 [260/105]	Plate & Sheet	Al-5.1Mg-Mn
25	22.4	ASTM/ASME	B/SB-209	5456	A95456	>0.05 and ≤1.5 >1.3 and ≤38]	42/19 [290/130]	Plate & Sheet	Al-5.1Mg-Mn
25	22.4	ASTM/ASME	B/SB-209	5456	A95456	>3 and ≤5 >76 and ≤127]	40/17 [275/115]	Plate & Sheet	Al-5.1Mg-Mn
25	22.4	ASTM/ASME	B/SB-209	5456	A95456	>1.5 and ≤3 >38 and ≤76]	41/18 [285/125]	Plate & Sheet	Al-5.1Mg-Mn
25	22.4	ASTM	B210	5083	A95083		39/16 [270/110]	Seamless Tube	Al-4.4Mg-Mn
25	22.4	ASTM	B210	5086	A95086		35/14 [240/97]	Seamless Tube	Al-4.0Mg-Mn
25	22.4	ASTM	B210	5456	A95456		41/19 [285/130]	Seamless Tube	Al-5.1Mg-Mn
25	22.4	ASTM/ASME	B/SB-211	5056	A95056		38/— [260/—]	Bar, Rod, & Wire	Al-5Mg-Mn-Cr
25	—	ASTM/ASME	B/SB-211	Alclad 5056	—		37/— [255/—]	Bar, Rod, & Wire	Al-5Mg-Mn-Cr
25	22.4	ASTM/ASME	B/SB-221	5083	A95083		39/16 [270/110]	Bar, Rod, & Shapes	Al-4.4Mg-Mn
25	22.4	ASTM/ASME	B/SB-221	5086	A95086		35/14 [240/97]	Bar, Rod, & Shapes	Al-4.0Mg-Mn
25	22.4	ASTM/ASME	B/SB-221	5456	A95456		41/19 [285/130]	Bar, Rod, & Shapes	Al-5.1Mg-Mn
25	22.4	ASTM/ASME	B/SB-241	5083	A95083		39/16 [270/110]	Seamless Pipe & Tube	Al-4.4Mg-Mn
25	22.4	ASTM/ASME	B/SB-241	5086	A95086		35/14 [240/97]	Seamless Pipe & Tube	Al-4.0Mg-Mn
25	22.4	ASTM/ASME	B/SB-241	5456	A95456		41/19 [285/130]	Seamless Pipe & Tube	Al-5.1Mg-Mn
25	22.4	ASTM/ASME	B/SB-247	5083	A95083		38/16 [260/110]	Forgings	Al-4.4Mg-Mn
25	22.4	ASTM	B313	5086	A95086		35/14 [240/97]	Welded Tube	Al-4.0Mg-Mn
25	22.4	ASTM	B345	5083	A95083		39/16 [270/110]	Seamless Pipe & Tube	Al-4.4Mg-Mn
25	22.4	ASTM	B345	5086	A95086		35/14 [240/97]	Seamless Pipe & Tube	Al-4.0Mg-Mn
25	22.4	ASTM	B361	5083	A95083		39/16 [270/110]	Fittings	Al-4.4Mg-Mn
25	22.4	ASTM	B547	5083	A95083		40/18 [275/125]	Welded Tube	Al-4.4Mg-Mn
25	22.4	ASTM	B547	5086	A95086		35/14 [240/97]	Welded Tube	Al-4.0Mg-Mn
25	22.4	ASTM/ASME	B/SB-928	5083	A95083	>1.5 and ≤3 >38 and ≤76]	39/16 [270/110]	Plate & Sheet	Al-4.4Mg-Mn

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Specification	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Aluminum and Aluminum Base Alloys</b>									
25	22.4	ASTM/ASME	B/SB-928	5086	A95086	>0.05 and ≤2 [>1.3 and ≤51]	35/14 [240/97]	Plate & Sheet	Al-4.0Mg-Mn
25	22.4	ASTM/ASME	B/SB-928	5456	A95456	>1.5 and ≤3 [>38 and ≤76]	41/19 [285/130]	Plate & Sheet	Al-5.1Mg-Mn
26	25	ASTM/ASME	B/SB-26	208.0	A02080		19/12 [130/83]	Castings	Al-3Si-4Cu
26	—	ASTM/ASME	B/SB-26	222.0, O	A02220		23/— [160/—]	Castings	Al-Cu-Mg
26	—	ASTM/ASME	B/SB-26	222.0, T61	A02220		30/— [205/—]	Castings	Al-Cu-Mg
26	25	ASTM/ASME	B/SB-26	319.0, F	A03190		23/13 [160/90]	Castings	Al-6Si-3Cu
26	25	ASTM/ASME	B/SB-26	319.0, T5	A03190		23/13 [160/90]	Castings	Al-6Si-3Cu
26	25	ASTM/ASME	B/SB-26	319.0, T6	A03190		31/20 [215/140]	Castings	Al-6Si-3Cu
26	25	ASTM/ASME	B/SB-26	328.0, F	A03280		25/14 [170/97]	Castings	Al-8Si-1Cu-Mn-Mg
26	25	ASTM/ASME	B/SB-26	328.0, T6	A03280		34/21 [235/145]	Castings	Al-8Si-1Cu-Mn-Mg
26	24.2	ASTM/ASME	B/SB-26	356.0, F	A03560		19/9.5 [130/66]	Castings	Al-Si-Mg
26	24.2	ASTM/ASME	B/SB-26	356.0, T51	A03560		23/16 [160/110]	Castings	Al-Si-Mg
26	24.2	ASTM/ASME	B/SB-26	356.0, T6	A03560		30/20 [205/140]	Castings	Al-Si-Mg
26	24.2	ASTM/ASME	B/SB-26	356.0, T7	A03560		31/— [215/—]	Castings	Al-Si-Mg
26	24.2	ASTM/ASME	B/SB-26	356.0, T71	A03560		25/18 [170/125]	Castings	Al-Si-Mg
26	24.1	ASTM/ASME	B/SB-26	443.0	A04430		17/7 [115/48]	Castings	Al-Si
26	23.1	ASTM/ASME	B/SB-26	512.0	A05120		17/10 [115/69]	Castings	Al-4Mg-2Si
26	23.1	ASTM/ASME	B/SB-26	514.0	A05140		22/9 [150/62]	Castings	Al-4Mg-Si
26	—	ASTM/ASME	B/SB-26	535.0	A05350		35/18 [240/125]	Castings	Al-7Mg-Mn
26	23.2	ASTM/ASME	B/SB-26	705.0, T5	A07050		30/17 [205/115]	Castings	Al-3Zn-Mg-Mn-Cr
26	23.2	ASTM/ASME	B/SB-26	710.0, T5	A07100		32/20 [220/140]	Castings	Al-6Zn-Mg
26	24.2	ASTM/ASME	B/SB-26	A356.0, T6	A13560		34/24 [235/165]	Castings	Al-Si-Mg
26	24.2	ASTM/ASME	B/SB-26	A356.0, T61	A13560		35/26 [240/180]	Castings	Al-Si-Mg
26	24.1	ASTM/ASME	B/SB-26	B443.0	A24430		17/6 [115/41]	Castings	Al-Si
26	25	ASTM/ASME	B/SB-108	308.0	A03080		24/— [165/—]	Castings	Al-5.5Si-4.5Cu
26	25	ASTM/ASME	B/SB-108	319.0	A03190		27/14 [185/97]	Castings	Al-6Si-3Cu
26	25	ASTM/ASME	B/SB-108	333.0, F	A03330		28/— [195/—]	Castings	Al-9Si-3.5Cu-Mg

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Specification	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Aluminum and Aluminum Base Alloys</b>									
26	25	ASTM/ASME	B/SB-108	333.0, T5	A03330		28/- [195/-]	Castings	Al-9Si-3.5Cu-Mg
26	25	ASTM/ASME	B/SB-108	333.0, T6	A03330		28/- [195/-]	Castings	Al-9Si-3.5Cu-Mg
26	25	ASTM/ASME	B/SB-108	333.0, T7	A03330		28/- [195/-]	Castings	Al-9Si-3.5Cu-Mg
26	24.2	ASTM/ASME	B/SB-108	356.0, F	A03560		21/10 [145/69]	Castings	Al-Si-Mg
26	24.2	ASTM/ASME	B/SB-108	356.0, T6	A03560		33/22 [230/150]	Castings	Al-Si-Mg
26	24.2	ASTM/ASME	B/SB-108	356.0, T71	A03560		23/- [160/-]	Castings	Al-Si-Mg
26	24.1	ASTM/ASME	B/SB-108	443.0	A04430		21/7 [145/48]	Castings	Al-Si
26	23.2	ASTM/ASME	B/SB-108	513.0	A05130		22/12 [150/83]	Castings	Al-4Mg-Zn
26	—	ASTM/ASME	B/SB-108	535.0	A05350		35/18 [240/125]	Castings	Al-7Mg-Mn
26	24.2	ASTM/ASME	B/SB-108	A356.0	A13560		28/26 [195/180]	Castings	Al-Si-Mg
26	24.1	ASTM/ASME	B/SB-108	A444.0	A14440		17/- [115/-]	Castings	Al-7Si
26	24.1	ASTM/ASME	B/SB-108	B443.0	A24430		21/6 [145/41]	Castings	Al-Si
26	25	ASTM	B618	208.0	A02080		19/12 [130/83]	Castings	Al-3Si-4Cu
26	25	ASTM	B618	319.0	A03190		23/13 [160/90]	Castings	Al-6Si-3Cu
26	25	ASTM	B618	328.0	A03280		25/14 [170/97]	Castings	Al-8Si-1Cu-Mn-Mg
26	24.2	ASTM	B618	356.0	A03560		19/- [130/-]	Castings	Al-Si-Mg
26	24.1	ASTM	B618	443.0	A04430		17/7 [115/48]	Castings	Al-Si
26	23.1	ASTM	B618	514.0	A05140		22/9 [150/62]	Castings	Al-4Mg-Si
26	—	ASTM	B618	535.0	A05350		35/18 [240/125]	Castings	Al-7Mg-Mn
26	24.2	ASTM	B618	A356.0	A13560		34/24 [235/165]	Castings	Al-Si-Mg
26	24.1	ASTM	B618	B443.0	A24430		17/6 [115/41]	Castings	Al-Si
26	24.2	ASTM	B686	A356.0	A13560		23/- [160/-]	Castings	Al-Si-Mg
27	23.2	ASTM/ASME	B/SB-221	7005	A97005		-/- [-/-]	Bar, Rod, & Shapes	Al-Zn-Mg-Mn-Cr-Ti
27	23.2	ISO	209	7020, T5	A97020		40/- [275/-]	Bar, Rod, Shapes, & Tube	Al-4.5Zn-1.2Mg-Mn-Cr-Zr



**Table C.2**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
31	31	ASTM/ASME	B/SB-42	—	C10200	30/9	[205/62]	Seamless Pipe	99.95Cu-P
31	31	ASTM/ASME	B/SB-42	—	C10300	30/9	[205/62]	Seamless Pipe	99.95Cu-P
31	31	ASTM/ASME	B/SB-42	—	C10800	30/9	[205/62]	Seamless Pipe	99.95Cu-P
31	31	ASTM/ASME	B/SB-42	—	C12000	30/9	[205/62]	Seamless Pipe	99.9Cu-P
31	31	ASTM/ASME	B/SB-42	—	C12200	30/9	[205/62]	Seamless Pipe	99.9Cu-P
31	31	ASTM	B68	—	C10200	30/9	[205/62]	Tube	99.95Cu-P
31	31	ASTM	B68	—	C10300	30/9	[205/62]	Tube	99.95Cu-P
31	31	ASTM	B68	—	C10800	30/9	[205/62]	Tube	99.95Cu-P
31	31	ASTM	B68	—	C12000	30/9	[205/62]	Tube	99.9Cu-P
31	31	ASTM	B68	—	C12200	30/9	[205/62]	Tube	99.9Cu-P
31	31	ASTM/ASME	B/SB-75	—	C10100	30/9	[205/62]	Seamless Tube	99.99Cu-P
31	31	ASTM/ASME	B/SB-75	—	C10200	30/9	[205/62]	Seamless Tube	99.95Cu-P
31	31	ASTM/ASME	B/SB-75	—	C10300	30/9	[205/62]	Seamless Tube	99.95Cu-P
31	31	ASTM/ASME	B/SB-75	—	C10800	30/9	[205/62]	Seamless Tube	99.95Cu-P
31	31	ASTM/ASME	B/SB-75	—	C12000	30/9	[205/62]	Seamless Tube	99.9Cu-P
31	31	ASTM/ASME	B/SB-75	—	C12200	30/9	[205/62]	Seamless Tube	99.9Cu-P
31	31	ASTM/ASME	B/SB-75	—	C14200	30/9	[205/62]	Seamless Tube	99.40Cu-P
31	31	ASTM	B88	—	C10200	30/-	[205/-]	Tube	99.95Cu-P
31	31	ASTM	B88	—	C12000	30/-	[205/-]	Tube	99.9Cu-P
31	31	ASTM	B88	—	C12200	30/-	[205/-]	Tube	99.9Cu-P
31	31	ASTM/ASME	B/SB-111	—	C10100	30/9	[205/62]	Seamless Tube	99.99Cu-P
31	31	ASTM/ASME	B/SB-111	—	C10200	30/9	[205/62]	Seamless Tube	99.95Cu-P
31	31	ASTM/ASME	B/SB-111	—	C10300	30/9	[205/62]	Seamless Tube	99.95Cu-P
31	31	ASTM/ASME	B/SB-111	—	C10800	30/9	[205/62]	Seamless Tube	99.95Cu-P
31	31	ASTM/ASME	B/SB-111	—	C12000	30/9	[205/62]	Seamless Tube	99.9Cu-P
31	31	ASTM/ASME	B/SB-111	—	C12200	30/9	[205/62]	Seamless Tube	99.9Cu-P
31	31	ASTM/ASME	B/SB-111	—	C14200	30/9	[205/62]	Seamless Tube	99.4Cu-As-P
31	31	ASTM/ASME	B/SB-111	—	C19200	38/12	[260/83]	Seamless Tube	99.7Cu-Fe-P
31	31	ASTM/ASME	B/SB-152	—	C10100	30/9	[205/62]	Plate, Sheet, Strip, & Bar	99.99Cu-P

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Copper and Copper Base Alloys</b>									
31	31	ASTM/ASME	B/SB-152	—	C10200	30/9	[205/62]	Plate, Sheet, Strip, & Bar	99.95Cu-P
31	31	ASTM/ASME	B/SB-152	—	C10300	30/9	[205/62]	Plate, Sheet, Strip, & Bar	99.95Cu-P
31	31	ASTM/ASME	B/SB-152	—	C10400	30/9	[205/62]	Plate, Sheet, Strip, & Bar	99.95Cu + Ag
31	31	ASTM/ASME	B/SB-152	—	C10500	30/9	[205/62]	Plate, Sheet, Strip, & Bar	99.95Cu + Ag
31	31	ASTM/ASME	B/SB-152	—	C10700	30/9	[205/62]	Plate, Sheet, Strip, & Bar	99.95Cu + Ag
31	31	ASTM/ASME	B/SB-152	—	C10800	30/9	[205/62]	Plate, Sheet, Strip, & Bar	99.95Cu-P
31	31	ASTM/ASME	B/SB-152	—	C11000	30/9	[205/62]	Plate, Sheet, Strip, & Bar	99.90Cu
31	31	ASTM/ASME	B/SB-152	—	C12000	30/9	[205/62]	Plate, Sheet, Strip, & Bar	99.9Cu-P
31	31	ASTM/ASME	B/SB-152	—	C12200	30/9	[205/62]	Plate, Sheet, Strip, & Bar	99.9Cu-P
31	31	ASTM/ASME	B/SB-152	—	C12300	30/9	[205/62]	Plate, Sheet, Strip, & Bar	99.9Cu-P
31	31	ASTM/ASME	B/SB-152	—	C14200	30/9	[205/62]	Plate, Sheet, Strip, & Bar	99.4Cu-As-P
31	31	ASTM/ASME	B/SB-152	—	C14420	30/9	[205/62]	Plate, Sheet, Strip, & Bar	99.99Cu-Sn-Te
31	31	ASTM	B170	1	C10100	30/9	[205/62]	Shapes	99.99Cu-P
31	31	ASTM	B170	2	C10200	30/9	[205/62]	Shapes	99.95Cu-P
31	31	ASTM/ASME	B/SB-187	—	C10100	28/8	[195/55]	Rod & Bar	99.99Cu-P
31	31	ASTM/ASME	B/SB-187	—	C10200	28/8	[195/55]	Rod & Bar	99.95Cu-P
31	31	ASTM/ASME	B/SB-187	—	C10300	28/8	[195/55]	Rod & Bar	99.95Cu-P
31	31	ASTM/ASME	B/SB-187	—	C10400	28/8	[195/55]	Rod & Bar	99.95Cu + Ag
31	31	ASTM/ASME	B/SB-187	—	C10700	28/8	[195/55]	Rod & Bar	99.95Cu + Ag
31	31	ASTM/ASME	B/SB-187	—	C10940	28/8	[195/55]	Rod & Bar	99.90Cu + Ag
31	31	ASTM/ASME	B/SB-187	—	C11000	28/8	[195/55]	Rod & Bar	99.9Cu
31	31	ASTM/ASME	B/SB-187	—	C14420	28/8	[195/55]	Rod & Bar	99.99Cu-Sn-Te
31	31	ASTM	B280	102	C10200	30/-	[205/-]	Seamless Tube	99.95Cu-P
31	31	ASTM	B280	120	C12000	30/-	[205/-]	Seamless Tube	99.9Cu-P
31	31	ASTM	B280	122	C12200	30/-	[205/-]	Seamless Tube	99.9Cu-P
31	31	ASTM	B302	—	C12000	30/9	[205/62]	Pipe	99.9Cu-P
31	31	ASTM	B302	—	C12200	30/9	[205/62]	Pipe	99.9Cu-P
31	31	ASTM	B359	—	C10100	30/9	[205/62]	Seamless Tube	99.99Cu-P
31	31	ASTM	B359	—	C10200	30/9	[205/62]	Seamless Tube	99.95Cu-P

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Copper and Copper Base Alloys</b>									
31	31	ASTM	B359	—	C10300	—	30/9 [205/62]	Seamless Tube	99.95Cu-P
31	31	ASTM	B359	—	C10800	—	30/9 [205/62]	Seamless Tube	99.95Cu-P
31	31	ASTM	B359	—	C12000	—	30/9 [205/62]	Seamless Tube	99.9Cu-P
31	31	ASTM/ASME	B/SB-359	—	C12200	—	30/9 [205/62]	Seamless Tube	99.9Cu-P
31	31	ASTM	B359	—	C14200	—	30/9 [205/62]	Seamless Tube	99.40Cu-P
31	31	ASTM	B359	—	C19200	—	38/12 [260/83]	Seamless Tube	99.7Cu-Fe-P
31	31	ASTM/ASME	B/SB-395	—	C10200	—	30/9 [205/62]	Seamless Tube	99.95Cu-P
31	31	ASTM/ASME	B/SB-395	—	C10300	—	30/9 [205/62]	Seamless Tube	99.95Cu-P
31	31	ASTM/ASME	B/SB-395	—	C10800	—	30/9 [205/62]	Seamless Tube	99.95Cu-P
31	31	ASTM/ASME	B/SB-395	—	C12000	—	30/9 [205/62]	Seamless Tube	99.9Cu-P
31	31	ASTM/ASME	B/SB-395	—	C12200	—	30/9 [205/62]	Seamless Tube	99.9Cu-P
31	31	ASTM/ASME	B/SB-395	—	C14200	—	30/9 [205/62]	Seamless Tube	99.4Cu-As-P
31	31	ASTM/ASME	B/SB-395	—	C19200	—	38/12 [260/83]	Seamless Tube	99.7Cu-Fe-P
31	31	ASTM/ASME	B/SB-543	—	C10800	—	30/9 [205/62]	Welded Tube	99.95Cu-P
31	31	ASTM/ASME	B/SB-543	—	C12200	—	30/9 [205/62]	Welded Tube	99.9Cu-P
31	31	ASTM/ASME	B/SB-543	—	C19400	—	45/15 [310/105]	Welded Tube	97.5Cu-P
32	32.2	ASTM	B21	—	C46400	—	52/20 [360/140]	Shapes	60Cu-39Zn-Sn
32	32.2	ASTM	B21	—	C46400	>1 and ≤2 [>25 and ≤50]	52/20 [360/140]	Rod & Bar	60Cu-39Zn-Sn
32	32.2	ASTM	B21	—	C46400	>2 [>50]	50/20 [345/140]	Rod & Bar	60Cu-39Zn-Sn
32	32.2	ASTM	B21	—	C46400	≤1 [≤25]	54/20 [370/140]	Rod & Bar	60Cu-39Zn-Sn
32	32.1	ASTM/ASME	B/SB-43	—	C23000	—	40/12 [275/83]	Seamless Pipe	85Cu-15Zn
32	32.1	ASTM/ASME	B/SB-111	—	C23000	—	40/12 [275/83]	Seamless Tube	85Cu-15Zn
32	32.1	ASTM/ASME	B/SB-111	—	C28000	—	50/20 [345/140]	Seamless Tube	60Cu-40Zn
32	32.2	ASTM/ASME	B/SB-111	—	C44300	—	45/15 [310/105]	Seamless Tube	71Cu-28Zn-1Sn-0.06As
32	32.2	ASTM/ASME	B/SB-111	—	C44400	—	45/15 [310/105]	Seamless Tube	71Cu-28Zn-1Sn-0.06Sb
32	32.2	ASTM/ASME	B/SB-111	—	C44500	—	45/15 [310/105]	Seamless Tube	71Cu-28Zn-1Sn-0.06P
32	32.2	ASTM/ASME	B/SB-111	—	C68700	—	50/18 [345/125]	Seamless Tube	78Cu-20Zn-2Al
32	32.1	ASTM/ASME	B/SB-135	—	C22000	—	38/12 [260/83]	Seamless Tube	90Cu-10Zn

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Copper and Copper Base Alloys</b>									
32	32.1	ASTM/ASME	B/SB-135	—	C23000	40/12 [275/83]	40/12 [275/83]	Seamless Tube	85Cu-15Zn
32	32.2	ASTM/ASME	B/SB-171	—	C44300	45/15 [310/105]	45/15 [310/105]	Plate & Sheet	71Cu-28Zn-1Sn-0.06As
32	32.2	ASTM/ASME	B/SB-171	—	C44400	45/15 [310/105]	45/15 [310/105]	Plate & Sheet	71Cu-28Zn-1Sn-0.06Sb
32	32.2	ASTM/ASME	B/SB-171	—	C44500	45/15 [310/105]	45/15 [310/105]	Plate & Sheet	71Cu-28Zn-1Sn-0.06P
32	32.2	ASTM/ASME	B/SB-171	—	C46400	50/18 [345/125]	50/18 [345/125]	Plate & Sheet	60Cu-39Zn-Sn
32	32.2	ASTM/ASME	B/SB-171	—	C46500	50/18 [345/125]	50/18 [345/125]	Plate & Sheet	60Cu-39Zn-As
32	32.1	ASTM	B359	—	C23000	40/12 [275/83]	40/12 [275/83]	Seamless Tube	85Cu-15Zn
32	32.2	ASTM/ASME	B/SB-359	—	C44300	45/15 [310/105]	45/15 [310/105]	Seamless Tube	71Cu-28Zn-1Sn-0.06As
32	32.2	ASTM/ASME	B/SB-359	—	C44400	45/15 [310/105]	45/15 [310/105]	Seamless Tube	71Cu-28Zn-1Sn-0.06Sb
32	32.2	ASTM/ASME	B/SB-359	—	C44500	45/15 [310/105]	45/15 [310/105]	Seamless Tube	71Cu-28Zn-1Sn-0.06P
32	32.2	ASTM	B359	—	C68700	50/18 [345/125]	50/18 [345/125]	Seamless Tube	78Cu-20Zn-2Al
32	32.1	ASTM/ASME	B/SB-395	—	C23000	40/12 [275/83]	40/12 [275/83]	Seamless Tube	85Cu-15Zn
32	32.2	ASTM/ASME	B/SB-395	—	C44300	45/15 [310/105]	45/15 [310/105]	Seamless Tube	71Cu-28Zn-1Sn-0.06As
32	32.2	ASTM/ASME	B/SB-395	—	C44400	45/15 [310/105]	45/15 [310/105]	Seamless Tube	71Cu-28Zn-1Sn-0.06Sb
32	32.2	ASTM/ASME	B/SB-395	—	C44500	45/15 [310/105]	45/15 [310/105]	Seamless Tube	71Cu-28Zn-1Sn-0.06P
32	32.2	ASTM/ASME	B/SB-395	—	C68700	50/18 [345/125]	50/18 [345/125]	Seamless Tube	78Cu-20Zn-2Al
32	32.1	ASTM/ASME	B/SB-543	—	C23000	40/12 [275/83]	40/12 [275/83]	Welded Tube	85Cu-15Zn
32	32.2	ASTM/ASME	B/SB-543	—	C44300	45/15 [310/105]	45/15 [310/105]	Welded Tube	71Cu-28Zn-1Sn-0.06As
32	32.2	ASTM/ASME	B/SB-543	—	C44400	45/15 [310/105]	45/15 [310/105]	Welded Tube	71Cu-28Zn-1Sn-0.06Sb
32	32.2	ASTM/ASME	B/SB-543	—	C44500	45/15 [310/105]	45/15 [310/105]	Welded Tube	71Cu-28Zn-1Sn-0.06P
32	32.2	ASTM/ASME	B/SB-543	—	C68700	50/18 [345/125]	50/18 [345/125]	Welded Tube	78Cu-20Zn-2Al
33	37	ASTM/ASME	B/SB-96	—	C65100	38/- [260/-]	38/- [260/-]	Plate, Sheet, Strip, & Bar	98.5Cu-1.5Si
33	37	ASTM/ASME	B/SB-96	—	C65400	65/- [450/-]	65/- [450/-]	Plate, Sheet, Strip, & Bar	98.5Cu-3Si-1.5Sn-Cr
33	37	ASTM/ASME	B/SB-96	—	C65500	50/18 [345/125]	50/18 [345/125]	Plate, Sheet, Strip, & Bar	97Cu-3Si
33	37	ASTM/ASME	B/SB-98	—	C65100	40/12 [275/83]	40/12 [275/83]	Rod, Bar, & Shapes	98.5Cu-1.5Si
33	37	ASTM/ASME	B/SB-98	—	C65500	52/15 [360/105]	52/15 [360/105]	Rod, Bar, & Shapes	97Cu-3Si
33	37	ASTM/ASME	B/SB-98	—	C66100	52/15 [360/105]	52/15 [360/105]	Rod, Bar, & Shapes	94Cu-3Si
33	31	ASTM/ASME	B/SB-283	—	C65500	50/15 [345/105]	50/15 [345/105]	Forgings	97Cu-3Si
33	37	ASTM/ASME	B/SB-315	—	C65100	40/10 [275/69]	40/10 [275/69]	Seamless Pipe & Tube	98.5Cu-1.5Si

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Copper and Copper Base Alloys</b>									
33	34	ASTM/ASME	B/SB-315	—	C65500		50/15 [345/105]	Seamless Pipe & Tube	97Cu-3Si
34	34	ASTM/ASME	B/SB-111	—	C70400		38/12 [260/83]	Seamless Tube	95Cu-5Ni
34	34	ASTM/ASME	B/SB-111	—	C70600		40/15 [275/105]	Seamless Tube	90Cu-10Ni
34	34	ASTM/ASME	B/SB-111	—	C71000		45/16 [310/110]	Seamless Tube	80Cu-20Ni
34	34	ASTM/ASME	B/SB-111	—	C71500		52/18 [360/125]	Seamless Tube	70Cu-30Ni
34	34	ASTM/ASME	B/SB-111	—	C71640		63/25 [435/170]	Seamless Tube	66Cu-30Ni-2Fe-2Mn
34	34	ASTM/ASME	B/SB-111	—	C72200		45/16 [310/110]	Seamless Tube	80Cu-16Ni-0.75Fe-0.5Cr
34	34	ASTM/ASME	B/SB-151	—	C70600		38/15 [260/105]	Rod & Bar	90Cu-10Ni
34	34	ASTM/ASME	B/SB-151	—	C71500		45/15 [310/105]	Bar (Rect.) & Shapes	70Cu-30Ni
34	34	ASTM/ASME	B/SB-151	—	C71500	≤0.5 [≤13]	52/18 [360/125]	Sq Bar & Rod (Rnd, Hex, Oct)	70Cu-30Ni
34	34	ASTM/ASME	B/SB-151	—	C71500	>1 [>25]	45/18 [310/125]	Sq Bar & Rod (Rnd, Hex, Oct)	70Cu-30Ni
34	34	ASTM/ASME	B/SB-151	—	C71500	>0.5 and ≤1 [>13 and ≤25]	48/18 [330/125]	Sq Bar & Rod (Rnd, Hex, Oct)	70Cu-30Ni
34	34	ASTM/ASME	B/SB-171	—	C70600		40/15 [275/105]	Plate & Sheet	90Cu-10Ni
34	34	ASTM/ASME	B/SB-171	—	C71500	≤2.5 [≤64]	50/20 [345/140]	Plate & Sheet	70Cu-30Ni
34	34	ASTM/ASME	B/SB-171	—	C71500	>2.5 and ≤5 [>64 and ≤127]	45/18 [310/125]	Plate & Sheet	70Cu-30Ni
34	34	ASTM/ASME	B/SB-171	—	C72200	≤2.5 [≤64]	42/16 [290/110]	Plate & Sheet	80Cu-16Ni-0.75Fe-0.5Cr
34	34	ASTM	B359	—	C70400		38/12 [260/83]	Seamless Tube	95Cu-5Ni
34	34	ASTM/ASME	B/SB-359	—	C70600		40/15 [275/105]	Seamless Tube	90Cu-10Ni
34	34	ASTM/ASME	B/SB-359	—	C71000		45/16 [310/110]	Seamless Tube	80Cu-20Ni
34	34	ASTM/ASME	B/SB-359	—	C71500		52/18 [360/125]	Seamless Tube	70Cu-30Ni
34	34	ASTM	B359	—	C72200		45/16 [310/110]	Seamless Tube	80Cu-16Ni-0.75Fe-0.5Cr
34	34	ASTM/ASME	B/SB-369	—	C96200		45/25 [310/170]	Castings	87.5Cu-10Ni-Fe-Mn
34	34	ASTM/ASME	B/SB-395	—	C70400		38/12 [260/83]	Seamless Tube	95Cu-5Ni
34	34	ASTM/ASME	B/SB-395	—	C70600		40/15 [275/105]	Seamless Tube	90Cu-10Ni
34	34	ASTM/ASME	B/SB-395	—	C71000		45/16 [310/110]	Seamless Tube	80Cu-20Ni
34	34	ASTM/ASME	B/SB-395	—	C71500		52/18 [360/125]	Seamless Tube	70Cu-30Ni
34	34	ASTM/ASME	B/SB-395	—	C72200		45/16 [310/110]	Seamless Tube	80Cu-16Ni-0.75Fe-0.5Cr

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Copper and Copper Base Alloys</b>									
34	34	ASTM/ASME	B/SB-466	—	C70400	—	37/12 [255/83]	Seamless Pipe & Tube	95Cu-5Ni
34	34	ASTM/ASME	B/SB-466	—	C70600	—	38/13 [260/90]	Seamless Pipe & Tube	90Cu-10Ni
34	34	ASTM/ASME	B/SB-466	—	C71000	—	45/16 [310/110]	Seamless Pipe & Tube	80Cu-20Ni
34	34	ASTM/ASME	B/SB-466	—	C71500	—	52/18 [360/125]	Seamless Pipe & Tube	70Cu-30Ni
34	34	ASTM/ASME	B/SB-466	—	C72200	—	40/14 [275/97]	Seamless Pipe & Tube	80Cu-16Ni-0.75Fe-0.5Cr
34	34	ASTM/ASME	B/SB-467	—	C70600	>4.5 [≥114]	38/13 [260/90]	Welded Pipe	90Cu-10Ni
34	34	ASTM/ASME	B/SB-467	—	C70600	≤4.5 [≤114]	40/15 [275/105]	Welded Pipe	90Cu-10Ni
34	34	ASTM/ASME	B/SB-467	—	C71500	>4.5 [≥114]	45/15 [310/105]	Welded Pipe	70Cu-30Ni
34	34	ASTM/ASME	B/SB-467	—	C71500	≤4.5 [≤114]	50/20 [345/140]	Welded Pipe	70Cu-30Ni
34	34	ASTM/ASME	B/SB-543	—	C70400	—	38/12 [260/83]	Welded Tube	95Cu-5Ni
34	34	ASTM/ASME	B/SB-543	—	C70600	—	40/15 [275/105]	Welded Tube	90Cu-10Ni
34	34	ASTM	B543	—	C71000	—	45/16 [310/110]	Welded Tube	80Cu-20Ni
34	34	ASTM/ASME	B/SB-543	—	C71500	—	52/18 [360/125]	Welded Tube	70Cu-30Ni
34	34	ASTM/ASME	B/SB-543	—	C71640	—	63/25 [435/170]	Welded Tube	66Cu-30Ni-2Fe-2Mn
34	34	ASTM	B543	—	C72200	—	45/16 [310/110]	Welded Tube	80Cu-16Ni-0.75Fe-0.5Cr
34	34	ASTM	B608	—	C70620	—	40/— [275/—]	Welded Pipe	87Cu-10Ni-1.4Fe
34	34	ASTM	B608	—	C71520	—	50/— [345/—]	Welded Pipe	65Cu-31Ni-0.7Fe
34	34	ASTM/ASME	B/SB-956	—	C70600	—	40/15 [275/105]	Finned Welded Tube	90Cu-10Ni
34	34	ASTM/ASME	B/SB-956	—	C71500	—	52/18 [360/125]	Finned Welded Tube	70Cu-30Ni
35	35	ASTM/ASME	B/SB-111	—	C60800	—	50/19 [345/130]	Seamless Tube	95Cu-5Al
35	35	ASTM/ASME	B/SB-111	—	C61300	—	70/30 [485/205]	Seamless Tube	90Cu-7Al-2.5Fe-Sn
35	35	ASTM/ASME	B/SB-111	—	C61400	—	70/30 [485/205]	Seamless Tube	90Cu-7Al-3Fe
35	35	ASTM/ASME	B/SB-148	—	C95200	—	65/25 [450/170]	Castings	88Cu-9Al-3Fe
35	35	ASTM/ASME	B/SB-148	—	C95300	—	65/25 [450/170]	Castings	89Cu-10Al-1Fe
35	35	ASTM/ASME	B/SB-148	—	C95400	—	75/30 [515/205]	Castings	85Cu-11Al-4Fe
35	35	ASTM/ASME	B/SB-148	—	C95410	—	75/30 [515/205]	Castings	84Cu-10Al-4Fe-2Ni
35	35	ASTM/ASME	B/SB-148	—	C95500	—	90/40 [620/275]	Castings	82Cu-11Al-4Fe-3Mn
35	35	ASTM/ASME	B/SB-148	—	C95600	—	60/28 [415/195]	Castings	90Cu-7Al-3Si
35	35	ASTM/ASME	B/SB-148	—	C95700	—	90/40 [620/275]	Castings	75Cu-8Al-3Fe-2-Ni-12Mn

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Copper and Copper Base Alloys</b>									
35	35	ASTM/ASME	B/SB-148	—	C95800		85/35 [585/240]	Castings	81Cu-9Al-4.5Ni-4Fe-1.2Mn
35	35	ASTM/ASME	B/SB-150	—	C61300	≤0.5 [≤13]	80/40 [550/275]	Bar & Rod (Hex & Oct)	90Cu-7Al-2.5Fe-Sn
35	35	ASTM/ASME	B/SB-150	—	C61300	>2 and ≤3 >50 and ≤75]	70/35 [485/240]	Rod (Round)	90Cu-7Al-2.5Fe-Sn
35	35	ASTM/ASME	B/SB-150	—	C61300	>1 and ≤2 >25 and ≤50]	70/32 [485/220]	Bar & Rod (Hex & Oct)	90Cu-7Al-2.5Fe-Sn
35	35	ASTM/ASME	B/SB-150	—	C61300	>0.5 and ≤1 >13 and ≤25]	75/45 [515/310]	Rod (Round)	90Cu-7Al-2.5Fe-Sn
35	35	ASTM/ASME	B/SB-150	—	C61300	≤0.5 [≤13]	80/50 [550/345]	Rod (Round)	90Cu-7Al-2.5Fe-Sn
35	35	ASTM/ASME	B/SB-150	—	C61300	>0.5 and ≤1 >13 and ≤25]	75/35 [515/240]	Bar & Rod (Hex & Oct)	90Cu-7Al-2.5Fe-Sn
35	35	ASTM/ASME	B/SB-150	—	C61300	>1 and ≤2 >25 and ≤50]	72/40 [495/275]	Rod (Round)	90Cu-7Al-2.5Fe-Sn
35	35	ASTM/ASME	B/SB-150	—	C61400	>0.5 and ≤1 >13 and ≤25]	75/35 [515/240]	Bar & Rod	90Cu-7Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C61400	>2 and ≤3 >50 and ≤75]	70/30 [485/205]	Bar & Rod	90Cu-7Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C61400	>1 and ≤2 >25 and ≤50]	70/32 [485/220]	Bar & Rod	90Cu-7Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C61400	≤0.5 [≤13]	80/40 [550/275]	Bar & Rod	90Cu-7Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C61900	>0.5 and ≤1 >13 and ≤25]	88/44 [605/305]	Rod (Round)	87Cu-9Al-4Fe
35	35	ASTM/ASME	B/SB-150	—	C61900	≤0.5 [≤13]	90/50 [620/345]	Rod (Round)	87Cu-9Al-4Fe
35	35	ASTM/ASME	B/SB-150	—	C61900	>1 and ≤2 >25 and ≤50]	85/40 [585/275]	Rod (Round)	87Cu-9Al-4Fe
35	35	ASTM/ASME	B/SB-150	—	C61900	>3 [>75]	75/30 [515/205]	Rod (Round)	87Cu-9Al-4Fe
35	35	ASTM/ASME	B/SB-150	—	C61900	≤0.5 [≤13]	75/30 [515/205]	Shapes	87Cu-9Al-4Fe
35	35	ASTM/ASME	B/SB-150	—	C61900	>2 and ≤3 >50 and ≤75]	78/37 [540/255]	Rod (Round)	87Cu-9Al-4Fe
35	35	ASTM/ASME	B/SB-150	—	C62300	>0.5 and ≤1 >13 and ≤25]	88/44 [605/305]	Rod (Round)	88Cu-9Al-3Fe

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Copper and Copper Base Alloys</b>									
35	35	ASTM/ASME	B/SB-150	—	C62300	>2 [ $>50$ ]	75/30 [515/205]	Bar & Rod (Hex & Oct)	88Cu-9Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C62300		75/30 [515/205]	Shapes	88Cu-9Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C62300	$\leq 1$ [ $\leq 25$ ]	80/35 [550/240]	Bar & Rod (Hex & Oct)	88Cu-9Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C62300	>2 and $\leq 3$ [ $>50$ and $\leq 75$ ]	76/37 [525/255]	Rod (Round)	88Cu-9Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C62300	>3 [ $>75$ ]	75/30 [515/205]	Rod (Round)	88Cu-9Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C62300	>1 and $\leq 2$ [ $>25$ and $\leq 50$ ]	84/40 [580/275]	Rod (Round)	88Cu-9Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C62300	>1 and $\leq 2$ [ $>25$ and $\leq 50$ ]	78/32 [540/220]	Bar & Rod (Hex & Oct)	88Cu-9Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C62300	$\leq 0.5$ [ $\leq 13$ ]	90/50 [620/345]	Rod (Round)	88Cu-9Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C62400		90/35 [620/240]	Shapes	87Cu-10Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C62400	>3 and $\leq 5$ [ $>75$ and $\leq 125$ ]	90/35 [620/240]	Rod (Round)	87Cu-10Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C62400	>2 and $\leq 3$ [ $>50$ and $\leq 75$ ]	90/40 [620/275]	Rod (Round)	87Cu-10Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C62400	>1 and $\leq 2$ [ $>25$ and $\leq 50$ ]	90/43 [620/295]	Rod (Round)	87Cu-10Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C62400	>0.5 and $\leq 5$ [ $>13$ and $\leq 125$ ]	90/35 [620/240]	Bar, & Rod (Hex & Oct)	87Cu-10Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C62400	$\leq 1$ [ $\leq 25$ ]	95/45 [655/310]	Rod (Round)	87Cu-10Al-3Fe
35	35	ASTM/ASME	B/SB-150	—	C63000		85/42.5 [585/295]	Shapes	81Cu-10Al-5Ni-3Fe
35	35	ASTM/ASME	B/SB-150	—	C63000	$\geq 0.5$ and $\leq 1$ [ $\geq 13$ and $\leq 25$ ]	100/50 [690/345]	Bar & Rod	81Cu-10Al-5Ni-3Fe
35	35	ASTM/ASME	B/SB-150	—	C63000	>1 and $\leq 2$ [ $>25$ and $\leq 50$ ]	90/45 [620/310]	Bar & Rod	81Cu-10Al-5Ni-3Fe
35	35	ASTM/ASME	B/SB-150	—	C63000	>2 and $\leq 4$ [ $>50$ and $\leq 100$ ]	85/42.5 [585/295]	Bar & Rod	81Cu-10Al-5Ni-3Fe
35	35	ASTM/ASME	B/SB-150	—	C63000	>4 [ $>100$ ]	80/40 [550/275]	Bar & Rod	81Cu-10Al-5Ni-3Fe
35	35	ASTM/ASME	B/SB-150	—	C63020	>1 and $\leq 2$ [ $>25$ and $\leq 50$ ]	130/95 [895/655]	Bar & Rod	80Cu-10Al-5Ni-5Fe

(Continued)



**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Copper and Copper Base Alloys</b>									
35	35	ASTM/ASME	B/SB-150	—	C63020	>2 and ≤4 [>50 and ≤100]	130/90 [895/620]	Bar & Rod	80Cu-10Al-5Ni-5Fe
35	35	ASTM/ASME	B/SB-150	—	C63020	≤1 [≤25]	135/100 [930/690]	Bar & Rod	80Cu-10Al-5Ni-5Fe
35	35	ASTM/ASME	B/SB-150	—	C63200		90/40 [620/275]	Bar, Rod, & Shapes	83Cu-9Al-4Ni-4Fe
35	35	ASTM/ASME	B/SB-150	—	C64200	>0.5 and ≤1 [>13 and ≤25]	85/45 [585/310]	Bar & Rod	91Cu-7Al-2Si
35	35	ASTM/ASME	B/SB-150	—	C64200	>4 [>100]	70/25 [485/170]	Bar & Rod	91Cu-7Al-2Si
35	35	ASTM/ASME	B/SB-150	—	C64200	>3 and ≤4 [>75 and ≤100]	70/30 [485/205]	Bar & Rod	91Cu-7Al-2Si
35	35	ASTM/ASME	B/SB-150	—	C64200	>2 and ≤3 [>50 and ≤75]	75/35 [515/240]	Bar & Rod	91Cu-7Al-2Si
35	35	ASTM/ASME	B/SB-150	—	C64200	>1 and ≤2 [>25 and ≤50]	80/42 [550/290]	Bar & Rod	91Cu-7Al-2Si
35	35	ASTM/ASME	B/SB-150	—	C64200		70/30 [485/205]	Shapes	91Cu-7Al-2Si
35	35	ASTM/ASME	B/SB-150	—	C64200	≤0.5 [≤13]	90/45 [620/310]	Bar & Rod	91Cu-7Al-2Si
35	35	ASTM/ASME	B/SB-169	—	C61300	>2 and ≤5 [>51 and ≤127]	65/28 [450/195]	Plate, Sheet, Strip, & Bar	90Cu-7Al-2.5Fe-Sn
35	35	ASTM/ASME	B/SB-169	—	C61300	>0.5 and ≤2 [>13 and ≤51]	72/32 [485/220]	Plate, Sheet, Strip, & Bar	90Cu-7Al-2.5Fe-Sn
35	35	ASTM/ASME	B/SB-169	—	C61300	≤0.5 [≤13]	75/36 [515/250]	Plate, Sheet, Strip, & Bar	90Cu-7Al-2.5Fe-Sn
35	35	ASTM/ASME	B/SB-169	—	C61400	>2 and ≤5 [>51 and ≤127]	65/28 [450/195]	Plate, Sheet, Strip, & Bar	90Cu-7Al-3Fe
35	35	ASTM/ASME	B/SB-169	—	C61400	>0.5 and ≤2 [>13 and ≤51]	70/30 [485/205]	Plate, Sheet, Strip, & Bar	90Cu-7Al-3Fe
35	35	ASTM/ASME	B/SB-169	—	C61400	≤0.5 [≤13]	72/32 [495/220]	Plate, Sheet, Strip, & Bar	90Cu-7Al-3Fe
35	35	ASTM/ASME	B/SB-171	—	C61300	>2 and ≤3 [>50 and ≤80]	70/30 [485/205]	Plate & Sheet	90Cu-7Al-2.5Fe-Sn
35	35	ASTM/ASME	B/SB-171	—	C61300	≤2 [≤50]	75/37 [515/255]	Plate & Sheet	90Cu-7Al-2.5Fe-Sn
35	35	ASTM/ASME	B/SB-171	—	C61300	>3 and ≤5 [>80 and ≤130]	65/28 [450/195]	Plate & Sheet	90Cu-7Al-2.5Fe-Sn
35	35	ASTM/ASME	B/SB-171	—	C61400	≤2 [≤51]	70/28 [485/195]	Plate & Sheet	90Cu-7Al-3Fe

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Copper and Copper Base Alloys</b>									
35	35	ASTM/ASME	B/SB-171	—	C61400	>2 and ≤5 [>51 and ≤127]	65/26 [450/180]	Plate & Sheet	90Cu-7Al-3Fe
35	35	ASTM/ASME	B/SB-171	—	C63000	≤2 [≤51]	90/36 [620/250]	Plate & Sheet	81Cu-10Al-5Ni-3Fe
35	35	ASTM/ASME	B/SB-171	—	C63000	>2 and ≤3.5 [>51 and ≤89]	85/33 [585/230]	Plate & Sheet	81Cu-10Al-5Ni-3Fe
35	35	ASTM/ASME	B/SB-171	—	C63000	>3.5 and ≤5 [>89 and ≤127]	80/30 [550/205]	Plate & Sheet	81Cu-10Al-5Ni-3Fe
35	35	ASTM/ASME	B/SB-171	—	C63200	>3.5 and ≤5 [>89 and ≤127]	80/30 [550/205]	Plate & Sheet	83Cu-9Al-4Ni-4Fe
35	35	ASTM/ASME	B/SB-171	—	C63200	≤2 [≤51]	90/36 [620/250]	Plate & Sheet	83Cu-9Al-4Ni-4Fe
35	35	ASTM/ASME	B/SB-171	—	C63200	>2 and ≤3.5 [>51 and ≤89]	85/33 [585/230]	Plate & Sheet	83Cu-9Al-4Ni-4Fe
35	35	ASTM/ASME	B/SB-271	—	C95200		65/25 [450/170]	Castings	88Cu-9Al-3Fe
35	35	ASTM/ASME	B/SB-271	—	C95300		65/25 [450/170]	Castings	89Cu-10Al-1Fe
35	35	ASTM/ASME	B/SB-271	—	C95400		75/30 [515/205]	Castings	85Cu-11Al-4Fe
35	35	ASTM/ASME	B/SB-271	—	C95410		75/30 [515/205]	Castings	84Cu-10Al-4Fe-2Ni
35	35	ASTM/ASME	B/SB-271	—	C95500		90/40 [620/275]	Castings	82Cu-11Al-4Fe-3Mn
35	35	ASTM/ASME	B/SB-283	—	C64200	>1.5 [≥40]	68/23 [470/160]	Forgings	91Cu-7Al-2Si
35	35	ASTM/ASME	B/SB-283	—	C64200	≤1.5 [≤40]	70/25 [485/170]	Forgings	91Cu-7Al-2Si
35	35	ASTM/ASME	B/SB-315	—	C61300		65/28 [450/195]	Seamless Pipe & Tube	90Cu-7Al-2.5Fe-Sn
35	35	ASTM/ASME	B/SB-315	—	C61400		65/28 [450/195]	Seamless Pipe & Tube	90Cu-7Al-3Fe
35	35	ASTM	B359	—	C60800		50/19 [345/130]	Seamless Tube	95Cu-5Al
35	35	ASTM/ASME	B/SB-395	—	C60800		50/19 [345/130]	Seamless Tube	95Cu-5Al
35	35	ASTM/ASME	B/SB-505	—	C95200		68/26 [470/180]	Castings	88Cu-9Al-3Fe
35	35	ASTM	B608	—	C61300		70/- [485/-]	Welded Pipe	90Cu-7Al-2.5Fe-Sn
35	35	ASTM	B608	—	C61400		70/- [485/-]	Welded Pipe	90Cu-7Al-3Fe

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I.2.2.1, and I.3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
41	41	ASTM/ASME	B/SB-160	—	N02200	55/15 [380/105]		Rod & Bar	99.0Ni
41	41	ASTM/ASME	B/SB-160	—	N02201	50/10 [345/69]		Rod & Bar	99.0Ni-Low C
41	41	ASTM/ASME	B/SB-161	—	N02200	55/12 [380/83]		Seamless Pipe, Tube	99.0Ni
41	41	ASTM/ASME	B/SB-161	—	N02201	50/10 [345/69]		Seamless Pipe, Tube	99.0Ni-Low C
41	41	ASTM/ASME	B/SB-162	—	N02200	55/15 [380/105]		Plate, Sheet, & Strip	99.0Ni
41	41	ASTM/ASME	B/SB-162	—	N02201	50/12 [345/83]		Plate, Sheet, & Strip	99.0Ni-Low C
41	41	ASTM/ASME	B/SB-163	—	N02200	55/15 [380/105]		Seamless Tube	99.0Ni
41	41	ASTM/ASME	B/SB-163	—	N02201	50/12 [345/83]		Seamless Tube	99.0Ni-Low C
41	41	ASTM/ASME	B/SB-366	—	N02200	55/15 [380/105]		Fittings	99.0Ni
41	41	ASTM/ASME	B/SB-366	—	N02201	50/10 [345/69]		Fittings	99.0Ni-Low C
41	41	ASTM/ASME	B/SB-564	—	N02200	55/15 [380/105]		Forgings	99.0Ni
41	41	ASTM	B725	—	N02200	55/12 [380/83]		Welded Pipe	99.0Ni
42	42	ASTM/ASME	B/SB-127	—	N04400	70/28 [485/195]		Plate, Sheet, & Strip	67Ni-30Cu
42	42	ASTM/ASME	B/SB-163	—	N04400	70/28 [485/195]		Seamless Tube	67Ni-30Cu
42	42	ASTM/ASME	B/SB-164	—	N04400	70/25 [485/170]		Rod, Bar, & Wire	67Ni-30Cu
42	42	ASTM/ASME	B/SB-164	—	N04405	70/25 [485/170]		Rod, Bar, & Wire	67Ni-30Cu
42	42	ASTM/ASME	B/SB-165	—	N04400	70/25 [485/170]		Seamless Pipe & Tube	67Ni-30Cu
42	42	ASTM/ASME	B/SB-366	—	N04400	70/25 [485/170]		Fittings	67Ni-30Cu
42	42	ASTM/ASME	A/SA-494	M30C	N24130	65/32.5 [450/225]		Castings	67Ni-30Cu-2Fe-Cb
42	42	ASTM/ASME	A/SA-494	M35-1	N24135	65/25 [450/170]		Castings	67Ni-30Cu-2Fe-Cb
42	42	ASTM/ASME	A/SA-494	M35-2	N04020	65/30 [450/205]		Castings	67Ni-30Cu-Fe-Si
42	42	ASTM/ASME	B/SB-564	—	N04400	70/25 [485/170]		Forgings	67Ni-30Cu
43	43	ASTM/ASME	B/SB-163	—	N06025	98/39 [675/270]		Seamless Tube	63Ni-25Cr-10Fe-2Al-Ti-Y-Zr
43	43	ASTM/ASME	B/SB-163	—	N06600	80/35 [550/240]		Seamless Tube	72Ni-15Cr-8Fe
43	43	ASTM/ASME	B/SB-163	—	N06601	80/30 [550/205]		Seamless Tube	60Ni-23Cr-12Fe-Al
43	43	ASTM/ASME	B/SB-163	—	N06690	85/35 [585/240]		Seamless Tube	58Ni-29Cr-9Fe
43	43	ASTM/ASME	B/SB-166	—	N06025	98/39 [675/270]		Rod, Bar, & Wire	63Ni-25Cr-10Fe-2Al-Ti-Y-Zr
43	43	ASTM/ASME	B/SB-166	—	N06600	80/35 [550/240]		Rod, Bar, & Wire	72Ni-15Cr-8Fe
43	43	ASTM/ASME	B/SB-166	—	N06601	80/30 [550/205]		Rod, Bar, & Wire	60Ni-23Cr-12Fe-Al

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Nickel and Nickel Base Alloys</b>									
43	46	ASTM/ASME	B/SB-166	—	N06617	—	95/35 [655/240]	Rod, Bar, & Wire	52Ni-22Cr-13Co-9Mo
43	43	ASTM/ASME	B/SB-166	—	N06690	—	85/35 [585/240]	Rod, Bar, & Wire	58Ni-29Cr-9Fe
43	43	ASTM/ASME	B/SB-167	—	N06025	—	98/39 [675/270]	Seamless Pipe & Tube	63Ni-25Cr-10Fe-2Al-Ti-Y-Zr
43	43	ASTM/ASME	B/SB-167	—	N06600	—	75/25 [515/170]	Seamless Pipe & Tube	72Ni-15Cr-8Fe
43	43	ASTM/ASME	B/SB-167	—	N06601	—	80/30 [550/205]	Seamless Pipe & Tube	60Ni-23Cr-12Fe-Al
43	46	ASTM/ASME	B/SB-167	—	N06617	—	95/35 [655/240]	Seamless Pipe & Tube	52Ni-22Cr-13Co-9Mo
43	43	ASTM/ASME	B/SB-167	—	N06690	—	75/25 [515/175]	Seamless Pipe & Tube	58Ni-29Cr-9Fe
43	43	ASTM/ASME	B/SB-168	—	N06025	—	98/39 [675/270]	Plate, Sheet, & Strip	63Ni-25Cr-10Fe-2Al-Ti-Y-Zr
43	43	ASTM/ASME	B/SB-168	—	N06600	—	80/35 [550/240]	Plate, Sheet, & Strip	72Ni-15Cr-8Fe
43	43	ASTM/ASME	B/SB-168	—	N06601	—	80/30 [550/205]	Plate, Sheet, & Strip	60Ni-23Cr-12Fe-Al
43	46	ASTM/ASME	B/SB-168	—	N06617	—	95/35 [655/240]	Plate, Sheet, & Strip	52Ni-22Cr-13Co-9Mo
43	43	ASTM/ASME	B/SB-168	—	N06690	—	85/35 [585/240]	Plate, Sheet, & Strip	58Ni-29Cr-9Fe
43	43	ASTM/ASME	B/SB-366	—	N06002	—	100/40 [690/275]	Fittings	47Ni-22Cr-18Fe-9Mo
43	44	ASTM/ASME	B/SB-366	—	N06022	—	100/45 [690/310]	Fittings	55Ni-21Cr-13.5Mo
43	43	ASTM/ASME	B/SB-366	—	N06025	—	98/39 [675/270]	Fittings	63Ni-25Cr-10Fe-2Al-Ti-Y-Zr
43	43	ASTM/ASME	B/SB-366	—	N06035	—	85/35 [585/240]	Fittings	58Ni-33Cr-8Mo
43	43	ASTM/ASME	B/SB-366	—	N06059	—	100/45 [690/310]	Fittings	59Ni-23Cr-16Mo
43	43	ASTM/ASME	B/SB-366	—	N06200	—	100/45 [690/310]	Fittings	59Ni-23Cr-16Mo-1.6Cu
43	43	ASTM/ASME	B/SB-366	—	N06210	—	100/45 [690/310]	Fittings	60Ni-19Cr-19Mo-1.8Ta
43	43	ASTM/ASME	B/SB-366	—	N06230	—	110/45 [760/310]	Fittings	53Ni-22Cr-14W-Co-Fe-Mo
43	43	ASTM/ASME	B/SB-366	—	N06455	—	100/40 [690/275]	Fittings	61Ni-15Mo-16Cr
43	43	ASTM/ASME	B/SB-366	—	N06600	—	80/35 [550/240]	Fittings	72Ni-15Cr-8Fe
43	43	ASTM/ASME	B/SB-366	—	N06603	—	94/43 [650/295]	Fittings	62Ni-25Cr-9Fe-3Al-Cu-Ti-Zr
43	43	ASTM/ASME	B/SB-366	—	N06625	—	110/55 [760/380]	Fittings	60Ni-22Cr-9Mo-3.5Cb
43	43	ASTM/ASME	B/SB-366	—	N10276	—	100/41 [690/285]	Fittings	54Ni-16Mo-15Cr
43	43	ASTM/ASME	B/SB-435	—	N06002	—	95/35 [655/240]	Plate, Sheet, & Strip	47Ni-22Cr-9Mo-18Fe
43	43	ASTM/ASME	B/SB-435	—	N06230	—	110/45 [760/310]	Plate, Sheet, & Strip	53Ni-22Cr-14W-Co-Fe-Mo
43	43	ASTM/ASME	B/SB-443	1	N06625	—	110/55 [760/380]	Plate, Sheet, & Strip	60Ni-22Cr-9Mo-3.5Cb
43	43	ASTM/ASME	B/SB-443	2	N06625	—	100/40 [690/275]	Plate, Sheet, & Strip	60Ni-22Cr-9Mo-3.5Cb

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
43	43	ASTM/ASME	B/SB-444	1	N06625	120/60	[825/415]	Seamless Pipe & Tube	60Ni-22Cr-9Mo-3.5Cb
43	43	ASTM/ASME	B/SB-444	2	N06625	100/40	[690/275]	Seamless Pipe & Tube	60Ni-22Cr-9Mo-3.5Cb
43	43	ASTM/ASME	B/SB-446	1	N06625	120/60	[825/415]	Rod & Bar	60Ni-22Cr-9Mo-3.5Cb
43	43	ASTM/ASME	B/SB-446	2	N06625	100/40	[690/275]	Rod & Bar	60Ni-22Cr-9Mo-3.5Cb
43	44	ASTM/ASME	B/SB-462	—	N06022	100/45	[690/310]	Forgings	55Ni-21Cr-13.5Mo
43	43	ASTM/ASME	B/SB-462	—	N06035	85/35	[585/240]	Forgings	58Ni-33Cr-8Mo
43	43	ASTM/ASME	B/SB-462	—	N06059	100/45	[690/310]	Forgings	59Ni-23Cr-16Mo
43	43	ASTM/ASME	B/SB-462	—	N06200	100/45	[690/310]	Forgings	59Ni-23Cr-16Mo-1.6Cu
43	43	ASTM/ASME	B/SB-462	—	N06686	100/45	[690/310]	Forgings	58Ni-21Cr-16Mo-3.5N
43	43	ASTM/ASME	B/SB-462	—	N10276	100/41	[690/285]	Forgings	54Ni-16Mo-15Cr
43	43	ASTM/ASME	A/SA-494	CW2M	N26455	72/40	[495/275]	Castings	66Ni-16Mo-16Cr-Fe-W
43	43	ASTM/ASME	A/SA-494	CW6MC	N26625	70/40	[485/275]	Castings	60Ni-21.5Cr-9Mo-4Cb-Fe
43	44	ASTM/ASME	A/SA-494	CX2MW	N26022	80/45	[550/310]	Castings	59Ni-22Cr-14Mo-4Fe-3W
43	43	ASTM/ASME	A/SA-494	CY40	N06040	70/28	[485/195]	Castings	72Ni-15Cr-8Fe-Si
43	43	ASTM/ASME	B/SB-516	—	N06025	98/39	[675/270]	Welded Tube	63Ni-25Cr-10Fe-2Al-Ti-Y-Zr
43	43	ASTM/ASME	B/SB-516	—	N06600	80/35	[550/240]	Welded Tube	72Ni-15Cr-8Fe
43	43	ASTM/ASME	B/SB-516	—	N06603	94/43	[650/295]	Welded Tube	62Ni-25Cr-9Fe-3Al-Cu-Ti-Zr
43	43	ASTM/ASME	B/SB-517	—	N06025	98/39	[675/270]	Welded Pipe	63Ni-25Cr-10Fe-2Al-Ti-Y-Zr
43	43	ASTM/ASME	B/SB-517	—	N06600	80/35	[550/240]	Welded Pipe	72Ni-15Cr-8Fe
43	43	ASTM/ASME	B/SB-517	—	N06603	94/43	[650/295]	Welded Pipe	62Ni-25Cr-9Fe-3Al-Cu-Ti-Zr
43	44	ASTM/ASME	B/SB-564	—	N06022	100/45	[690/310]	Forgings	55Ni-21Cr-13.5Mo
43	43	ASTM/ASME	B/SB-564	—	N06025	98/39	[675/270]	Forgings	63Ni-25Cr-10Fe-2Al-Ti-Y-Zr
43	43	ASTM/ASME	B/SB-564	—	N06025	>4 and ≤12	[>100 and ≤305]	Forgings	63Ni-25Cr-10Fe-2Al-Ti-Y-Zr
43	43	ASTM/ASME	B/SB-564	—	N06035	85/35	[585/240]	Forgings	58Ni-33Cr-8Mo
43	43	ASTM/ASME	B/SB-564	—	N06059	100/45	[690/310]	Forgings	59Ni-23Cr-16Mo
43	43	ASTM/ASME	B/SB-564	—	N06110	90/40	[620/275]	Forgings	51Ni-30Cr-10Mo-W
43	43	ASTM/ASME	B/SB-564	—	N06110	95/45	[655/310]	Forgings	51Ni-30Cr-10Mo-W

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]		Product Form	Nominal Composition
							Strength, ksi [MPa]	Strength, ksi [MPa]		
<b>Nickel and Nickel Base Alloys</b>										
43	43	ASTM/ASME	B/SB-564	—	N06200		100/45 [690/310]		Forgings	59Ni-23Cr-16Mo-1.6Cu
43	43	ASTM/ASME	B/SB-564	—	N06210		100/45 [690/310]		Forgings	60Ni-19Cr-19Mo-1.8Ta
43	43	ASTM/ASME	B/SB-564	—	N06230		110/45 [760/310]		Forgings	53Ni-22Cr-14W-Co-Fe-Mo
43	43	ASTM/ASME	B/SB-564	—	N06600		80/35 [550/240]		Forgings	72Ni-15Cr-8Fe
43	43	ASTM/ASME	B/SB-564	—	N06603		94/43 [650/295]		Forgings	62Ni-25Cr-9Fe-3Al-Cu-Ti-Zr
43	46	ASTM/ASME	B/SB-564	—	N06617		95/35 [655/240]		Forgings	52Ni-22Cr-13Co-9Mo
43	43	ASTM/ASME	B/SB-564	—	N06625	>4 and ≤10 >102 and ≤254	110/50 [760/345]		Forgings	60Ni-22Cr-9Mo-3.5Cb
43	43	ASTM/ASME	B/SB-564	—	N06625	≤4 [≤102]	120/60 [825/415]		Forgings	60Ni-22Cr-9Mo-3.5Cb
43	43	ASTM/ASME	B/SB-564	—	N06686		100/45 [690/310]		Forgings	58Ni-21Cr-16Mo-3.5W
43	43	ASTM/ASME	B/SB-564	—	N06690		85/35 [585/240]		Forgings	58Ni-29Cr-9Fe
43	43	ASTM/ASME	B/SB-564	—	N10276		100/41 [690/285]		Forgings	54Ni-16Mo-15Cr
43	43	ASTM/ASME	B/SB-572	—	N06002		95/35 [655/240]		Rod	47Ni-22Cr-9Mo-18Fe
43	43	ASTM/ASME	B/SB-572	—	N06230		110/45 [760/310]		Rod	53Ni-22Cr-14W-Co-Fe-Mo
43	44	ASTM/ASME	B/SB-574	—	N06022		100/45 [690/310]		Rod	55Ni-21Cr-13.5Mo
43	43	ASTM/ASME	B/SB-574	—	N06035		85/35 [585/240]		Rod	58Ni-33Cr-8Mo
43	43	ASTM/ASME	B/SB-574	—	N06059		100/45 [690/310]		Rod	59Ni-23Cr-16Mo
43	43	ASTM/ASME	B/SB-574	—	N06200		100/45 [690/310]		Rod	59Ni-23Cr-16Mo-1.6Cu
43	43	ASTM/ASME	B/SB-574	—	N06210		100/45 [690/310]		Rod	60Ni-19Cr-19Mo-1.8Ta
43	43	ASTM/ASME	B/SB-574	—	N06455		100/40 [690/275]		Rod	61Ni-16Mo-16Cr
43	43	ASTM/ASME	B/SB-574	—	N06686		100/45 [690/310]		Rod	58Ni-21Cr-16Mo-3.5W
43	43	ASTM/ASME	B/SB-574	—	N10276		100/41 [690/285]		Rod	54Ni-16Mo-15Cr
43	44	ASTM/ASME	B/SB-575	—	N06022		100/45 [690/310]		Plate, Sheet, & Strip	55Ni-21Cr-13.5Mo
43	43	ASTM/ASME	B/SB-575	—	N06035		85/35 [585/240]		Plate, Sheet, & Strip	58Ni-33Cr-8Mo
43	43	ASTM/ASME	B/SB-575	—	N06059		100/45 [690/310]		Plate, Sheet, & Strip	59Ni-23Cr-16Mo
43	43	ASTM/ASME	B/SB-575	—	N06200		100/45 [690/310]		Plate, Sheet, & Strip	59Ni-23Cr-16Mo-1.6Cu
43	43	ASTM/ASME	B/SB-575	—	N06210		100/45 [690/310]		Plate, Sheet, & Strip	60Ni-19Cr-19Mo-1.8Ta
43	43	ASTM/ASME	B/SB-575	—	N06200		100/45 [690/310]		Plate, Sheet, & Strip	59Ni-23Cr-16Mo-1.6Cu
43	43	ASTM/ASME	B/SB-575	—	N06210		100/45 [690/310]		Plate, Sheet, & Strip	60Ni-19Cr-19Mo-1.8Ta
43	43	ASTM/ASME	B/SB-575	—	N06455		100/40 [690/275]		Plate, Sheet, & Strip	61Ni-16Mo-16Cr
43	43	ASTM/ASME	B/SB-575	—	N06686		100/45 [690/310]		Plate, Sheet, & Strip	58Ni-21Cr-16Mo-3.5W

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]		Product Form	Nominal Composition
							Strength, ksi [MPa]	Strength, ksi [MPa]		
<b>Nickel and Nickel Base Alloys</b>										
43	43	ASTM/ASME	B/SB-575	—	N10276	100/41	[690/285]		Plate, Sheet, & Strip	54Ni-16Mo-15Cr
43	43	ASTM/ASME	B/SB-619	—	N06002	100/40	[690/275]		Welded Pipe	47Ni-22Cr-9Mo-18Fe
43	44	ASTM/ASME	B/SB-619	—	N06022	100/45	[690/310]		Welded Pipe	55Ni-21Cr-13.5Mo
43	43	ASTM/ASME	B/SB-619	—	N06035	85/35	[585/240]		Welded Pipe	58Ni-33Cr-8Mo
43	43	ASTM/ASME	B/SB-619	—	N06059	100/45	[690/310]		Welded Pipe	59Ni-23Cr-16Mo
43	43	ASTM/ASME	B/SB-619	—	N06200	100/45	[690/310]		Welded Pipe	59Ni-23Cr-16Mo-1.6Cu
43	43	ASTM/ASME	B/SB-619	—	N06210	100/45	[690/310]		Welded Pipe	60Ni-19Cr-19Mo-1.8Ta
43	43	ASTM/ASME	B/SB-619	—	N06230	110/45	[760/310]		Welded Pipe	53Ni-22Cr-14W-Co-Fe-Mo
43	43	ASTM/ASME	B/SB-619	—	N06455	100/40	[690/275]		Welded Pipe	61Ni-16Mo-16Cr
43	43	ASTM/ASME	B/SB-619	—	N06686	100/45	[690/310]		Welded Pipe	58Ni-21Cr-16Mo-3.5W
43	43	ASTM/ASME	B/SB-619	—	N10276	100/41	[690/285]		Welded Pipe	54Ni-16Mo-15Cr
43	43	ASTM/ASME	B/SB-622	—	N06002	100/40	[690/275]		Seamless Pipe & Tube	47Ni-22Cr-9Mo-18Fe
43	44	ASTM/ASME	B/SB-622	—	N06022	100/45	[690/310]		Seamless Pipe & Tube	55Ni-21Cr-13.5Mo
43	43	ASTM/ASME	B/SB-622	—	N06035	85/35	[585/240]		Seamless Pipe & Tube	58Ni-33Cr-8Mo
43	43	ASTM/ASME	B/SB-622	—	N06059	100/45	[690/310]		Seamless Pipe & Tube	59Ni-23Cr-16Mo
43	43	ASTM/ASME	B/SB-622	—	N06060	90/35	[620/240]		Seamless Pipe & Tube	57Ni-21Cr-13Mo-6Fe-Cu-(Cb+Ta)
43	43	ASTM/ASME	B/SB-622	—	N06200	100/45	[690/310]		Seamless Pipe & Tube	59Ni-23Cr-16Mo-1.6Cu
43	43	ASTM/ASME	B/SB-622	—	N06210	100/45	[690/310]		Seamless Pipe & Tube	60Ni-19Cr-19Mo-1.8Ta
43	43	ASTM/ASME	B/SB-622	—	N06230	110/45	[760/310]		Seamless Pipe & Tube	53Ni-22Cr-14W-Co-Fe-Mo
43	43	ASTM/ASME	B/SB-622	—	N06250	90/35	[620/240]		Seamless Pipe & Tube	52Ni-21Cr-13Fe-11Mo-W-Cu
43	43	ASTM/ASME	B/SB-622	—	N06255	85/32	[585/220]		Seamless Pipe & Tube	50Ni-24Cr-17Fe-7Mo-W
43	43	ASTM/ASME	B/SB-622	—	N06455	100/40	[690/275]		Seamless Pipe & Tube	61Ni-16Mo-16Cr
43	43	ASTM/ASME	B/SB-622	—	N06686	100/45	[690/310]		Seamless Pipe & Tube	58Ni-21Cr-16Mo-3.5W
43	43	ASTM/ASME	B/SB-622	—	N10276	100/41	[690/285]		Seamless Pipe & Tube	54Ni-16Mo-15Cr
43	43	ASTM/ASME	B/SB-626	—	N06002	100/40	[690/275]		Welded Tube	47Ni-22Cr-9Mo-18Fe
43	44	ASTM/ASME	B/SB-626	—	N06022	100/45	[690/310]		Welded Tube	55Ni-21Cr-13.5Mo
43	43	ASTM/ASME	B/SB-626	—	N06035	85/35	[585/240]		Welded Tube	58Ni-33Cr-8Mo
43	43	ASTM/ASME	B/SB-626	—	N06059	100/45	[690/310]		Welded Tube	59Ni-23Cr-16Mo
43	43	ASTM/ASME	B/SB-626	—	N06200	100/45	[690/310]		Welded Tube	59Ni-23Cr-16Mo-1.6Cu

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
43	43	ASTM/ASME	B/SB-626	—	N06210		100/45 [690/310]	Welded Tube	60Ni-19Cr-19Mo-1.8Ta
43	43	ASTM/ASME	B/SB-626	—	N06230		110/45 [760/310]	Welded Tube	53Ni-22Cr-14W-Co-Fe-Mo
43	43	ASTM/ASME	B/SB-626	—	N06455		100/40 [690/275]	Welded Tube	61Ni-16Mo-16Cr
43	43	ASTM/ASME	B/SB-626	—	N06686		100/45 [690/310]	Welded Tube	58Ni-21Cr-16Mo-3.5W
43	43	ASTM/ASME	B/SB-626	—	N10276		100/41 [690/285]	Welded Tube	54Ni-16Mo-15Cr
43	43	ASTM/ASME	B/SB-704	—	N06625		120/60 [825/415]	Welded Tube	60Ni-22Cr-9Mo-3.5Cb
43	43	ASTM/ASME	B/SB-705	—	N06625		120/60 [825/415]	Welded Pipe	60Ni-22Cr-9Mo-3.5Cb
43	43	ASTM	B755	—	N06110		95/45 [655/310]	Plate, Sheet, & Strip	51Ni-30Cr-10Mo-W
43	43	ASTM	B756	—	N06110	>4 and ≤10 >102 and ≤254]	90/40 [620/275]	Rod & Bar	51Ni-30Cr-10Mo-W
43	43	ASTM	B756	—	N06110	≤4 [≤102]	95/45 [655/310]	Rod & Bar	51Ni-30Cr-10Mo-W
43	43	ASTM	B757	—	N06110		95/45 [655/310]	Welded Pipe	51Ni-30Cr-10Mo-W
43	43	ASTM	B758	—	N06110		95/45 [655/310]	Welded Tube	51Ni-30Cr-10Mo-W
43	43	ASTM	B759	—	N06110		95/45 [655/310]	Seamless Pipe & Tube	51Ni-30Cr-10Mo-W
44	44	ASTM/ASME	B/SB-333	—	N10001	<0.1875 [ $\leq$ 48]	115/50 [795/345]	Plate, Sheet, & Strip	62Ni-28Mo-5Fe
44	44	ASTM/ASME	B/SB-333	—	N10001	≥0.1875 and ≤2.5 [≥4.8 and ≤64]	100/45 [690/310]	Plate, Sheet, & Strip	62Ni-28Mo-5Fe
44	44	ASTM/ASME	B/SB-333	—	N10624		104/46 [715/315]	Plate, Sheet, & Strip	60Ni-23Mo-8Cr-6.5Fe
44	44	ASTM/ASME	B/SB-333	—	N10629		110/51 [760/350]	Plate, Sheet, & Strip	66Ni-28Mo-3Fe-1.3Cr-0.25Al
44	44	ASTM/ASME	B/SB-333	—	N10665		110/51 [760/350]	Plate, Sheet, & Strip	65Ni-28Mo-2Fe
44	44	ASTM/ASME	B/SB-333	—	N10675		110/51 [760/350]	Plate, Sheet, & Strip	65Ni-29.5Mo-2Fe-2Cr
44	44	ASTM/ASME	B/SB-335	—	N10001	>1.5 and ≤3.5 [>38 and ≤89]	100/46 [690/315]	Rod	62Ni-28Mo-5Fe
44	44	ASTM/ASME	B/SB-335	—	N10001	≥0.3125 and ≤1.5 [≥8 and ≤38]	115/46 [795/315]	Rod	62Ni-28Mo-5Fe
44	44	ASTM/ASME	B/SB-335	—	N10624		104/46 [715/315]	Rod	60Ni-23Mo-8Cr-6.5Fe
44	44	ASTM/ASME	B/SB-335	—	N10629		110/51 [760/350]	Rod	66Ni-28Mo-3Fe-1.3Cr-0.25Al
44	44	ASTM/ASME	B/SB-335	—	N10665		110/51 [760/350]	Rod	65Ni-28Mo-2Fe
44	44	ASTM/ASME	B/SB-335	—	N10675		110/51 [760/350]	Rod	65Ni-29.5Mo-2Fe-2Cr

(Continued)



**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]		Product Form	Nominal Composition
							Strength, ksi [MPa]	Strength, ksi [MPa]		
<b>Nickel and Nickel Base Alloys</b>										
44	44	ASTM/ASME	B/SB-366	—	N10001	—	100/45 [690/310]	—	Fittings	62Ni-28Mo-5Fe
44	44	ASTM/ASME	B/SB-366	—	N10003	—	100/40 [690/275]	—	Fittings	70Ni-16Mo-7Cr-5Fe
44	44	ASTM/ASME	B/SB-366	—	N10242	—	105/45 [725/310]	—	Fittings	62Ni-25Mo-8Cr-2Fe
44	44	ASTM/ASME	B/SB-366	—	N10624	—	104/46 [715/315]	—	Fittings	60Ni-23Mo-8Cr-6.5Fe
44	44	ASTM/ASME	B/SB-366	—	N10629	—	110/51 [760/350]	—	Fittings	66Ni-28Mo-3Fe-1.3Cr-0.25Al
44	44	ASTM/ASME	B/SB-366	—	N10665	—	110/51 [760/350]	—	Fittings	65Ni-28Mo-2Fe
44	44	ASTM/ASME	B/SB-366	—	N10675	—	110/51 [760/350]	—	Fittings	65Ni-29.5Mo-2Fe-2Cr
44	44	ASTM/ASME	B/SB-434	—	N10003	—	100/40 [690/275]	—	Plate, Sheet, & Strip	70Ni-16Mo-7Cr-5Fe
44	44	ASTM/ASME	B/SB-434	—	N10242	—	105/45 [725/310]	—	Plate, Sheet, & Strip	62Ni-25Mo-8Cr-2Fe
44	44	ASTM/ASME	B/SB-462	—	N10629	—	110/51 [760/350]	—	Forgings	66Ni-28Mo-3Fe-1.3Cr-0.25Al
44	44	ASTM/ASME	B/SB-462	—	N10665	—	110/51 [760/350]	—	Forgings	65Ni-28Mo-2Fe
44	44	ASTM/ASME	B/SB-462	—	N10675	—	110/51 [760/350]	—	Forgings	65Ni-29.5Mo-2Fe-2Cr
44	44	ASTM/ASME	A/SA-494	CW6M	N30107	—	72/40 [495/275]	—	Castings	56Ni-19Mo-18Cr-2Fe
44	44	ASTM/ASME	A/SA-494	N7M	N30007	—	76/40 [525/275]	—	Castings	65Ni-31.5Mo-1.5Fe-Cr
44	44	ASTM/ASME	B/SB-564	—	N10242	—	105/45 [725/310]	—	Forgings	62Ni-25Mo-8Cr-2Fe
44	44	ASTM/ASME	B/SB-564	—	N10624	—	104/46 [715/315]	—	Forgings	60Ni-23Mo-8Cr-6.5Fe
44	44	ASTM/ASME	B/SB-564	—	N10629	—	110/51 [760/350]	—	Forgings	66Ni-28Mo-3Fe-1.3Cr-0.25Al
44	44	ASTM/ASME	B/SB-564	—	N10665	—	110/51 [760/350]	—	Forgings	65Ni-28Mo-2Fe
44	44	ASTM/ASME	B/SB-564	—	N10675	—	110/51 [760/350]	—	Forgings	65Ni-29.5Mo-2Fe-2Cr
44	44	ASTM/ASME	B/SB-573	—	N10003	—	100/40 [690/275]	—	Rod	70Ni-16Mo-7Cr-5Fe
44	44	ASTM/ASME	B/SB-573	—	N10242	—	105/45 [725/310]	—	Rod	62Ni-25Mo-8Cr-2Fe
44	44	ASTM/ASME	B/SB-619	—	N10001	—	100/45 [690/310]	—	Welded Pipe	62Ni-28Mo-5Fe
44	44	ASTM/ASME	B/SB-619	—	N10242	—	105/45 [725/310]	—	Welded Pipe	62Ni-25Mo-8Cr-2Fe
44	44	ASTM/ASME	B/SB-619	—	N10624	—	104/46 [715/315]	—	Welded Pipe	60Ni-23Mo-8Cr-6.5Fe
44	44	ASTM/ASME	B/SB-619	—	N10629	—	110/51 [760/350]	—	Welded Pipe	66Ni-28Mo-3Fe-1.3Cr-0.25Al
44	44	ASTM/ASME	B/SB-619	—	N10665	—	110/51 [760/350]	—	Welded Pipe	65Ni-28Mo-2Fe
44	44	ASTM/ASME	B/SB-619	—	N10675	—	110/51 [760/350]	—	Welded Pipe	65Ni-29.5Mo-2Fe-2Cr
44	44	ASTM/ASME	B/SB-622	—	N10001	—	100/45 [690/310]	—	Seamless Pipe & Tube	62Ni-28Mo-5Fe
44	44	ASTM/ASME	B/SB-622	—	N10242	—	105/45 [725/310]	—	Seamless Pipe & Tube	62Ni-25Mo-8Cr-2Fe

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
44	44	ASTM/ASME	B/SB-622	—	N10624	104/46 [715/315]	104/46 [715/315]	Seamless Pipe & Tube	60Ni-23Mo-8Cr-7Fe
44	44	ASTM/ASME	B/SB-622	—	N10629	110/51 [760/350]	110/51 [760/350]	Seamless Pipe & Tube	66Ni-28Mo-3Fe-1.3Cr-0.25Al
44	44	ASTM/ASME	B/SB-622	—	N10665	110/51 [760/350]	110/51 [760/350]	Seamless Pipe & Tube	65Ni-28Mo-2Fe
44	44	ASTM/ASME	B/SB-622	—	N10675	110/51 [760/350]	110/51 [760/350]	Seamless Pipe & Tube	65Ni-29.5Mo-2Fe-2Cr
44	44	ASTM/ASME	B/SB-626	—	N10001	100/45 [690/310]	100/45 [690/310]	Welded Tube	62Ni-28Mo-5Fe
44	44	ASTM/ASME	B/SB-626	—	N10242	105/45 [725/310]	105/45 [725/310]	Welded Tube	62Ni-25Mo-8Cr-2Fe
44	44	ASTM/ASME	B/SB-626	—	N10624	104/46 [715/315]	104/46 [715/315]	Welded Tube	60Ni-23Mo-8Cr-6.5Fe
44	44	ASTM/ASME	B/SB-626	—	N10629	110/51 [760/350]	110/51 [760/350]	Welded Tube	66Ni-28Mo-3Fe-1.3Cr-0.25Al
44	44	ASTM/ASME	B/SB-626	—	N10665	110/51 [760/350]	110/51 [760/350]	Welded Tube	65Ni-28Mo-2Fe
44	44	ASTM/ASME	B/SB-626	—	N10675	110/51 [760/350]	110/51 [760/350]	Welded Tube	65Ni-29.5Mo-2Fe-2Cr
44	43	AMS	5711	—	N06635	185/120 [1275/825]	185/120 [1275/825]	Sheet	62Ni-16Cr-15Mo-3Fe-2Co-1W-Mn-Si-Al
45	45	ASTM/ASME	B/SB-163	—	N08120	90/40 [620/275]	90/40 [620/275]	Seamless Tube	37Ni-33Fe-25Cr
45	45	ASTM/ASME	B/SB-163	—	N08800	75/30 [515/205]	75/30 [515/205]	Seamless Tube	33Ni-42Fe-21Cr
45	45	ASTM/ASME	B/SB-163	—	N08801	65/25 [450/170]	65/25 [450/170]	Seamless Tube	32Ni-45Fe-20.5Cr-Ti
45	45	ASTM/ASME	B/SB-163	—	N08810	65/25 [450/170]	65/25 [450/170]	Seamless Tube	33Ni-42Fe-21Cr
45	45	ASTM/ASME	B/SB-163	—	N08811	65/25 [450/170]	65/25 [450/170]	Seamless Tube	33Ni-42Fe-21Cr-Al-Ti
45	45	ASTM/ASME	B/SB-163	—	N08825	85/35 [585/240]	85/35 [585/240]	Seamless Tube	42Ni-21.5Cr-3Mo-2.3Cu
45	8.2	ASTM	A182	F904L	N08904	71/31 [490/215]	71/31 [490/215]	Forgings	44Fe-25Ni-21Cr-Mo
45	8.2	ASTM	A240	—	N08367	<0.1875 [<5]	100/45 [690/310]	Sheet & Strip	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM	A240	—	N08367	≥0.1875 [≥5]	95/45 [655/310]	Plate	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM	A240	904L	N08904	71/31 [490/215]	71/31 [490/215]	Plate, Sheet, & Strip	44Fe-25Ni-21Cr-Mo
45	8.2	ASTM	A249	—	N08367	≤0.1875 [≤5]	100/45 [690/310]	Welded Tube	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM	A249	—	N08367	>0.1875 [>5]	95/45 [655/310]	Welded Tube	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	A/SA-249	—	N08904	71/31 [490/215]	71/31 [490/215]	Welded Tube	44Fe-25Ni-21Cr-Mo
45	8.2	ASTM	A312	—	N08904	71/31 [490/215]	71/31 [490/215]	Seamless & Welded Pipe	44Fe-25Ni-21Cr-Mo
45	8.2	ASTM	A312	N08367	N08367	>0.1875 [>5]	95/45 [655/310]	Seamless & Welded Pipe	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM	A312	N08367	N08367	≤0.1875 [≤5]	100/45 [690/310]	Seamless & Welded Pipe	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	A/SA-351	CN7M	N08007	62/25 [425/170]	62/25 [425/170]	Castings	28Ni-19Cr-Cu-Mo

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
45	45	ASTM/ASME	A/SA-351	CT15C	N08151		63/25 [435/170]	Castings	32Ni-45Fe-20Cr-Cb
45	8.2	ASTM	A358	N08367	N08367	≤0.1875 [≤5]	100/45 [690/310]	Fusion Welded Pipe	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM	A358	N08367	N08367	>0.1875 [>5]	95/45 [655/310]	Fusion Welded Pipe	46Fe-24Ni-21Cr-6Mo-Cu-N
45	43	ASTM/ASME	B/SB-366	—	N06007		90/35 [620/240]	Fittings	47Ni-22Cr-19Fe-6Mo
45	45	ASTM/ASME	B/SB-366	—	N06030		85/35 [585/240]	Fittings	40Ni-29Cr-15Fe-5Mo
45	45	ASTM/ASME	B/SB-366	—	N06985		90/35 [620/240]	Fittings	47Ni-22Cr-20Fe-7Mo
45	45	ASTM/ASME	B/SB-366	—	N08020		80/35 [550/240]	Fittings	35Ni-35Fe-20Cr-Cb
45	45	ASTM/ASME	B/SB-366	—	N08031		94/40 [650/275]	Fittings	31Ni-31Fe-27Cr-7Mo
45	45	ASTM/ASME	B/SB-366	—	N08120		90/40 [620/275]	Fittings	37Ni-33Fe-25Cr
45	8.2	ASTM/ASME	B/SB-366	—	N08367	≤0.1875 [≤4.8]	100/45 [690/310]	Fittings	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-366	—	N08367	>0.1875 [>4.8]	95/45 [655/310]	Fittings	46Fe-24Ni-21Cr-6Mo-Cu-N
45	45	ASTM/ASME	B/SB-366	—	N08800		75/30 [515/205]	Fittings	33Ni-42Fe-21Cr
45	45	ASTM/ASME	B/SB-366	—	N08810		65/25 [450/170]	Fittings	33Ni-42Fe-21Cr
45	45	ASTM/ASME	B/SB-366	—	N08811		65/25 [450/170]	Fittings	33Ni-42Fe-21Cr-Al-Ti
45	45	ASTM/ASME	B/SB-366	—	N08825		85/35 [585/240]	Fittings	42Ni-21.5Cr-3Mo-2.3Cu
45	8.2	ASTM/ASME	B/SB-366	—	N08904		71/31 [490/215]	Fittings	44Fe-25Ni-21Cr-Mo
45	8.2	ASTM/ASME	B/SB-366	—	N08925		87/43 [600/295]	Fittings	25Ni-20Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-366	—	N08926		94/43 [650/295]	Fittings	25Ni-20Cr-6Mo-Cu-N
45	45	ASTM/ASME	B/SB-366	—	R20033		109/55 [750/380]	Fittings	33Cr-31Ni-32Fe-1.5Mo-0.6Cu-N
45	45	ASTM/ASME	B/SB-366	—	R30556		100/45 [690/310]	Fittings	21Ni-30Fe-22Cr-18Co-3Mo-3W
45	45	ASTM/ASME	B/SB-407	—	N08120		90/40 [620/275]	Seamless Pipe & Tube	37Ni-33Fe-25Cr
45	45	ASTM/ASME	B/SB-407	—	N08800		75/30 [515/205]	Seamless Pipe & Tube	33Ni-42Fe-21Cr
45	45	ASTM/ASME	B/SB-407	—	N08801		65/25 [450/170]	Seamless Pipe & Tube	32Ni-45Fe-20.5Cr-Ti
45	45	ASTM/ASME	B/SB-407	—	N08810		65/25 [450/170]	Seamless Pipe & Tube	33Ni-42Fe-21Cr
45	45	ASTM/ASME	B/SB-407	—	N08811		65/25 [450/170]	Seamless Pipe & Tube	33Ni-42Fe-21Cr-Al-Ti
45	45	ASTM/ASME	B/SB-408	—	N08120		90/40 [620/275]	Rod & Bar	37Ni-33Fe-25Cr
45	45	ASTM/ASME	B/SB-408	—	N08800		75/30 [515/205]	Rod & Bar	33Ni-42Fe-21Cr

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]		Product Form	Nominal Composition
							Strength, ksi [MPa]	Strength, ksi [MPa]		
<b>Nickel and Nickel Base Alloys</b>										
45	45	ASTM/ASME	B/SB-408	—	N08810	—	65/25 [450/170]	—	Rod & Bar	33Ni-42Fe-21Cr
45	45	ASTM/ASME	B/SB-408	—	N08811	—	65/25 [450/170]	—	Rod & Bar	33Ni-42Fe-21Cr-Al-Ti
45	45	ASTM/ASME	B/SB-409	—	N08120	—	90/40 [620/275]	—	Plate, Sheet, & Strip	37Ni-33Fe-25Cr
45	45	ASTM/ASME	B/SB-409	—	N08800	—	75/30 [515/205]	—	Plate, Sheet, & Strip	33Ni-42Fe-21Cr
45	45	ASTM/ASME	B/SB-409	—	N08810	—	65/25 [450/170]	—	Plate, Sheet, & Strip	33Ni-42Fe-21Cr
45	45	ASTM/ASME	B/SB-409	—	N08811	—	65/25 [450/170]	—	Plate, Sheet, & Strip	33Ni-42Fe-21Cr-Al-Ti
45	45	ASTM/ASME	B/SB-423	—	N08221	—	79/34 [545/235]	—	Seamless Pipe & Tube	42Ni-21Cr-6Mo-2.3Cu
45	45	ASTM/ASME	B/SB-423	—	N08825	—	75/25 [515/170]	—	Seamless Pipe & Tube	42Ni-21.5Cr-3Mo-2.3Cu
45	45	ASTM/ASME	B/SB-424	—	N08221	—	79/34 [545/235]	—	Plate, Sheet, & Strip	42Ni-21Cr-6Mo-2.3Cu
45	45	ASTM/ASME	B/SB-424	—	N08825	—	85/35 [585/240]	—	Plate, Sheet, & Strip	42Ni-21.5Cr-3Mo-2.3Cu
45	45	ASTM/ASME	B/SB-425	—	N08221	—	79/34 [545/235]	—	Rod & Bar	42Ni-21Cr-6Mo-2.3Cu
45	45	ASTM/ASME	B/SB-425	—	N08825	—	85/35 [585/240]	—	Rod & Bar	42Ni-21.5Cr-3Mo-2.3Cu
45	45	ASTM/ASME	B/SB-435	—	R30556	—	100/45 [690/310]	—	Plate, Sheet, & Strip	21Ni-30Fe-22Cr-18Co-3Mo-3W
45	45	ASTM/ASME	B/SB-462	—	N06030	—	85/35 [585/240]	—	Forgings	40Ni-29Cr-15Fe-5Mo
45	45	ASTM/ASME	B/SB-462	—	N08020	—	80/35 [550/240]	—	Forgings	35Ni-35Fe-20Cr-Cb
45	45	ASTM/ASME	B/SB-462	—	N08024	—	80/35 [550/240]	—	Forgings	37Ni-33Fe-23Cr-4Mo
45	45	ASTM/ASME	B/SB-462	—	N08026	—	80/35 [550/240]	—	Forgings	35Ni-30Fe-24Cr-6Mo-3Cu
45	45	ASTM/ASME	B/SB-462	—	N08031	—	94/40 [650/275]	—	Forgings	31Ni-33Fe-22Cr-6.5Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-462	—	N08367	—	95/45 [655/310]	—	Forgings	46Fe-24Ni-21Cr-6Mo-Cu-N
45	45	ASTM/ASME	B/SB-462	—	R20033	—	109/55 [750/380]	—	Forgings	33Cr-31Ni-32Fe-1.5Mo-0.6Cu-N
45	45	ASTM/ASME	B/SB-463	—	N08020	—	80/35 [550/240]	—	Plate, Sheet, & Strip	35Ni-35Fe-20Cr-Cb
45	45	ASTM/ASME	B/SB-463	—	N08024	—	80/35 [550/240]	—	Plate, Sheet, & Strip	37Ni-33Fe-23Cr-4Mo
45	45	ASTM/ASME	B/SB-463	—	N08026	—	80/35 [550/240]	—	Plate, Sheet, & Strip	35Ni-30Fe-24Cr-6Mo-3Cu
45	45	ASTM/ASME	B/SB-464	—	N08020	—	80/35 [550/240]	—	Welded Pipe	35Ni-35Fe-20Cr-Cb
45	45	ASTM/ASME	B/SB-464	—	N08024	—	80/35 [550/240]	—	Welded Pipe	37Ni-33Fe-23Cr-4Mo
45	45	ASTM/ASME	B/SB-464	—	N08026	—	80/35 [550/240]	—	Welded Pipe	35Ni-30Fe-24Cr-6Mo-3Cu
45	45	ASTM/ASME	B/SB-468	—	N08020	—	80/35 [550/240]	—	Welded Tube	35Ni-35Fe-20Cr-Cb

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
45	45	ASTM/ASME	B/SB-468	—	N08024		80/35 [550/240]	Welded Tube	37Ni-33Fe-23Cr-4Mo
45	45	ASTM/ASME	B/SB-468	—	N08026		80/35 [550/240]	Welded Tube	35Ni-30Fe-24Cr-6Mo-3Cu
45	45	ASTM/ASME	B/SB-473	—	N08020		80/35 [550/240]	Bar	35Ni-35Fe-20Cr-Cb
45	45	ASTM/ASME	B/SB-473	—	N08024		80/35 [550/240]	Bar	37Ni-33Fe-23Cr-4Mo
45	45	ASTM/ASME	B/SB-473	—	N08026		80/35 [550/240]	Bar	35Ni-30Fe-24Cr-6Mo-3Cu
45	8.2	ASTM	A479	904L	N08904		71/31 [490/215]	Bars & Shapes	44Fe-25Ni-21Cr-Mo
45	45	ASTM/ASME	A/SA-494	CU5MCuC	N08826		75/35 [515/240]	Castings	42Ni-21.5Cr-3Mo-2.3Cu
45	45	ASTM/ASME	B/SB-514	—	N08120		90/40 [620/275]	Welded Pipe	37Ni-33Fe-25Cr
45	45	ASTM/ASME	B/SB-514	—	N08800		75/30 [515/205]	Welded Pipe	33Ni-42Fe-21Cr
45	45	ASTM/ASME	B/SB-514	—	N08810		65/25 [450/170]	Welded Pipe	33Ni-42Fe-21Cr
45	45	ASTM/ASME	B/SB-515	—	N08120		90/40 [620/275]	Welded Tube	37Ni-33Fe-25Cr
45	45	ASTM/ASME	B/SB-515	—	N08800		75/30 [515/205]	Welded Tube	33Ni-42Fe-21Cr
45	45	ASTM/ASME	B/SB-515	—	N08810		65/25 [450/170]	Welded Tube	33Ni-42Fe-21Cr
45	45	ASTM/ASME	B/SB-515	—	N08811		65/25 [450/170]	Welded Tube	33Ni-42Fe-21Cr-Al-Ti
45	45	ASTM/ASME	B/SB-564	—	N08031		94/40 [650/275]	Forgings	31Ni-31Fe-27Cr-7Mo
45	45	ASTM/ASME	B/SB-564	—	N08120		90/40 [620/275]	Forgings	37Ni-33Fe-25Cr
45	8.2	ASTM/ASME	B/SB-564	—	N08367		95/45 [655/310]	Forgings	46Fe-24Ni-21Cr-6Mo-Cu-N
45	45	ASTM/ASME	B/SB-564	—	N08800		75/30 [515/205]	Forgings	33Ni-42Fe-21Cr
45	45	ASTM/ASME	B/SB-564	—	N08810		65/25 [450/170]	Forgings	33Ni-42Fe-21Cr
45	44	ASTM/ASME	B/SB-564	—	N08811		65/25 [450/170]	Forgings	33Ni-42Fe-21Cr-Al-Ti
45	45	ASTM/ASME	B/SB-564	—	N08825		85/35 [585/240]	Forgings	42Ni-21.5Cr-3Mo-2.3Cu
45	45	ASTM/ASME	B/SB-564	—	R20033		109/55 [750/380]	Forgings	33Cr-31Ni-32Fe-1.5Mo-0.6Cu-N
45	45	ASTM/ASME	B/SB-572	—	R30556		100/45 [690/310]	Rod	21Ni-30Fe-22Cr-18Co-3Mo-3W
45	43	ASTM/ASME	B/SB-581	—	N06007	≥0.3125 and ≤0.75 [≥8 and ≤19]	90/35 [620/240]	Rod	47Ni-22Cr-19Fe-6Mo
45	43	ASTM/ASME	B/SB-581	—	N06007	>0.75 and ≤3.5 [≥19 and ≤89]	85/30 [585/205]	Rod	47Ni-22Cr-19Fe-6Mo

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
45	45	ASTM/ASME	B/SB-581	—	N06030		85/35 [585/240]	Rod	40Ni-29Cr-15Fe-5Mo
45	45	ASTM/ASME	B/SB-581	—	N06975		85/32 [585/220]	Rod	49Ni-25Cr-18Fe-6Mo
45	45	ASTM/ASME	B/SB-581	—	N06985	>0.75 and ≤3.5 >19 and ≤89]	85/30 [585/205]	Rod	47Ni-22Cr-20Fe-7Mo
45	45	ASTM/ASME	B/SB-581	—	N06985	≥0.3125 and ≤0.75 [≥8 and ≤19]	90/35 [620/240]	Rod	47Ni-22Cr-20Fe-7Mo
45	45	ASTM/ASME	B/SB-581	—	N08031		94/40 [650/275]	Rod	31Ni-31Fe-27Cr-7Mo
45	43	ASTM/ASME	B/SB-582	—	N06007	≤0.75 [≤19]	90/35 [620/240]	Plate, Sheet, & Strip	47Ni-22Cr-19Fe-6Mo
45	43	ASTM/ASME	B/SB-582	—	N06007	>0.75 and ≤2.5 [>19 and ≤64]	85/30 [585/205]	Plate, Sheet, & Strip	47Ni-22Cr-19Fe-6Mo
45	45	ASTM/ASME	B/SB-582	—	N06030		85/35 [585/240]	Plate, Sheet, & Strip	40Ni-29Cr-15Fe-5Mo
45	45	ASTM/ASME	B/SB-582	—	N06975		85/32 [585/220]	Plate, Sheet, & Strip	49Ni-25Cr-18Fe-6Mo
45	45	ASTM/ASME	B/SB-582	—	N06985	>0.75 and ≤2.5 [>19 and ≤64]	85/30 [585/205]	Plate, Sheet, & Strip	47Ni-22Cr-20Fe-7Mo
45	45	ASTM/ASME	B/SB-582	—	N06985	≤0.75 [≤19]	90/35 [620/240]	Plate, Sheet, & Strip	47Ni-22Cr-20Fe-7Mo
45	8.2	ASTM/ASME	B/SB-599	—	N08700		80/35 [550/240]	Plate, Sheet, & Strip	25Ni-47Fe-21Cr-5Mo
45	43	ASTM/ASME	B/SB-619	—	N06007		90/35 [620/240]	Welded Pipe	47Ni-22Cr-19Fe-6Mo
45	45	ASTM/ASME	B/SB-619	—	N06030		85/35 [585/240]	Welded Pipe	40Ni-29Cr-15Fe-5Mo
45	45	ASTM/ASME	B/SB-619	—	N06975		85/32 [585/220]	Welded Pipe	49Ni-25Cr-18Fe-6Mo
45	45	ASTM/ASME	B/SB-619	—	N06985		90/35 [620/240]	Welded Pipe	47Ni-22Cr-20Fe-7Mo
45	45	ASTM/ASME	B/SB-619	—	N08031		94/40 [650/275]	Welded Pipe	31Ni-31Fe-27Cr-7Mo
45	8.2	ASTM/ASME	B/SB-619	—	N08320		75/28 [515/195]	Welded Pipe	26Ni-22Cr-5Mo-Ti
45	45	ASTM/ASME	B/SB-619	—	R20033		109/55 [750/380]	Welded Pipe	33Cr-31Ni-32Fe-1.5Mo-0.6Cu-N
45	45	ASTM/ASME	B/SB-619	—	R30556		100/45 [690/310]	Welded Pipe	21Ni-30Fe-22Cr-18Co-3Mo-3W
45	8.2	ASTM/ASME	B/SB-620	—	N08320		75/28 [515/195]	Plate, Sheet, & Strip	26Ni-22Cr-5Mo-Ti
45	8.2	ASTM/ASME	B/SB-621	—	N08320		75/28 [515/195]	Rod	26Ni-22Cr-5Mo-Ti
45	43	ASTM/ASME	B/SB-622	—	N06007		90/35 [620/240]	Seamless Pipe & Tube	47Ni-22Cr-19Fe-6Mo
45	45	ASTM/ASME	B/SB-622	—	N06030		85/35 [585/240]	Seamless Pipe & Tube	40Ni-29Cr-15Fe-5Mo

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
45	45	ASTM/ASME	B/SB-622	—	N06975	—	85/32 [585/220]	Seamless Pipe & Tube	49Ni-25Cr-18Fe-6Mo
45	45	ASTM/ASME	B/SB-622	—	N06985	—	90/35 [620/240]	Seamless Pipe & Tube	47Ni-22Cr-20Fe-7Mo
45	45	ASTM/ASME	B/SB-622	—	N08031	—	94/40 [650/275]	Seamless Pipe & Tube	31Ni-31Fe-27Cr-7Mo
45	45	ASTM/ASME	B/SB-622	—	N08135	—	73/31 [505/215]	Seamless Pipe & Tube	36Ni-35Fe-22Cr-5Mo-W
45	8.2	ASTM/ASME	B/SB-622	—	N08320	—	75/28 [515/195]	Seamless Pipe & Tube	26Ni-22Cr-5Mo-Ti
45	45	ASTM/ASME	B/SB-622	—	N08535	—	73/31 [505/215]	Seamless Pipe & Tube	37Fe-33Ni-26Cr-3Mo-Cu
45	45	ASTM/ASME	B/SB-622	—	R20033	—	109/55 [750/380]	Seamless Pipe & Tube	33Cr-31Ni-32Fe-1.5Mo-0.6Cu-N
45	45	ASTM/ASME	B/SB-622	—	R30556	—	100/45 [690/310]	Seamless Pipe & Tube	21Ni-30Fe-22Cr-18Co-3Mo-3W
45	45	ASTM/ASME	B/SB-625	—	N08031	—	94/40 [650/275]	Plate, Sheet, & Strip	31Ni-31Fe-27Cr-7Mo
45	8.2	ASTM/ASME	B/SB-625	—	N08904	—	71/31 [490/215]	Plate, Sheet, & Strip	44Fe-25Ni-21Cr-Mo
45	8.2	ASTM/ASME	B/SB-625	—	N08925	—	87/43 [600/295]	Plate, Sheet, & Strip	25Ni-20Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-625	—	N08926	—	94/43 [650/295]	Plate, Sheet, & Strip	25Ni-20Cr-6Mo-Co-N
45	8.2	ASTM/ASME	B/SB-625	—	N08932	—	87/44 [600/305]	Plate, Sheet, & Strip	41Fe-25Ni-25Cr-5Mo-Cu-N
45	45	ASTM/ASME	B/SB-625	—	R20033	—	109/55 [750/380]	Plate, Sheet, & Strip	33Cr-31Ni-32Fe-1.5Mo-0.6Cu-N
45	43	ASTM/ASME	B/SB-626	—	N06007	—	90/35 [620/240]	Welded Tube	47Ni-22Cr-19Fe-6Mo
45	45	ASTM/ASME	B/SB-626	—	N06030	—	85/35 [585/240]	Welded Tube	40Ni-29Cr-15Fe-5Mo
45	45	ASTM/ASME	B/SB-626	—	N06975	—	85/32 [585/220]	Welded Tube	49Ni-25Cr-18Fe-6Mo
45	45	ASTM/ASME	B/SB-626	—	N06985	—	90/35 [620/240]	Welded Tube	47Ni-22Cr-20Fe-7Mo
45	45	ASTM/ASME	B/SB-626	—	N08031	—	94/40 [650/275]	Welded Tube	31Ni-31Fe-27Cr-7Mo
45	8.2	ASTM/ASME	B/SB-626	—	N08320	—	75/28 [515/195]	Welded Tube	26Ni-22Cr-5Mo-Ti
45	45	ASTM/ASME	B/SB-626	—	R20033	—	109/55 [750/380]	Welded Tube	33Cr-31Ni-32Fe-1.5Mo-0.6Cu-N
45	45	ASTM/ASME	B/SB-626	—	R30556	—	100/45 [690/310]	Welded Tube	21Ni-30Fe-22Cr-18Co-3Mo-3W
45	45	ASTM/ASME	B/SB-649	—	N08031	—	94/40 [650/275]	Bar & Wire	31Ni-31Fe-27Cr-7Mo
45	8.2	ASTM/ASME	B/SB-649	—	N08904	—	71/31 [490/215]	Bar & Wire	44Fe-25Ni-21Cr-Mo
45	8.2	ASTM/ASME	B/SB-649	—	N08925	—	87/43 [600/295]	Bar & Wire	25Ni-20Cr-6Mo-Cu-N

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
45	8.2	ASTM/ASME	B/SB-649	—	N08926		94/43 [650/295]	Bar & Wire	25Ni-20Cr-6Mo-Cu-N
45	45	ASTM/ASME	B/SB-649	—	R20033		109/55 [750/380]	Bar & Wire	33Cr-31Ni-32Fe-1.5Mo-0.6Cu-N
45	45	ASTM/ASME	B/SB-668	—	N08028		73/31 [505/215]	Seamless Tube	31Ni-31Fe-29Cr-Mo
45	8.2	ASTM/ASME	B/SB-672	—	N08700		80/35 [550/240]	Bar & Wire	25Ni-47Fe-21Cr-3Mo
45	8.2	ASTM/ASME	B/SB-673	—	N08904		71/31 [490/215]	Welded Pipe	44Fe-25Ni-21Cr-Mo
45	8.2	ASTM/ASME	B/SB-673	—	N08925		87/43 [600/295]	Welded Pipe	25Ni-20Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-673	—	N08926		94/43 [650/295]	Welded Pipe	25Ni-20Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-674	—	N08904		71/31 [490/215]	Welded Tube	44Fe-25Ni-21Cr-Mo
45	8.2	ASTM/ASME	B/SB-674	—	N08925		87/43 [600/295]	Welded Tube	25Ni-20Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-674	—	N08926		94/43 [650/295]	Welded Tube	25Ni-20Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-675	—	N08367	>0.1875 [ $\geq$ 4.8]	95/45 [655/310]	Welded Pipe	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-675	—	N08367	$\leq$ 0.1875 [ $\leq$ 4.8]	100/45 [690/310]	Welded Pipe	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-676	—	N08367	$\leq$ 0.1875 [ $\leq$ 4.8]	100/45 [690/310]	Welded Tube	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-676	—	N08367	>0.1875 [ $\geq$ 4.8]	95/45 [655/310]	Welded Tube	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-677	—	N08904		71/31 [490/215]	Seamless Pipe & Tube	44Fe-25Ni-21Cr-Mo
45	8.2	ASTM/ASME	B/SB-677	—	N08925		87/43 [600/295]	Seamless Pipe & Tube	25Ni-20Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-677	—	N08926		94/43 [650/295]	Seamless Pipe & Tube	25Ni-20Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-688	—	N08366		75/35 [515/240]	Plate, Sheet, & Strip	46Fe-24Ni-21Cr-6Mo
45	8.2	ASTM/ASME	B/SB-688	—	N08367	$\leq$ 0.1875 [ $\leq$ 4.8]	100/45 [690/310]	Plate, Sheet, & Strip	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-688	—	N08367	>0.1875 [ $\geq$ 4.8]	95/45 [655/310]	Plate, Sheet, & Strip	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-690	—	N08366		75/30 [515/205]	Seamless Pipe & Tube	46Fe-24Ni-21Cr-6Mo
45	8.2	ASTM/ASME	B/SB-690	—	N08367	>0.1875 [ $\geq$ 4.8]	95/45 [655/310]	Seamless Pipe & Tube	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-690	—	N08367	$\leq$ 0.1875 [ $\leq$ 4.8]	100/45 [690/310]	Seamless Pipe & Tube	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-691	—	N08366		75/30 [515/205]	Rod, Bar, & Wire	46Fe-24Ni-21Cr-6Mo
45	8.2	ASTM/ASME	B/SB-691	—	N08367		95/45 [655/310]	Rod, Bar, & Wire	46Fe-24Ni-21Cr-6Mo-Cu-N
45	45	ASTM/ASME	B/SB-704	—	N08825		85/35 [585/240]	Welded Tube	42Ni-21.5Cr-3Mo-2.3Cu
45	45	ASTM/ASME	B/SB-705	—	N08825		85/35 [585/240]	Welded Pipe	42Ni-21.5Cr-3Mo-2.3Cu
45	45	ASTM/ASME	B/SB-709	—	N08028		73/40 [505/275]	Plate, Sheet, & Strip	31Ni-31Fe-29Cr-Mo

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Nickel and Nickel Base Alloys</b>									
45	43	ASTM	B718	—	N06333	>0.1875 [ $>5$ ]	80/35 [550/240]	Plate, Sheet, & Strip	46Ni-26Cr-16Fe-3Mo-3W-3Co
45	43	ASTM	B719	—	N06333	$\leq 0.1875$ [ $\leq 5$ ]	80/35 [550/240]	Bar	46Ni-26Cr-16Fe-3Mo-3W-3Co
45	—	ASTM	B720	—	N08310	—	—	Seamless Tube	Fe-Cr-Ni-Mo
45	43	ASTM	B722	—	N06333	>0.1875 [ $>5$ ]	80/35 [550/240]	Seamless Pipe & Tube	46Ni-26Cr-16Fe-3Mo-3W-3Co
45	43	ASTM	B723	—	N06333	>0.1875 [ $>5$ ]	80/35 [550/240]	Welded Pipe	46Ni-26Cr-16Fe-3Mo-3W-3Co
45	43	ASTM	B726	—	N06333	$\leq 0.1875$ [ $\leq 5$ ]	80/35 [550/240]	Welded Tube	46Ni-26Cr-16Fe-3Mo-3W-3Co
45	45	ASTM/ASME	B/SB-729	—	N08020	>0.1875 [ $>5$ ]	80/35 [550/240]	Seamless Pipe & Tube	35Ni-35Fe-20Cr-Cb
45	8.2	ASTM/ASME	B/SB-804	—	N08367	$\leq 0.1875$ [ $\leq 5$ ]	95/45 [655/310]	Welded Pipe	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM/ASME	B/SB-804	—	N08367	$\leq 0.1875$ [ $\leq 5$ ]	100/45 [690/310]	Welded Pipe	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM	A813	N08367	N08367	>0.1875 [ $>5$ ]	95/45 [655/310]	Welded Pipe	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM	A813	N08367	N08367	$\leq 0.1875$ [ $\leq 5$ ]	100/45 [690/310]	Welded Pipe	46Fe-24Ni-21Cr-6Mo-Cu-N
45	43	ASTM	B814	—	N06920	>0.1875 [ $>5$ ]	95/35 [655/240]	Plate, Sheet, & Strip	46Ni-22Cr-19Fe-9Mo-2W
45	8.2	ASTM	A814	N08367	N08367	$\leq 0.1875$ [ $\leq 5$ ]	100/45 [690/310]	Cold Worked Welded Pipe	46Fe-24Ni-21Cr-6Mo-Cu-N
45	8.2	ASTM	A814	N08367	N08367	>0.1875 [ $>5$ ]	95/45 [655/310]	Cold Worked Welded Pipe	46Fe-24Ni-21Cr-6Mo-Cu-N
45	43	NACE	MR 01-75	100	N06950	110/102 [760/700]	90/35 [620/240]	Pipe	50Ni-20Cr-18Fe-9Mo
45	43	NACE	MR 01-75	110	N06950	115/110 [795/760]	90/35 [620/240]	Pipe	50Ni-20Cr-18Fe-9Mo
45	43	NACE	MR 01-75	125	N06950	131/125 [900/860]	90/35 [620/240]	Pipe	50Ni-20Cr-18Fe-9Mo
45	43	NACE	MR 01-75	140	N06950	145/140 [1000/965]	90/35 [620/240]	Pipe	50Ni-20Cr-18Fe-9Mo
46	45	ASTM/ASME	B/SB-163	—	N06045	>0.1875 [ $>5$ ]	90/35 [620/240]	Seamless Tube	46Ni-27Cr-23Fe-2.75Si
46	45	ASTM/ASME	B/SB-166	—	N06045	>0.1875 [ $>5$ ]	90/35 [620/240]	Rod, Bar, & Wire	46Ni-27Cr-23Fe-2.75Si
46	45	ASTM/ASME	B/SB-167	—	N06045	>0.1875 [ $>5$ ]	90/35 [620/240]	Seamless Pipe & Tube	46Ni-27Cr-23Fe-2.75Si
46	45	ASTM/ASME	B/SB-168	—	N06045	>0.1875 [ $>5$ ]	90/35 [620/240]	Plate, Sheet, & Strip	46Ni-27Cr-23Fe-2.75Si
46	45	ASTM/ASME	B/SB-366	—	N06045	>0.1875 [ $>5$ ]	90/35 [620/240]	Fittings	46Ni-27Cr-23Fe-2.75Si
46	45	ASTM/ASME	B/SB-366	—	N08330	>0.1875 [ $>5$ ]	70/30 [485/205]	Fittings	35Ni-19Cr-1.25Si
46	46	ASTM/ASME	B/SB-366	—	N12160	>0.1875 [ $>5$ ]	90/35 [620/240]	Fittings	37Ni-30Co-28Cr-2.7Si
46	46	ASTM/ASME	B/SB-435	—	N12160	>0.1875 [ $>5$ ]	90/35 [620/240]	Plate, Sheet, & Strip	37Ni-30Co-28Cr-2.7Si
46	45	ASTM/ASME	B/SB-462	—	N06045	>0.1875 [ $>5$ ]	90/35 [620/240]	Forgings	46Ni-27Cr-23Fe-2.75Si
46	45	ASTM/ASME	B/SB-511	—	N08330	>0.1875 [ $>5$ ]	70/30 [485/205]	Bars & Shapes	35Ni-19Cr-1.25Si
46	45	ASTM/ASME	B/SB-511	—	N08332	>0.1875 [ $>5$ ]	67/27 [460/185]	Bars & Shapes	35Ni-19Cr-1.25Si-C

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Nickel and Nickel Base Alloys</b>									
46	45	ASTM	B512	—	N08330	—	70/30 [485/205]	Bars & Billets	35Ni-19Cr-1.25Si
46	45	ASTM/ASME	B/SB-516	—	N06045	—	90/35 [620/240]	Welded Tube	46Ni-27Cr-23Fe-2.75Si
46	45	ASTM/ASME	B/SB-517	—	N06045	—	90/35 [620/240]	Welded Pipe	46Ni-27Cr-23Fe-2.75Si
46	45	ASTM/ASME	B/SB-535	—	N08330	—	70/30 [485/205]	Seamless Pipe & Tube	35Ni-19Cr-1.25Si
46	45	ASTM/ASME	B/SB-535	—	N08332	—	67/27 [460/185]	Seamless Pipe & Tube	35Ni-19Cr-1.25Si-C
46	45	ASTM/ASME	B/SB-536	—	N08330	—	70/30 [485/205]	Plate, Sheet, & Strip	35Ni-19Cr-1.25Si
46	45	ASTM/ASME	B/SB-536	—	N08332	—	67/27 [460/185]	Plate, Sheet, & Strip	35Ni-19Cr-1.25Si-C
46	45	ASTM/ASME	B/SB-564	—	N06045	—	90/35 [620/240]	Forgings	46Ni-27Cr-23Fe-2.75Si
46	46	ASTM/ASME	B/SB-564	—	N12160	—	90/35 [620/240]	Forgings	37Ni-30Co-28Cr-2.7Si
46	46	ASTM/ASME	B/SB-572	—	N12160	—	90/35 [620/240]	Rod	37Ni-30Co-28Cr-2.7Si
46	46	ASTM/ASME	B/SB-619	—	N12160	—	90/35 [620/240]	Welded Pipe	37Ni-30Co-28Cr-2.7Si
46	46	ASTM/ASME	B/SB-622	—	N12160	—	90/35 [620/240]	Seamless Pipe & Tube	37Ni-30Co-28Cr-2.7Si
46	46	ASTM/ASME	B/SB-626	—	N12160	—	90/35 [620/240]	Welded Tube	37Ni-30Co-28Cr-2.7Si
46	45	ASTM/ASME	B/SB-710	—	N08330	—	70/30 [485/205]	Welded Pipe	35Ni-19Cr-1.25Si
46	45	ASTM/ASME	B/SB-710	—	N08332	—	67/27 [460/185]	Welded Pipe	35Ni-19Cr-1.25Si-C
49	—	ASTM/ASME	B/SB-815	—	R31233	—	120/55 [825/380]	Rod	Co-26Cr-9Ni-5Mo-3Fe-2W
49	—	ASTM/ASME	B/SB-818	—	R31233	—	120/55 [825/380]	Plate, Sheet, & Strip	Co-26Cr-9Ni-5Mo-3Fe-2W

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I.2.2.1, and I.3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Titanium and Titanium Base Alloys</b>									
51	51	ASTM/ASME	B/SB-265	1	R50250	35/20 [240/140]		Plate, Sheet, & Strip	Ti
51	51	ASTM/ASME	B/SB-265	11	R52250	35/20 [240/140]		Plate, Sheet, & Strip	Ti-Pd
51	52	ASTM/ASME	B/SB-265	13	R53413	40/25 [275/170]		Plate, Sheet, & Strip	Ti-0.5Ni-Ru
51	51	ASTM/ASME	B/SB-265	16	R52402	50/40 [345/275]		Plate, Sheet, & Strip	Ti-Pd
51	51	ASTM/ASME	B/SB-265	16H	R52402	58/40 [400/275]		Plate, Sheet, & Strip	Ti-Pd
51	51	ASTM/ASME	B/SB-265	17	R52252	35/20 [240/140]		Plate, Sheet, & Strip	Ti-Pd
51	51	ASTM/ASME	B/SB-265	2	R50400	50/40 [345/275]		Plate, Sheet, & Strip	Ti
51	51	ASTM/ASME	B/SB-265	26	R52404	50/40 [345/275]		Plate, Sheet, & Strip	Ti-Ru
51	51	ASTM/ASME	B/SB-265	26H	R52404	58/40 [400/275]		Plate, Sheet, & Strip	Ti-Ru
51	51	ASTM/ASME	B/SB-265	27	R52254	35/20 [240/140]		Plate, Sheet, & Strip	Ti-Ru
51	51	ASTM/ASME	B/SB-265	2H	R50400	58/40 [400/275]		Plate, Sheet, & Strip	Ti
51	52	ASTM/ASME	B/SB-265	30	R53530	50/40 [345/275]		Plate, Sheet, & Strip	Ti-0.3Co-Pd
51	54	ASTM/ASME	B/SB-265	33	R53442	50/40 [345/275]		Plate, Sheet, & Strip	Ti-Ni-Pd-Ru-Cr
51	51	ASTM/ASME	B/SB-265	7	R52400	50/40 [345/275]		Plate, Sheet, & Strip	Ti-Pd
51	51	ASTM/ASME	B/SB-265	7H	R52400	58/40 [400/275]		Plate, Sheet, & Strip	Ti-Pd
51	51	ASTM	B337	1	R50250	35/25 [240/170]		Seamless & Welded Pipe	Ti
51	51	ASTM	B337	11	R52250	35/25 [240/170]		Seamless & Welded Pipe	Ti-Pd
51	51	ASTM	B337	2	R50400	50/40 [345/275]		Seamless & Welded Pipe	Ti
51	51	ASTM	B337	7	R52400	50/40 [345/275]		Seamless & Welded Pipe	Ti-Pd
51	51	ASTM/ASME	B/SB-338	1	R50250	35/20 [240/140]		Seamless & Welded Tube	Ti
51	51	ASTM/ASME	B/SB-338	11	R52250	35/20 [240/140]		Seamless & Welded Tube	Ti-Pd
51	52	ASTM/ASME	B/SB-338	13	R53413	40/25 [275/170]		Seamless & Welded Tube	Ti-0.5Ni-Ru
51	51	ASTM/ASME	B/SB-338	16	R52402	50/40 [345/275]		Seamless & Welded Tube	Ti-Pd
51	51	ASTM/ASME	B/SB-338	16H	R52402	58/40 [400/275]		Seamless & Welded Tube	Ti-Pd
51	51	ASTM/ASME	B/SB-338	17	R52252	35/20 [240/140]		Seamless & Welded Tube	Ti-Pd
51	51	ASTM/ASME	B/SB-338	2	R50400	50/40 [345/275]		Seamless & Welded Tube	Ti
51	51	ASTM/ASME	B/SB-338	26	R52404	50/40 [345/275]		Seamless & Welded Tube	Ti-Ru
51	51	ASTM/ASME	B/SB-338	26H	R52404	58/40 [400/275]		Seamless & Welded Tube	Ti-Ru
51	51	ASTM/ASME	B/SB-338	27	R52254	35/20 [240/140]		Seamless & Welded Tube	Ti-Ru

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Titanium and Titanium Base Alloys</b>									
51	51	ASTM/ASME	B/SB-338	2H	R50400		58/40 [400/275]	Seamless & Welded Tube	Ti
51	52	ASTM/ASME	B/SB-338	30	R53530		50/40 [345/275]	Seamless & Welded Tube	Ti-0.3Co-Pd
51	54	ASTM/ASME	B/SB-338	33	R53442		50/40 [345/275]	Seamless & Welded Tube	Ti-Ni-Pd-Ru-Cr
51	51	ASTM/ASME	B/SB-338	7	R52400		50/40 [345/275]	Seamless & Welded Tube	Ti-Pd
51	51	ASTM/ASME	B/SB-338	7H	R52400		58/40 [400/275]	Seamless & Welded Tube	Ti-Pd
51	51	ASTM/ASME	B/SB-348	1	R50250		35/20 [240/140]	Bars & Billets	Ti
51	51	ASTM/ASME	B/SB-348	11	R52250		35/20 [240/140]	Bars & Billets	Ti-Pd
51	52	ASTM/ASME	B/SB-348	13	R53413		40/25 [275/170]	Bars & Billets	Ti-0.5Ni-Ru
51	51	ASTM/ASME	B/SB-348	16	R52402		50/40 [345/275]	Bars & Billets	Ti-Pd
51	51	ASTM/ASME	B/SB-348	16H	R52402		58/40 [400/275]	Bars & Billets	Ti-Pd
51	51	ASTM/ASME	B/SB-348	17	R52252		35/20 [240/140]	Bars & Billets	Ti-Pd
51	51	ASTM/ASME	B/SB-348	2	R50400		50/40 [345/275]	Bars & Billets	Ti
51	51	ASTM/ASME	B/SB-348	26	R52404		50/40 [345/275]	Bars & Billets	Ti-Ru
51	51	ASTM/ASME	B/SB-348	26H	R52404		58/40 [400/275]	Bars & Billets	Ti-Ru
51	51	ASTM/ASME	B/SB-348	2H	R50400		58/40 [400/275]	Bars & Billets	Ti
51	52	ASTM/ASME	B/SB-348	30	R53530		50/40 [345/275]	Bars & Billets	Ti-0.3Co-Pd
51	54	ASTM/ASME	B/SB-348	33	R53442		50/40 [345/275]	Bars & Billets	Ti-Ni-Pd-Ru-Cr
51	51	ASTM/ASME	B/SB-348	7	R52400		50/40 [345/275]	Bars & Billets	Ti-Pd
51	51	ASTM/ASME	B/SB-348	7H	R52400		58/40 [400/275]	Bars & Billets	Ti-Pd
51	51	ASTM/ASME	B/SB-363	WPT 1	R50250		35/25 [240/170]	Seamless & Welded Fittings	Ti
51	51	ASTM/ASME	B/SB-363	WPT 11	R52250		35/25 [240/170]	Seamless & Welded Fittings	Ti-Pd
51	52	ASTM/ASME	B/SB-363	WPT 13	R53413		40/25 [275/170]	Seamless & Welded Fittings	Ti-0.5Ni-Ru
51	51	ASTM/ASME	B/SB-363	WPT 16	R52402		50/40 [345/275]	Seamless & Welded Fittings	Ti-Pd
51	51	ASTM/ASME	B/SB-363	WPT 16H	R52402		58/40 [400/275]	Seamless & Welded Fittings	Ti-Pd
51	51	ASTM/ASME	B/SB-363	WPT 17	R52252		35/25 [240/170]	Seamless & Welded Fittings	Ti-Pd
51	51	ASTM/ASME	B/SB-363	WPT 2	R50400		50/40 [345/275]	Seamless & Welded Fittings	Ti
51	51	ASTM/ASME	B/SB-363	WPT 26	R52404		50/40 [345/275]	Seamless & Welded Fittings	Ti-Ru
51	51	ASTM/ASME	B/SB-363	WPT 26H	R52404		58/40 [400/275]	Seamless & Welded Fittings	Ti-Ru
51	52	ASTM/ASME	B/SB-363	WPT 30	R53530		50/40 [345/275]	Seamless & Welded Fittings	Ti-0.3Co-Pd

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Titanium and Titanium Base Alloys</b>									
51	51	ASTM/ASME	B/SB-363	WPT 7	R52400		50/40 [345/275]	Seamless & Welded Fittings	Ti-Pd
51	51	ASTM/ASME	B/SB-363	WPT 7H	R52400		58/40 [400/275]	Seamless & Welded Fittings	Ti-Pd
51	51	ASTM/ASME	B/SB-367	C-16	R52402		50/40 [345/275]	Castings	Ti-Pd
51	51	ASTM/ASME	B/SB-367	C-17	R52252		35/25 [240/170]	Castings	Ti-Pd
51	51	ASTM/ASME	B/SB-367	C-2	R50400		50/40 [345/275]	Castings	Ti
51	51	ASTM/ASME	B/SB-367	C-7	—		50/40 [345/275]	Castings	Ti-Pd
51	51	ASTM/ASME	B/SB-381	F-1	R50250		35/20 [240/140]	Forgings	Ti
51	51	ASTM/ASME	B/SB-381	F-11	R52250		35/20 [240/140]	Forgings	Ti-Pd
51	52	ASTM/ASME	B/SB-381	F-13	R53413		40/25 [275/170]	Forgings	Ti-0.5Ni-Ru
51	51	ASTM/ASME	B/SB-381	F-16	R52402		50/40 [345/275]	Forgings	Ti-Pd
51	51	ASTM/ASME	B/SB-381	F-16H	R52402		58/40 [400/275]	Forgings	Ti-Pd
51	51	ASTM/ASME	B/SB-381	F-17	R52252		35/20 [240/140]	Forgings	Ti-Pd
51	51	ASTM/ASME	B/SB-381	F-2	R50400		50/40 [345/275]	Forgings	Ti
51	51	ASTM/ASME	B/SB-381	F-26	R52404		50/40 [345/275]	Forgings	Ti-Ru
51	51	ASTM/ASME	B/SB-381	F-26H	R52404		58/40 [400/275]	Forgings	Ti-Ru
51	51	ASTM/ASME	B/SB-381	F-2H	R50400		58/40 [400/275]	Forgings	Ti
51	52	ASTM/ASME	B/SB-381	F-30	R53530		50/40 [345/275]	Forgings	Ti-0.3Co-Pd
51	51	ASTM/ASME	B/SB-381	F-7	R52400		50/40 [345/275]	Forgings	Ti-Pd
51	51	ASTM/ASME	B/SB-381	F-7H	R52400		58/40 [400/275]	Forgings	Ti-Pd
51	51	ASTM/ASME	B/SB-861	1	R50250		35/20 [240/140]	Seamless Pipe	Ti
51	51	ASTM/ASME	B/SB-861	11	R52250		35/20 [240/140]	Seamless Pipe	Ti-Pd
51	52	ASTM/ASME	B/SB-861	13	R53413		40/25 [275/170]	Seamless Pipe	Ti-0.5Ni-Ru
51	51	ASTM/ASME	B/SB-861	16	R52402		50/40 [345/275]	Seamless Pipe	Ti-Pd
51	51	ASTM/ASME	B/SB-861	16H	R52402		58/40 [400/275]	Seamless Pipe	Ti-Pd
51	51	ASTM/ASME	B/SB-861	17	R52252		35/20 [240/140]	Seamless Pipe	Ti-Pd
51	51	ASTM/ASME	B/SB-861	2	R50400		50/40 [345/275]	Seamless Pipe	Ti
51	51	ASTM/ASME	B/SB-861	26	R52404		50/40 [345/275]	Seamless Pipe	Ti-Ru
51	51	ASTM/ASME	B/SB-861	26H	R52404		58/40 [400/275]	Seamless Pipe	Ti-Ru
51	51	ASTM/ASME	B/SB-861	2H	R50400		58/40 [400/275]	Seamless Pipe	Ti

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Titanium and Titanium Base Alloys</b>									
51	54	ASTM/ASME	B/SB-861	33	R53442		50/40 [345/275]	Seamless Pipe	Ti-Ni-Pd-Ru-Cr
51	51	ASTM/ASME	B/SB-861	7	R52400		50/40 [345/275]	Seamless Pipe	Ti-Pd
51	51	ASTM/ASME	B/SB-861	7H	R52400		58/40 [400/275]	Seamless Pipe	Ti-Pd
51	51	ASTM/ASME	B/SB-862	1	R50250		35/20 [240/140]	Welded Pipe	Ti
51	51	ASTM/ASME	B/SB-862	11	R52250		35/20 [240/140]	Welded Pipe	Ti-Pd
51	52	ASTM/ASME	B/SB-862	13	R53413		40/25 [275/170]	Welded Pipe	Ti-0.5Ni-Ru
51	51	ASTM/ASME	B/SB-862	16	R52402		50/40 [345/275]	Welded Pipe	Ti-Pd
51	51	ASTM/ASME	B/SB-862	16H	R52402		58/40 [400/275]	Welded Pipe	Ti-Pd
51	51	ASTM/ASME	B/SB-862	17	R52252		35/20 [240/140]	Welded Pipe	Ti-Pd
51	51	ASTM/ASME	B/SB-862	2	R50400		50/40 [345/275]	Welded Pipe	Ti
51	51	ASTM/ASME	B/SB-862	26	R52404		50/40 [345/275]	Welded Pipe	Ti-Ru
51	51	ASTM/ASME	B/SB-862	26H	R52404		58/40 [400/275]	Welded Pipe	Ti-Ru
51	51	ASTM/ASME	B/SB-862	27	R52254		35/20 [240/140]	Welded Pipe	Ti-Ru
51	51	ASTM/ASME	B/SB-862	2H	R50400		58/40 [400/275]	Welded Pipe	Ti
51	54	ASTM/ASME	B/SB-862	33	R53442		50/40 [345/275]	Welded Pipe	Ti-Ni-Pd-Ru-Cr
51	51	ASTM/ASME	B/SB-862	7	R52400		50/40 [345/275]	Welded Pipe	Ti-Pd
51	51	ASTM/ASME	B/SB-862	7H	R52400		58/40 [400/275]	Welded Pipe	Ti-Pd
52	52	ASTM/ASME	B/SB-265	12	R53400		70/50 [485/345]	Plate, Sheet, & Strip	Ti-0.3Mo-0.8Ni
52	52	ASTM/ASME	B/SB-265	14	R53414		60/40 [415/275]	Plate, Sheet, & Strip	Ti-0.5Ni-Ru
52	52	ASTM/ASME	B/SB-265	15	R53415		70/55 [485/380]	Plate, Sheet, & Strip	Ti-0.5Ni-Ru
52	52	ASTM/ASME	B/SB-265	3	R50550		65/55 [450/380]	Plate, Sheet, & Strip	Ti
52	52	ASTM/ASME	B/SB-265	31	R53532		65/55 [450/380]	Plate, Sheet, & Strip	Ti-0.3Co-Pd
52	54	ASTM/ASME	B/SB-265	34	R53445		65/55 [450/380]	Plate, Sheet, & Strip	Ti-Ni-Pd-Ru-Cr
52	52	ASTM	B337	12	R53400		70/50 [485/345]	Seamless & Welded Pipe	Ti-0.3Mo-0.8Ni
52	52	ASTM	B337	3	R50550		65/55 [450/380]	Seamless & Welded Pipe	Ti
52	52	ASTM/ASME	B/SB-338	12	R53400		70/50 [485/345]	Seamless & Welded Tube	Ti-0.3Mo-0.8Ni
52	52	ASTM/ASME	B/SB-338	14	R53414		60/40 [415/275]	Seamless & Welded Tube	Ti-0.5Ni-Ru
52	52	ASTM/ASME	B/SB-338	15	R53415		70/55 [485/380]	Seamless & Welded Tube	Ti-0.5Ni-Ru
52	52	ASTM/ASME	B/SB-338	3	R50550		65/55 [450/380]	Seamless & Welded Tube	Ti

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
52	52	ASTM/ASME	B/SB-338	31	R53532		65/55 [450/380]	Seamless & Welded Tube	Ti-0.3Co-Pd
52	54	ASTM/ASME	B/SB-338	34	R53445		65/55 [450/380]	Seamless & Welded Tube	Ti-Ni-Pd-Ru-Cr
52	52	ASTM/ASME	B/SB-348	12	R53400		70/50 [485/345]	Bars & Billets	Ti-0.3Mo-0.8Ni
52	52	ASTM/ASME	B/SB-348	14	R53414		60/40 [415/275]	Bars & Billets	Ti-0.5Ni-Ru
52	52	ASTM/ASME	B/SB-348	15	R53415		70/55 [485/380]	Bars & Billets	Ti-0.5Ni-Ru
52	52	ASTM/ASME	B/SB-348	3	R50550		65/55 [450/380]	Bars & Billets	Ti
52	52	ASTM/ASME	B/SB-348	31	R53532		65/55 [450/380]	Bars & Billets	Ti-0.3Co-Pd
52	54	ASTM/ASME	B/SB-348	34	R53445		65/55 [450/380]	Bars & Billets	Ti-Ni-Pd-Ru-Cr
52	52	ASTM/ASME	B/SB-363	WPT 12	R53400		70/50 [485/345]	Seamless & Welded Fittings	Ti-0.3Mo-0.8Ni
52	52	ASTM/ASME	B/SB-363	WPT 14	R53414		60/40 [415/275]	Seamless & Welded Fittings	Ti-0.5Ni-Ru
52	52	ASTM/ASME	B/SB-363	WPT 15	R53415		65/55 [450/380]	Seamless & Welded Fittings	Ti-0.5Ni-Ru
52	52	ASTM/ASME	B/SB-363	WPT 3	R50550		65/55 [450/380]	Seamless & Welded Fittings	Ti
52	52	ASTM/ASME	B/SB-367	C-3	R50550		65/55 [450/380]	Castings	Ti
52	52	ASTM/ASME	B/SB-367	C-8	—		65/55 [450/380]	Castings	Ti-Pd
52	52	ASTM/ASME	B/SB-381	F-12	R53400		70/50 [485/345]	Forgings	Ti-0.3Mo-0.8Ni
52	52	ASTM/ASME	B/SB-381	F-14	R53414		60/40 [415/275]	Forgings	Ti-0.5Ni-Ru
52	52	ASTM/ASME	B/SB-381	F-15	R53415		70/55 [485/380]	Forgings	Ti-0.5Ni-Ru
52	52	ASTM/ASME	B/SB-381	F-3	R50550		65/55 [450/380]	Forgings	Ti
52	52	ASTM/ASME	B/SB-381	F-31	R53532		65/55 [450/380]	Forgings	Ti-0.3Co-Pd
52	52	ASTM/ASME	B/SB-861	12	R53400		70/50 [485/345]	Seamless Pipe	Ti-0.3Mo-0.8Ni
52	52	ASTM/ASME	B/SB-861	14	R53414		60/40 [415/275]	Seamless Pipe	Ti-0.5Ni-Ru
52	52	ASTM/ASME	B/SB-861	15	R53415		70/55 [485/380]	Seamless Pipe	Ti-0.5Ni-Ru
52	52	ASTM/ASME	B/SB-861	3	R50550		65/55 [450/380]	Seamless Pipe	Ti
52	54	ASTM/ASME	B/SB-861	34	R53445		65/55 [450/380]	Seamless Pipe	Ti-Ni-Pd-Ru-Cr
52	52	ASTM/ASME	B/SB-862	12	R53400		70/50 [485/345]	Welded Pipe	Ti-0.3Mo-0.8Ni
52	52	ASTM/ASME	B/SB-862	14	R53414		60/40 [415/275]	Welded Pipe	Ti-0.5Ni-Ru
52	52	ASTM/ASME	B/SB-862	15	R53415		70/55 [485/380]	Welded Pipe	Ti-0.5Ni-Ru
52	52	ASTM/ASME	B/SB-862	3	R50550		65/55 [450/380]	Welded Pipe	Ti
52	54	ASTM/ASME	B/SB-862	34	R53445		65/55 [450/380]	Welded Pipe	Ti-Ni-Pd-Ru-Cr

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Titanium and Titanium Base Alloys</b>									
53	53	ASTM/ASME	B/SB-265	18	R56322		90/70 [620/485]	Plate, Sheet, & Strip	Ti-3Al-2.5V-Pd
53	54	ASTM/ASME	B/SB-265	19	R58640		115/110 [795/760]	Plate, Sheet, & Strip	Ti-3Al-8V-6Cr-4Zr-4Mo
53	54	ASTM/ASME	B/SB-265	20	R58645		115/110 [795/760]	Plate, Sheet, & Strip	Ti-3Al-8V-6Cr-4Zr-4Mo-Pd
53	54	ASTM/ASME	B/SB-265	21	R58210		115/110 [795/760]	Plate, Sheet, & Strip	Ti-15Mo-3Al-2.7Nb-Si
53	53	ASTM/ASME	B/SB-265	28	R56323		90/70 [620/485]	Plate, Sheet, & Strip	Ti-3Al-2.5V-0.1Ru
53	52	ASTM/ASME	B/SB-265	32	R55111		100/85 [690/585]	Plate, Sheet, & Strip	Ti-5Al-1Sn-1Zr-1V-Mo
53	51.4	ASTM/ASME	B/SB-265	4	R50700		80/70 [550/485]	Plate, Sheet, & Strip	Ti
53	53	ASTM/ASME	B/SB-265	9	R56320		90/70 [620/485]	Plate, Sheet, & Strip	Ti-3Al-2.5V
53	53	ASTM	B337	9	R56320		90/70 [620/485]	Seamless & Welded Pipe	Ti-3Al-2.5V
53	53	ASTM/ASME	B/SB-338	18	R56322		90/70 [620/485]	Seamless & Welded Tube	Ti-3Al-2.5V-Pd
53	53	ASTM/ASME	B/SB-338	28	R56323		90/70 [620/485]	Seamless & Welded Tube	Ti-3Al-2.5V-0.1Ru
53	53	ASTM/ASME	B/SB-338	9	R56320		90/70 [620/485]	Seamless & Welded Tube	Ti-3Al-2.5V
53	53	ASTM/ASME	B/SB-348	18	R56322		90/70 [620/485]	Bars & Billets	Ti-3Al-2.5V-Pd
53	54	ASTM/ASME	B/SB-348	19	R58640		115/110 [795/760]	Bars & Billets	Ti-3Al-8V-6Cr-4Zr-4Mo
53	54	ASTM/ASME	B/SB-348	20	R58645		115/110 [795/760]	Bars & Billets	Ti-3Al-8V-6Cr-4Zr-4Mo-Pd
53	54	ASTM/ASME	B/SB-348	21	R58210		115/110 [795/760]	Bars & Billets	Ti-15Mo-3Al-2.7Nb-Si
53	53	ASTM/ASME	B/SB-348	28	R56323		90/70 [620/485]	Bars & Billets	Ti-3Al-2.5V-0.1Ru
53	52	ASTM/ASME	B/SB-348	32	R55111		100/85 [690/585]	Bars & Billets	Ti-5Al-1Sn-1Zr-1V-Mo
53	51.4	ASTM/ASME	B/SB-348	4	R50700		80/70 [550/485]	Bars & Billets	Ti
53	53	ASTM/ASME	B/SB-348	9	R56320		90/70 [620/485]	Bars & Billets	Ti-3Al-2.5V
53	53	ASTM/ASME	B/SB-363	WPT 18	R56322		90/70 [620/485]	Seamless & Welded Fittings	Ti-3Al-2.5V-Pd
53	54	ASTM/ASME	B/SB-363	WPT 19	R58640		115/110 [795/760]	Seamless & Welded Fittings	Ti-3Al-8V-6Cr-4Zr-4Mo
53	54	ASTM/ASME	B/SB-363	WPT 20	R58645		115/110 [795/760]	Seamless & Welded Fittings	Ti-3Al-8V-6Cr-4Zr-4Mo-Pd
53	54	ASTM/ASME	B/SB-363	WPT 21	R58210		115/110 [795/760]	Seamless & Welded Fittings	Ti-15Mo-3Al-2.7Nb-Si
53	53	ASTM/ASME	B/SB-363	WPT 28	R56323		90/70 [620/485]	Seamless & Welded Fittings	Ti-3Al-2.5V-0.1Ru
53	53	ASTM/ASME	B/SB-363	WPT 9	R56320		90/70 [620/485]	Seamless & Welded Fittings	Ti-3Al-2.5V
53	53	ASTM/ASME	B/SB-381	F-18	R56322		90/70 [620/485]	Forgings	Ti-3Al-2.5V-Pd
53	54	ASTM/ASME	B/SB-381	F-19	R58640		115/110 [795/760]	Forgings	Ti-3Al-8V-6Cr-4Zr-4Mo
53	54	ASTM/ASME	B/SB-381	F-20	R58645		115/110 [795/760]	Forgings	Ti-3Al-8V-6Cr-4Zr-4Mo-Pd

(Continued)



**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Titanium and Titanium Base Alloys</b>									
53	54	ASTM/ASME	B/SB-381	F-21	R58210		115/110 [795/760]	Forgings	Ti-15Mo-3Al-2.7Nb-Si
53	53	ASTM/ASME	B/SB-381	F-28	R56323		90/70 [620/485]	Forgings	Ti-3Al-2.5V-0.1Ru
53	51.4	ASTM/ASME	B/SB-381	F-4	R50700		80/70 [550/485]	Forgings	Ti
53	53	ASTM/ASME	B/SB-381	F-9	R56320		90/70 [620/485]	Forgings	Ti-3Al-2.5V
53	53	ASTM/ASME	B/SB-861	18	R56322		90/70 [620/485]	Seamless Pipe	Ti-3Al-2.5V-Pd
53	54	ASTM/ASME	B/SB-861	19	R58640		115/110 [795/760]	Seamless Pipe	Ti-3Al-8V-6Cr-4Zr-4Mo
53	54	ASTM/ASME	B/SB-861	20	R58645		115/110 [795/760]	Seamless Pipe	Ti-3Al-8V-6Cr-4Zr-4Mo-Pd
53	54	ASTM/ASME	B/SB-861	21	R58210		115/110 [795/760]	Seamless Pipe	Ti-15Mo-3Al-2.7Nb-Si
53	53	ASTM/ASME	B/SB-861	28	R56323		90/70 [620/485]	Seamless Pipe	Ti-3Al-2.5V-0.1Ru
53	53	ASTM/ASME	B/SB-861	9	R56320		90/70 [620/485]	Seamless Pipe	Ti-3Al-2.5V
53	53	ASTM/ASME	B/SB-862	18	R56322		90/70 [620/485]	Welded Pipe	Ti-3Al-2.5V-Pd
53	54	ASTM/ASME	B/SB-862	19	R58640		115/110 [795/760]	Welded Pipe	Ti-3Al-8V-6Cr-4Zr-4Mo
53	54	ASTM/ASME	B/SB-862	20	R58645		115/110 [795/760]	Welded Pipe	Ti-3Al-8V-6Cr-4Zr-4Mo-Pd
53	54	ASTM/ASME	B/SB-862	21	R58210		115/110 [795/760]	Welded Pipe	Ti-15Mo-3Al-2.7Nb-Si
53	53	ASTM/ASME	B/SB-862	28	R56323		90/70 [620/485]	Welded Pipe	Ti-3Al-2.5V-0.1Ru
53	53	ASTM/ASME	B/SB-862	9	R56320		90/70 [620/485]	Welded Pipe	Ti-3Al-2.5V
53	54	AMS	4914	—	R58153		98/96 [675/660]	Sheet	Ti-15V-3Al-3Cr-3Sn
54	53	ASTM/ASME	B/SB-265	24	R56405		130/120 [895/825]	Plate, Sheet, & Strip	Ti-6Al-4V-Pd
54	53	ASTM/ASME	B/SB-265	25	R56403		130/120 [895/825]	Plate, Sheet, & Strip	Ti-6Al-4V-Ni-Pd
54	53	ASTM/ASME	B/SB-265	29	R56404		120/110 [825/760]	Plate, Sheet, & Strip	Ti-6Al-4V-Pd-ELI-Ru
54	53	ASTM/ASME	B/SB-265	35	R56340		130/120 [895/825]	Plate, Sheet, & Strip	Ti-4Al-2.5V-1.5Fe
54	53	ASTM/ASME	B/SB-265	5	R56400		130/120 [895/825]	Plate, Sheet, & Strip	Ti-6Al-4V
54	52	ASTM/ASME	B/SB-265	6	R54520		120/115 [825/795]	Plate, Sheet, & Strip	Ti-5Al-2.5Sn
54	53	ASTM/ASME	B/SB-338	35	R56340		130/120 [895/825]	Seamless & Welded Tube	Ti-4Al-2.5V-1.5Fe
54	53	ASTM/ASME	B/SB-348	23	R56407		120/110 [825/760]	Bars & Billets	Ti-6Al-4V-ELI
54	53	ASTM/ASME	B/SB-348	24	R56405		130/120 [895/825]	Bars & Billets	Ti-6Al-4V-Pd
54	53	ASTM/ASME	B/SB-348	25	R56403		130/120 [895/825]	Bars & Billets	Ti-6Al-4V-Ni-Pd
54	53	ASTM/ASME	B/SB-348	35	R56340		130/120 [895/825]	Bars & Billets	Ti-4Al-2.5V-1.5Fe
54	53	ASTM/ASME	B/SB-348	5	R56400		130/120 [895/825]	Bars & Billets	Ti-6Al-4V

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
<b>Titanium and Titanium Base Alloys</b>									
54	52	ASTM/ASME	B/SB-348	6	R54520		120/115 [825/795]	Bars & Billets	Ti-5Al-2.5Sn
54	53	ASTM/ASME	B/SB-363	WPT 23	R56407		120/110 [825/760]	Seamless & Welded Fittings	Ti-6Al-4V-ELI
54	53	ASTM/ASME	B/SB-363	WPT 24	R56405		130/120 [895/825]	Seamless & Welded Fittings	Ti-6Al-4V-Pd
54	53	ASTM/ASME	B/SB-363	WPT 25	R56403		130/120 [895/825]	Seamless & Welded Fittings	Ti-6Al-4V-Ni-Pd
54	53	ASTM/ASME	B/SB-367	C-5	R56400		130/120 [895/825]	Castings	Ti-6Al-4V
54	52	ASTM/ASME	B/SB-367	C-6	R54520		115/105 [795/725]	Castings	Ti-5Al-2.5Sn
54	53	ASTM/ASME	B/SB-381	F-23	R56407		120/110 [825/760]	Forgings	Ti-6Al-4V-ELI
54	53	ASTM/ASME	B/SB-381	F-24	R56405		130/120 [895/825]	Forgings	Ti-6Al-4V-Pd
54	53	ASTM/ASME	B/SB-381	F-25	R56403		130/120 [895/825]	Forgings	Ti-6Al-4V-Ni-Pd
54	53	ASTM/ASME	B/SB-381	F-5	R56400		130/120 [895/825]	Forgings	Ti-6Al-4V
54	52	ASTM/ASME	B/SB-381	F-6	R54520		120/115 [825/795]	Forgings	Ti-5Al-2.5Sn
54	53	ASTM/ASME	B/SB-861	23	R56407		120/110 [825/760]	Seamless Pipe	Ti-6Al-4V-ELI
54	53	ASTM/ASME	B/SB-861	24	R56405		130/120 [895/825]	Seamless Pipe	Ti-6Al-4V-Pd
54	53	ASTM/ASME	B/SB-861	25	R56403		130/120 [895/825]	Seamless Pipe	Ti-6Al-4V-Ni-Pd
54	53	ASTM/ASME	B/SB-861	29	R56404		120/110 [825/760]	Seamless Pipe	Ti-6Al-4V-Pd-ELI-Ru
54	53	ASTM/ASME	B/SB-861	35	R56340		130/120 [895/825]	Seamless Pipe	Ti-4Al-2.5V-1.5Fe
54	53	ASTM/ASME	B/SB-861	5	R56400		130/120 [895/825]	Seamless Pipe	Ti-6Al-4V
54	53	ASTM/ASME	B/SB-862	23	R56407		120/110 [825/760]	Welded Pipe	Ti-6Al-4V-ELI
54	53	ASTM/ASME	B/SB-862	24	R56405		130/120 [895/825]	Welded Pipe	Ti-6Al-4V-Pd
54	53	ASTM/ASME	B/SB-862	25	R56403		130/120 [895/825]	Welded Pipe	Ti-6Al-4V-Ni-Pd
54	53	ASTM/ASME	B/SB-862	29	R56404		120/110 [825/760]	Welded Pipe	Ti-6Al-4V-Pd-ELI-Ru
54	53	ASTM/ASME	B/SB-862	35	R56340		130/120 [895/825]	Welded Pipe	Ti-4Al-2.5V-1.5Fe
54	53	ASTM/ASME	B/SB-862	5	R56400		130/120 [895/825]	Welded Pipe	Ti-6Al-4V
54	52	AMS	4915	—	R54810	>0.187 and ≤0.5 [>5 and ≤13]	145/135 [1000/930]	Plate	Ti-8Al-1Mo-1V
54	52	AMS	4915	—	R54810	>2.5 and ≤4 [>65 and ≤100]	120/110 [825/760]	Plate	Ti-8Al-1Mo-1V
54	52	AMS	4915	—	R54810	>1 and ≤2.5 [>25 and ≤65]	130/120 [895/825]	Plate	Ti-8Al-1Mo-1V

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
54	52	AMS	4915	—	R54810	>0.5 and ≤1 [>13 and ≤25]	140/130 [965/895]	Plate	Ti-8Al-1Mo-1V
54	52	AMS	4915	—	R54810	≤0.187 [≤5]	145/135 [1000/930]	Sheet & Strip	Ti-8Al-1Mo-1V
54	52	AMS	4919	—	R54620		135/125 [930/860]	Sheet	Ti-6Al-4Zr-2Mo-2Sn
54	52	AMS	4973	—	R54810	>2.5 and ≤4 [>65 and ≤100]	120/110 [825/760]	Forgings	Ti-8Al-1Mo-1V
54	52	AMS	4973	—	R54810	≤2.5 [≤65]	130/120 [895/825]	Forgings	Ti-8Al-1Mo-1V
54	52	AMS	4975	—	R54620		130/120 [895/825]	Bar	Ti-6Al-4Zr-2Mo-2Sn
54	52	AMS	4976	—	R54620		130/120 [895/825]	Forgings	Ti-6Al-4Zr-2Mo-2Sn

**Table C-2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
61	61	ASTM	B351	R60001	R60001	42/20 [290/140]		Bar, Rod, & Wire	99.9Zr
61	61	ASTM	B351	R60802	R60802	60/35 [415/240]		Bar, Rod, & Wire	98Zr-1.45Sn-0.28(Fe+Ni+Cr)
61	61	ASTM	B351	R60804	R60804	60/35 [415/240]		Bar, Rod, & Wire	98.2Zr-1.5Sn-0.32(Fe+Cr)
61	61	ASTM	B353	R60001	R60001	42/20 [290/140]		Plate, Sheet, & Strip	99.9Zr
61	61	ASTM	B352	R60802	R60802	58/35 [400/240]		Plate, Sheet, & Strip	98Zr-1.45Sn-0.28(Fe+Ni+Cr)
61	61	ASTM	B352	R60804	R60804	56/35 [385/240]		Sheet & Strip	98.2Zr-1.5Sn-0.32(Fe+Cr)
61	61	ASTM	B352	R60804	R60804	58/35 [400/240]		Plate	98.2Zr-1.5Sn-0.32(Fe+Cr)
61	61	ASTM	B353	R60001	R60001	42/20 [290/140]		Seamless & Welded Tube	99.9Zr
61	61	ASTM	B353	R60802	R60802	60/35 [415/240]		Seamless & Welded Tube	98Zr-1.45Sn-0.28(Fe+Ni+Cr)
61	61	ASTM	B353	R60804	R60804	60/35 [415/240]		Seamless & Welded Tube	98.2Zr-1.5Sn-0.32(Fe+Cr)
61	61	ASTM/ASME	B/SB-493	R60702	R60702	55/30 [380/205]		Forgings	99.2Zr
61	61	ASTM/ASME	B/SB-523	R60702	R60702	55/30 [380/205]		Seamless & Welded Tube	99.2Zr
61	61	ASTM/ASME	B/SB-550	R60702	R60702	55/30 [380/205]		Bar & Wire	99.2Zr
61	61	ASTM/ASME	B/SB-551	R60702	R60702	55/30 [380/205]		Plate, Sheet, & Strip	99.2Zr
61	61	ASTM/ASME	B/SB-653	R60702	R60702	55/30 [380/205]		Seamless & Welded Fittings	99.2Zr
61	61	ASTM/ASME	B/SB-658	R60702	R60702	55/30 [380/205]		Seamless & Welded Pipe	99.2Zr
62	62	ASTM	B351	R60901	R60901	65/45 [450/310]		Bar, Rod, & Wire	97.3Zr-2.6Cb
62	62	ASTM	B352	R60901	R60901	65/45 [450/310]		Plate, Sheet, & Strip	97.3Zr-2.6Cb
62	62	ASTM	B353	R60901	R60901	65/45 [450/310]		Seamless & Welded Tube	97.3Zr-2.6Cb
62	62	ASTM	B353	R60904	R60904	65/45 [450/310]		Seamless & Welded Tube	97.35Zr-2.65Cb
62	62	ASTM/ASME	B/SB-493	R60704	R60704	60/35 [415/240]		Forgings	97.5Zr-1.55Sn-0.3(Fe+Cr)
62	62	ASTM/ASME	B/SB-493	R60705	R60705	70/55 [485/380]		Forgings	95.5Zr+2.5Cb
62	62	ASTM/ASME	B/SB-523	R60704	R60704	60/35 [415/240]		Seamless & Welded Tube	97.5Zr-1.5Sn-0.3(Fe+Cr)
62	62	ASTM/ASME	B/SB-523	R60705	R60705	80/55 [550/380]		Seamless & Welded Tube	95.5Zr+2.5Cb
62	62	ASTM/ASME	B/SB-550	R60704	R60704	60/35 [415/240]		Bar & Wire	97.5Zr-1.5Sn-0.3(Fe+Cr)
62	62	ASTM/ASME	B/SB-550	R60705	R60705	80/55 [550/380]		Bar & Wire	95.5Zr+2.5Cb
62	62	ASTM/ASME	B/SB-551	R60704	R60704	60/35 [415/240]		Plate, Sheet, & Strip	97.5Zr-1.55Sn-0.3(Fe+Cr)
62	62	ASTM/ASME	B/SB-551	R60705	R60705	80/55 [550/380]		Plate, Sheet, & Strip	95.5Zr+2.5Cb
62	62	ASTM/ASME	B/SB-551	R60706	R60706	74/50 [510/345]		Plate, Sheet, & Strip	95.5Zr+2.5Cb

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**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
62	62	ASTM/ASME	B/SB-658	R60704	R60704		60/35 [415/240]	Seamless & Welded Pipe	97.5Zr-1.5Sn-0.3(Fe+Cr)
62	62	ASTM/ASME	B/SB-658	R60705	R60705		80/55 [550/380]	Seamless & Welded Pipe	95.5Zr+2.5Cb

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I.2.2.1, and I.3)**

Material Number	ISO 15608 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
81	—	ASTM	B90	AZ31B	M11311		32/— [220/—]	Plate & Sheet	95.5Mg-3Al-Zn-Mn
81	—	ASTM	B90	AZ31C	M11312	≥0.06 and ≤3 [≥1.5 and ≤80]	32/15 [220/105]	Plate & Sheet	95.5Mg-3Al-Zn
81	—	ASTM	B90	AZ31C	M11312	≥0.016 and ≤0.06 [≥0.4 and ≤1.5]	32/18 [220/125]	Sheet	95.5Mg-3Al-Zn
81	—	ASTM	B90	HK31A	M13310	≥0.016 and ≤0.5 [≥0.4 and ≤13]	30/16 [205/110]	Plate & Sheet	95.5Mg-3Al-Zn
81	—	ASTM	B90	HK31A	M13310	>0.5 and ≤1 [>13 and ≤25]	30/15 [205/105]	Plate	95.5Mg-3Al-Zn
81	—	ASTM	B90	HK31A	M13310	>1 and ≤3 [>25 and ≤80]	29/14 [200/97]	Plate	95.5Mg-3Al-Zn
81	—	ASTM	B90	ZE10A	M16100	≥0.25 and ≤0.5 [≥6 and ≤13]	29/12 [200/83]	Plate	98Mg-1.25Zn-0.17Re
81	—	ASTM	B90	ZE10A	M16100	≥0.016 and ≤0.06 [≥0.4 and ≤1.5]	30/18 [205/125]	Sheet	98Mg-1.25Zn-0.17Re
81	—	ASTM	B90	ZE10A	M16100	>0.06 and ≤0.25 [>1.5 and ≤6]	30/15 [205/105]	Sheet	98Mg-1.25Zn-0.17Re
81	—	ASTM	B91	AZ31B	M11311		32/15 [220/105]	Forgings	95.5Mg-3Al-Zn-Mn
81	—	ASTM	B91	AZ61A	M11610		35/19 [240/130]	Forgings	92.5Mg-6Al-Zn
81	—	ASTM	B107	AZ31B	M11311	≥0.25 and <1.5 [≥6 and <40]	32/19 [220/130]	Bar, Rods, Profiles, & Wire	95.5Mg-3Al-Zn-Mn
81	—	ASTM	B107	AZ31B	M11311	>0.25 and ≤0.75 [>6 and ≤20]	29/13 [200/90]	Tube	95.5Mg-3Al-Zn-Mn
81	—	ASTM	B107	AZ31B	M11311	≥0.028 and ≤0.25 [≥1 and ≤6]	29/17 [200/115]	Tube	95.5Mg-3Al-Zn-Mn
81	—	ASTM	B107	AZ31B	M11311		29/13 [200/90]	Hollow Profiles	95.5Mg-3Al-Zn-Mn
81	—	ASTM	B107	AZ31B	M11311	≥1.5 and <2.5 [≥40 and <60]	31/19 [215/130]	Bar, Rods, Profiles, & Wire	95.5Mg-3Al-Zn-Mn
81	—	ASTM	B107	AZ31B	M11311	<0.25 [ <6]	32/18 [220/125]	Bar, Rods, Profiles, & Wire	95.5Mg-3Al-Zn-Mn
81	—	ASTM	B107	AZ31B	M11311	≥2.5 and <5 [≥60 and <130]	29/17 [200/115]	Bar, Rods, Profiles, & Wire	95.5Mg-3Al-Zn-Mn

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
81	—	ASTM	B107	AZ31C	M11312	≥1.5 and <2.5 [≥40 and <60]	31/19 [215/130]	Bar, Rods, Profiles, & Wire	95.5Mg-3Al-Zn
81	—	ASTM	B107	AZ31C	M11312	>0.25 and ≤0.75 [≥6 and ≤20]	29/13 [200/90]	Tube	95.5Mg-3Al-Zn
81	—	ASTM	B107	AZ31C	M11312	<0.25 [≤6]	32/18 [220/125]	Bar, Rods, Profiles, & Wire	95.5Mg-3Al-Zn
81	—	ASTM	B107	AZ31C	M11312	≥0.25 and <1.5 [≥6 and <40]	32/19 [220/130]	Bar, Rods, Profiles, & Wire	95.5Mg-3Al-Zn
81	—	ASTM	B107	AZ31C	M11312	≥2.5 and <5 [≥60 and <130]	29/17 [200/115]	Bar, Rods, Profiles, & Wire	95.5Mg-3Al-Zn
81	—	ASTM	B107	AZ31C	M11312		29/13 [200/90]	Hollow Profiles	95.5Mg-3Al-Zn
81	—	ASTM	B107	AZ31C	M11312	≥0.028 and ≤0.25 [≥1 and ≤6]	29/17 [200/115]	Tube	95.5Mg-3Al-Zn
81	—	ASTM	B107	AZ61A	M11610		33/13 [230/90]	Hollow Profiles	92.5Mg-6Al-Zn
81	—	ASTM	B107	AZ61A	M11610	≥0.028 and ≤0.75 [≥1 and ≤20]	33/13 [230/90]	Tube	92.5Mg-6Al-Zn
81	—	ASTM	B107	AZ61A	M11610	≥0.25 and <2.5 [≥6 and <60]	37/21 [255/145]	Bar, Rods, Profiles, & Wire	92.5Mg-6Al-Zn
81	—	ASTM	B107	AZ61A	M11610	<0.25 [≤6]	35/18 [240/125]	Bar, Rods, Profiles, & Wire	92.5Mg-6Al-Zn
81	—	ASTM	B107	AZ61A	M11610	≥2.5 and <5 [≥60 and <130]	37/19 [255/130]	Bar, Rods, Profiles, & Wire	92.5Mg-6Al-Zn
81	—	ASTM	B107	M1A	M15100		33/13 [230/90]	Hollow Profiles	98Mg-Mn
81	—	ASTM	B107	M1A	M15100	<0.25 [≤6]	35/18 [240/125]	Bar, Rods, Profiles, & Wire	98Mg-Mn
81	—	ASTM	B107	M1A	M15100	≥0.25 and <2.5 [≥6 and <60]	37/21 [255/145]	Bar, Rods, Profiles, & Wire	98Mg-Mn
81	—	ASTM	B107	M1A	M15100	≥2.5 and <5 [≥60 and <130]	37/19 [255/130]	Bar, Rods, Profiles, & Wire	98Mg-Mn
81	—	ASTM	B107	M1A	M15100	≥0.028 and ≤0.75 [≥1 and ≤20]	33/13 [230/90]	Tube	98Mg-Mn
83	—	ASTM	B80	AZ91C, F	M11914		21/10 [145/69]	Castings	90.5Mg-9Al-Zn-Mn
83	—	ASTM	B80	AZ92A, F	M11920		21/10 [145/69]	Castings	88.5Mg-9Al-2Zn-Mn
83	—	ASTM	B80	K1A	M18010		22/5 [150/34]	Castings	99.6Mg-Zr

(Continued)

**Table C.2 (Continued)**  
**M-Number Listing of Base Metals—Nonferrous Alloys (see C.1, I2.2.1, and I3)**

Material Number	ISO Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Thickness or Diameter Limitations, in [mm]	Minimum Tensile/Yield Strength, ksi [MPa]	Product Form	Nominal Composition
83	—	ASTM	B199	AM100A	M10100		18/9 [125/62]	Castings	89.5Mg-10Al-Mn
83	—	ASTM	B199	AZ91C, F	M11914		21/10 [145/69]	Castings	90.5Mg-9Al-Zn-Mn
83	—	ASTM	B199	AZ92A, F	M11920		21/10 [145/69]	Castings	88.5Mg-9Al-2Zn-Mn
83	—	ASTM	B403	AM100A, F	M10100		18/9 [125/62]	Castings	89.5Mg-10Al-Mn
83	—	ASTM	B403	AZ91C, F	M11914		16/9 [110/62]	Castings	90.5Mg-9Al-Zn-Mn
83	—	ASTM	B403	AZ92A, F	M11920		18/9 [125/62]	Castings	88.5Mg-9Al-2Zn-Mn
83	—	ASTM	B403	K1A	M18010		22/5 [150/34]	Castings	99.6Mg-Zr



**Table C.3**  
**Listing of Base Metal Specifications—Iron Castings**

AWS D11.2 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Minimum As-Welded Tensile/Yield Strength, ksi [MPa]	Type of Base Metal	Nominal Composition
<b>Iron Castings<sup>a, b</sup></b>							
A	ASTM	A48	Class 20	F11401	20/- [138/-]	Gray Cast Iron	Not Specified
A	ASTM	A48	Class 25	F11701	25/- [172/-]	Gray Cast Iron	Not Specified
A	ASTM	A48	Class 30	F12101	30/- [207/-]	Gray Cast Iron	Not Specified
A	ASTM	A48	Class 35	F12401	35/- [241/-]	Gray Cast Iron	Not Specified
A	ASTM	A48	Class 40	F12801	40/- [276/-]	Gray Cast Iron	Not Specified
A	ASTM	A48	Class 45	F13101	45/- [310/-]	Gray Cast Iron	Not Specified
A	ASTM	A48	Class 50	F13501	50/- [345/-]	Gray Cast Iron	Not Specified
A	ASTM	A48	Class 55	F13801	55/- [379/-]	Gray Cast Iron	Not Specified
A	ASTM	A48	Class 60	F14101	60/- [414/-]	Gray Cast Iron	Not Specified
A	ASTM	A74	Class A	—	21/- [145/-]	Gray Cast Iron	0.75 Max.P, 0.15 Max.S
A	ASTM	A126	Class A	F11501	21/- [145/-]	Gray Cast Iron	0.75 Max.P, 0.15 Max.S
A	ASTM	A126	Class B	F12102	31/- [214/-]	Gray Cast Iron	0.75 Max.P, 0.15 Max.S
A	ASTM	A126	Class C	F12103	41/- [283/-]	Gray Cast Iron	0.75 Max.P, 0.15 Max.S
A	ASTM	A159	Grade 1800	F10004	18/- [124/-]	Gray Cast Iron	0.55Si-0.65Mn; 4.35CE
A	ASTM	A159	Grade 2500	F10005	25/- [172/-]	Gray Cast Iron	2.2 Si-0.75Mn; 4.12CE
A	ASTM	A159	Grade 2500a	F10009	25/- [172/-]	Gray Cast Iron	1.85Si-0.75Mn; 4.12 CE
A	ASTM	A159	Grade 3000	F10006	30/- [207/-]	Gray Cast Iron	2.1Si-0.75Mn; 4.02CE
A	ASTM	A159	Grade 3500	F10007	35/- [241/-]	Gray Cast Iron	2.0Si-0.75Mn; 3.8CE
A	ASTM	A159	Grade 3500b	F10010	35/- [241/-]	Gray Cast Iron	1.55Si-0.75Mn; 3.8CE
A	ASTM	A159	Grade 3500c	F10011	35/- [241/-]	Gray Cast Iron	1.55Si-0.75Mn; 3.8CE
A	ASTM	A159	Grade 4000	F10008	40/- [276/-]	Gray Cast Iron	1.95Si-0.85Mn; 3.8CE
A	ASTM	A159	Grade 4000d	F10012	40/- [276/-]	Gray Cast Iron	1.95Si-0.85Mn; 3.8CE
A	ASTM	A319	Class I	F10001	25/- [172/-]	Gray Cast Iron	Not Specified
A	ASTM	A319	Class II	F10002	30/- [207/-]	Gray Cast Iron	Not Specified
A	ASTM	A319	Class III	F10003	40/- [276/-]	Gray Cast Iron	Not Specified
A	SAE	J431	G1800	F10004	18/- [124/-]	Gray Cast Iron	2.3Si-0.65Mn; 4.35CE
A	SAE	J431	G2500	F10005	25 [172]	Gray Cast Iron	2.3Si-0.75Mn; 4.12CE
A	SAE	J431	G3000	F10006	30 [207]	Gray Cast Iron	2.1Si-0.65Mn; 4.02CE
A	SAE	J431	G3500	F10007	35 [241]	Gray Cast Iron	2.0Si-0.75Mn; 3.8CE
A	SAE	J431	G4000	F10008	40 [276]	Gray Cast Iron	1.95Si-0.95Mn; 3.8CE
B	ASTM	A536	100-70-03	F34800	100/70 [689/483]	Ductile	Not Specified
B	ASTM	A536	120-90-02	F36200	120/90 [827/621]	Ductile	Not Specified
B	ASTM	A536	60-40-18	F32800	60/40 [414/276]	Ductile	Not Specified
B	ASTM	A536	65-45-12	F33100	65/42 [448/290]	Ductile	Not Specified
B	ASTM	A536	80-55-06	F33800	80/55 [552/379]	Ductile	Not Specified
B	ASTM	A716	60-42-10	F32900	60/- [414/-]	Ductile	Not Specified
B	ASTM	A746	60-42-10	—	60/- [414/-]	Ductile	Not Specified
B	ASTM	A874	—	—	45/30 [310/207]	Ductile	3.35C-1.75Si
B	ASTM	A897	125-80-10	—	125/80 [862/552]	Ductile	1.0Ni-0.5Cu-0.35Mn-0.015Mo
B	SAE	J434	D4018	F32800	60/- [414/-]	Ductile	Not Specified

**Table C.3 (Continued)**  
**Listing of Base Metal Specifications—Iron Castings**

AWS D11.2 Group	Standard	Base Metal Specification	Type, Grade, or Alloy Designation	UNS Number	Minimum As-Welded Tensile/Yield Strength, ksi [MPa]	Type of Base Metal	Nominal Composition
<b>Iron Castings<sup>a, b</sup></b>							
B	SAE	J434	D4512	F33100	65/- [448/-]	Ductile	Not Specified
B	SAE	J434	D5506	F33800	80/- [552/-]	Ductile	Not Specified
B	SAE	J434	D7003	F34800	100/- [689/-]	Ductile	Not Specified
C	ASTM	A47	32510	F22200	50/- [345/-]	Malleable	Not Specified
C	ASTM	A47	35018	F22400	53/- [365/-]	Malleable	Not Specified
C	ASTM	A197	—	F22200	40/- [276/-]	Malleable	Not Specified
C	ASTM	A220	40010	F22830	60/- [414/-]	Malleable	Not Specified
C	ASTM	A220	45006	F23131	65/- [448/-]	Malleable	Not Specified
C	ASTM	A220	45008	F23130	65/- [448/-]	Malleable	Not Specified
C	ASTM	A220	50005	F23530	70/- [483/-]	Malleable	Not Specified
C	ASTM	A220	60004	F24130	80/- [552/-]	Malleable	Not Specified
C	ASTM	A220	70003	F24830	85/- [586/-]	Malleable	Not Specified
C	ASTM	A220	80002	F25530	95/- [655/-]	Malleable	Not Specified
C	ASTM	A220	90001	F26230	105/- [724/-]	Malleable	Not Specified
C	ASTM	A602	M3210	F20000	50/- [345/-]	Malleable	Not Specified
C	ASTM	A602	M4504	F20000	65/- [448/-]	Malleable	Not Specified
C	ASTM	A602	M5003	F20000	75/- [517/-]	Malleable	Not Specified
C	SAE	J158a	M3210	F20000	50/- [345/-]	Malleable	Not Specified
C	SAE	J158a	M4504	F20001	65/- [448/-]	Malleable	Not Specified

<sup>a</sup> In the absence of an M number to group the alloys, a separate procedure qualification is required for each group of the above materials.

<sup>b</sup> The groups are based on AWS D11.2.

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## **Annex D (Normative)**

### **Radiographic Examination Procedure (see 5.5.2)**

This annex is part of AWS B2.1/B2.1M:2014, *Specification for Welding Procedure and Performance Qualification*, and includes mandatory elements for use with this standard.

#### **D1. General**

**D1.1** This procedure defines requirements for radiographic examination of those qualification test weldments specified to have radiographic examination.

#### **D2. Radiographic Procedure**

**D2.1** Radiographs shall be made by either x-rays or other high-energy radiation source methods. Film shall be clean and free of artifacts and film processing defects in the area of interest. Unless otherwise specified in the Referencing Document, radiography shall be performed in accordance with ASME *Boiler and Pressure Vessel Code*, Section V, Article 2, or ASTM E94, *Standard Guide for Radiographic Testing*. As a minimum the film shall contain:

(1) The welder's name or identification number and the WPS number, or alternatively, a test number may be used if traceable to the required data.

(2) The radiograph shall be within the required film density. When multiple radiographs are required to cover the weld, markers shall be used to indicate the location that each radiograph covers.

**D2.2** Radiography shall be performed in accordance with all applicable safety requirements.

**D2.3** Penetrators shall conform to the requirements of ASTM E94, *Standard Guide for Radiographic Testing*, or ASTM E747, *Standard Practice for Design, Manufacture and Material Grouping Classification of Wire Image Quality Indicators (IQI) Used for Radiology*. Alternatively, hole type or wire penetrators may conform to ASME *Boiler and Pressure Vessel Code*, Section V.

**D2.4** Weld reinforcement may be removed at the Qualifier's option, except that root reinforcement shall not be removed from single-welded joints with a groove weld. Backing shall not be removed. Shims of material that is radiographically similar to the base metal shall be placed under penetrators so that the total thickness of material between the penetrator and the film is at least equal to the average thickness of the base metal plus weld reinforcement and backing.

Radiographs shall be made with a single source of radiation centered approximately over the weld. The perpendicular distance from the radiation source to the film shall be not less than seven times the maximum thickness of the base metal plus weld reinforcement and backing. The film, during exposure, shall be as close to the weld surface opposite the source of radiation as possible.

#### **D3. Personnel Requirements**

Personnel performing radiography shall be qualified in accordance with ASNT SNT-TC-1A or equivalent. Acceptance of radiographs shall be the responsibility of the Qualifier.

## D4. Acceptance Criteria

The entire weld, except for the discard on plate, shall be examined.

**D4.1** When the qualification test is a Standard Test Weldment, a minimum of 6 in [152 mm] of weld length shall be examined, except that for pipe the entire weld shall be examined. Multiple welds may be required for small diameter test weldments to permit an examination of 6 in [152 mm] of weld. No more than four joints need be examined to meet this requirement.

**D4.2** When qualification is based upon a production weldment the criteria for acceptance of the weld shall be as required by the Referencing Document. The criteria for acceptance of the welder or welding operator shall be in accordance with the acceptance criteria of D4.4. The extent of the examination shall be in accordance with Clause D4 and D4.1, except that for operators, the minimum length of weld examined shall be 3 ft [1 m].

**D4.3** Face reinforcement may be removed at the option of the Qualifier. Root reinforcement or backing strips shall not be removed from single-welded groove joints.

**D4.4** Acceptance shall be in accordance with the following requirements.

(1) There shall be no cracks, incomplete joint penetration, or incomplete fusion. Root concavity in the test weldment is permitted, provided the film density through the weld is not less than that through the base metal.

(2) Acceptable linear indications shall be as shown in Table D.1. Linear discontinuities are those in which the length is more than three times the width.

(3) Acceptable rounded indications shall be as shown in Table D.2 and Figure D.1. Rounded discontinuities are those having a length less than three times the width and may be circular, elliptical, or irregular in shape.

**Table D.1**  
**Acceptable Linear Discontinuities for Radiographic Examination (see D4.4)**

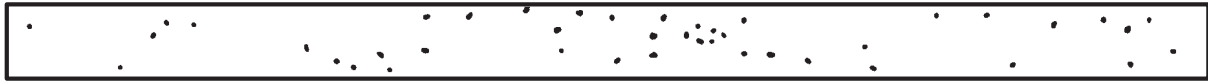
Weld Metal Thickness (t), in [mm]	Maximum Discontinuity, in [mm]	Maximum Aggregate Length Aligned Indications <sup>a</sup>
Up to 3/8 [9.5] inclusive	1/8 [3.2]	t in a length of 12t
Over 3/8 to 2-1/4 [9.5 to 57]	1/3t	t in a length of 12t
Over 2-1/4 [57]	3/4 [19]	t in a length of 12t

<sup>a</sup> Aligned indications are those where the distance between the successive indications is less than 6L, where L is the length of the longest indication in the group.

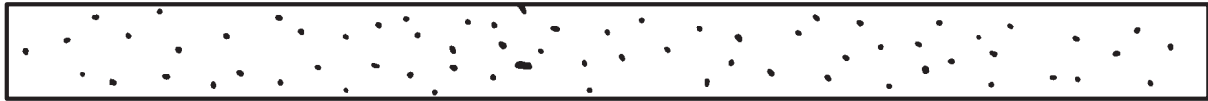
**Table D.2**  
**Acceptable Rounded Discontinuities for Radiographic Examination (see D4.4)**

Weld Metal Thickness (t), in [mm]	Maximum Acceptable Discontinuities	
	Single	Multiple
< 1/8 [3.2]	20% of t	A maximum of 12 acceptable indications in 6 in [150 mm] of weld
≥ 1/8 [3.2] or thicker <sup>a</sup>	The less of 20% of t or 1/8 in [3.2 mm]	Per chart Figure <u>D.1</u>

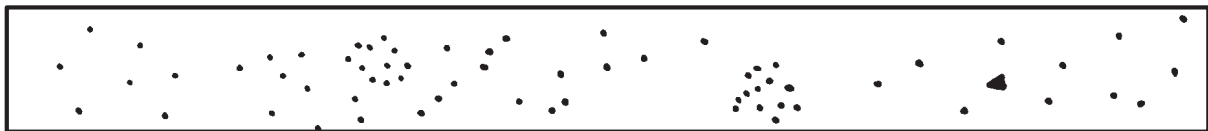
<sup>a</sup> Rounded indications less than 1/32 in [0.8 mm] maximum diameter shall not be considered in this thickness range. Root concavity is permitted provided the film density through the area of interest is not less than that through the base metal.



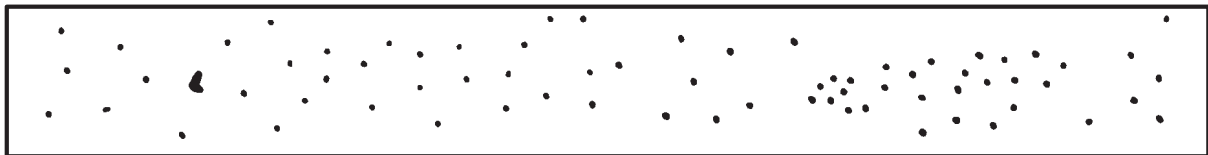
TYPICAL QUANTITY AND SIZE PERMITTED IN 6 in [125 mm]  
LENGTH OF WELD 1/8 in TO 1/4 in [3 mm TO 6 mm] THICKNESS



TYPICAL QUANTITY AND SIZE PERMITTED IN 6 in [125 mm]  
LENGTH OF WELD OVER 1/4 in TO 1/2 in [6 mm TO 13 mm] THICKNESS



TYPICAL QUANTITY AND SIZE PERMITTED IN 6 in [125 mm]  
LENGTH OF WELD OVER 1/2 in TO 1 in [13 mm TO 25 mm] THICKNESS



TYPICAL QUANTITY AND SIZE PERMITTED IN 6 in [152 mm]  
LENGTH OF WELD OVER 1 in [25 mm] THICKNESS

**Figure D.1—Rounded Indication Charts for Radiographic Examination (see Table D.2)**

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## **Annex E (Informative)**

### **Basis for Establishing a Standard Welding Procedure Specification (SWPS) (see 4.1.2)**

This annex is not part of AWS B2.1/B2.1M:2014, *Specification for Welding Procedure and Performance Qualification*, but is included for informational purposes only.

The American Welding Society, acting under ANSI rules for consensus standards, publishes AWS Standard Welding Procedure Specifications (SWPSs) which are initiated by the Welding Procedures Committee of the Welding Research Council (WRC). In initiating SWPSs for consideration as AWS standards, the WRC Committee is guided by the successful service experience in welded construction of the combination of base materials, welding process(es), and welding filler metals covered by the scope of each SWPS. An SWPS must meet the rules for qualification of AWS B2.1, *Specification for Welding Procedure and Performance Qualification*, and be approved by the AWS B2 Committee on Procedure and Performance Qualification. All SWPSs are supported by Procedure Qualification Records (PQRs) which meet the rules of AWS B2.1 and which in addition are intended to meet the rules of the major codes which govern the intended applications such as AWS Structural Codes (D1.1, D1.2, D1.3, etc.), AWS Sheet Metal Welding Code (D9.1), ASME *Boiler and Pressure Vessel Code*, Section IX, NAVSEA Technical Publication S9074-AQ-GIB-010/248, Requirements for Welding and Brazing Procedure and Performance Qualification, NAVSEA Technical Publication S9074-AR-GIB-010/278, Requirements for Fabrication Welding and Inspection, and CASTING Inspection and Repair for Machinery, Piping and Pressure Vessels, MIL-STD-1689, Fabrication, Welding and Inspection of Ships Structure, NAVSEA Technical Publication T9074-AD-GIB-010/688, Requirements for Fabrication Welding, and Inspection of Submarine Structures, and American Bureau of Shipping (ABS) Navel Vessel Rules (NVR).

The data to support a Standard Welding Procedure Specification are derived from Procedure Qualification Records (PQRs) generated by the Welding Procedures Committee of the WRC and PQRs received from industry and government agencies. For all committee generated PQRs, the welding, testing, and evaluation are performed under the direct supervision of the WRC Welding Procedures Committee.

To be referenced as a supporting document for an SWPS, a PQR received from an industry or government agency must be qualified and documented in accordance with one of the nationally recognized codes or specifications such as AWS D1.1 through AWS D1.6, AWS D15.1, AWS D14.1 through AWS D14.6, ASME *Boiler and Pressure Vessel Code*, Section IX, NAVSEA Technical Publication S9074-AQ-GIB-010/248, Requirements for Welding and Brazing Procedure and Performance Qualification, or American Bureau of Shipping (ABS) Navel Vessel Rules (NVR). The Welding Procedures Committee of the WRC reviews and validates these PQRs before entering the information contained on them into a data bank.

It is the policy of the AWS B2 Committee that the range of conditions and variables listed for an SWPS be more restrictive than permitted by application of the full range of conditions and variables allowed by the B2.1 document or by other American National Standards (such as AWS D1.1 through AWS D1.6 or ASME *Boiler and Pressure Vessel Code*, Section IX). The purpose of this policy is to restrict the WPS to a high probability of successful application by all users. In judging the extent of such restriction, the Committee is guided by the number and scope of the supporting PQRs, including the specific material, thickness and value for each welding variable used for the development of the PQR, and by known fabrication experience. The minimum number of supporting PQRs required by the Committee is two, but is usually in the range of two to fifty, the specific minimum number being a Committee decision for each WPS. It is the intent of the AWS B2 Committee to have SWPSs only for commonly welded materials and common manual and semiautomatic welding processes.



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## **Annex F (Informative)**

### **Sample Forms (see 4.1.4 and 5.1.8)**

This annex is not part of AWS B2.1/B2.1M:2014, *Specification for Welding Procedure and Performance Qualification*, but is included for informational purposes only.

#### **F1. General**

There is no required format for Welding Procedure Specifications (WPSs), Procedure Qualification Records (PQRs), and Performance Qualification Test Records (PQTRs). Any form may be used. Refer to 4.13 and 4.14 for inclusion of all required data or variables. Examples of forms for documenting qualification tests appear as Figures F.1 through F.5.

**SAMPLE PERFORMANCE QUALIFICATION TEST RECORD**  
(SMAW, GMAW, GTAW, FCAW, SAW, OFW, PAW)

Name \_\_\_\_\_ Welder  Welding Operator   
 ID No. \_\_\_\_\_ WPS Used \_\_\_\_\_  
 Process(es) \_\_\_\_\_ Transfer Mode (GMAW) \_\_\_\_\_  
 Test Base Metal Specification \_\_\_\_\_ To \_\_\_\_\_  
 Material Number \_\_\_\_\_ To \_\_\_\_\_  
 Fuel Gas (OFW) \_\_\_\_\_  
 AWS Filler Metal Classification(s) \_\_\_\_\_ F No. \_\_\_\_\_  
 Backing: Yes  No  Double Side  Single Side   
 Current/Polarity: AC  DCEP  DCEN   
 Consumable Insert: Yes  No  Backing Gas: Yes  No

Test Joint Sketch	
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**Test Weldment**      **Position Tested**      **Weldment Thickness (T)**

Groove: Pipe      1G   2G   5G   6G      Thickness \_\_\_\_\_ Diameter \_\_\_\_\_  
 Plate      1G   2G   3G   4G      Thickness \_\_\_\_\_  
 Fillet: Pipe      1F   2F   2FR   4F   5F      Thickness \_\_\_\_\_ Diameter \_\_\_\_\_  
 Plate      1F   2F   3F   4F      Thickness \_\_\_\_\_  
 Cladding:      1C   2C   3C   4C   5C   6C      Thickness \_\_\_\_\_  
 Hardfacing:      1C   2C   3C   4C   5C   6C      Thickness \_\_\_\_\_  
 Progression:      Vertical Up  Vertical Down

**Test Results**      Remarks \_\_\_\_\_

Visual Test:      Pass  Fail  N/A  \_\_\_\_\_  
 Bend Test:      Pass  Fail  N/A  \_\_\_\_\_  
 Macro Test:      Pass  Fail  N/A  \_\_\_\_\_  
 Break Test:      Pass  Fail  N/A  \_\_\_\_\_  
 Radiographic Test:      Pass  Fail  N/A  \_\_\_\_\_

**Qualification Limits**  
 Process(es) \_\_\_\_\_

<b>Weldment</b>	<b>Position</b>	<b>Deposit Thickness</b>
Groove: Pipe	F   H   V   O   All	t min. _____ t max. _____ Dia. min. _____
Plate	F   H   V   O   All	t min. _____ t max. _____
Cladding:	F   H   V   O   All	t min. _____ t max. _____
Hardfacing:	F   H   V   O   All	t min. _____ t max. _____
<b>Base Metal Thickness</b>		
Fillet: Pipe	F   H   V   O   All	T min. _____ T max. _____ Dia. min. _____
Plate	F   H   V   O   All	T min. _____ T max. _____

Progression:      Vertical Up  Vertical Down

Base Metal M No(s). \_\_\_\_\_ Fuel Gas (OFW) \_\_\_\_\_  
 Filler Metal F No(s). \_\_\_\_\_ Backing: Yes  No   
 Current/Polarity: AC  DCEP  DCEN  Consumable Insert: Yes  No   
 Backing Gas \_\_\_\_\_ Transfer Mode (GMAW) \_\_\_\_\_

I certify that the statements in this record are correct and the test welds were prepared, welded, and tested in accordance with the requirements of AWS B2.1/B2.1M, (\_\_\_\_\_), *Specification for Welding Procedure and Performance Qualification*.  
 (year)

Date Tested \_\_\_\_\_ Qualifier Signature \_\_\_\_\_

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**Figure F.1—Example of a Performance Qualification Test Record**



**Shielding (see 4.13.7)**

	Torch Shielding	Root Shielding	Trailing	Environmental Shielding
Gas(es)				
Composition				
Flow Rate				

**Electrical Characteristics (see 4.13.8)**

Current Type/Polarity \_\_\_\_\_  
 Pulsing: Yes  No   
 Current (Range) \_\_\_\_\_  
 Voltage (Range) \_\_\_\_\_  
 Wire Feed Speed (Range) \_\_\_\_\_  
 Tungsten Electrode Size/Type \_\_\_\_\_  
 Pulsing Parameters \_\_\_\_\_  
 Transfer Mode \_\_\_\_\_  
 Other \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Other Variables (see 4.13.9)**

Cup or Nozzle Size \_\_\_\_\_  
 Collet Body  or Glass Lens   
 Cleaning Method \_\_\_\_\_  
 Technique: Stringer  or Weave Bead   
 Cleaning Method \_\_\_\_\_  
 Number of Electrodes \_\_\_\_\_  
 Single  or Multipass   
 Contact Tip to Work Distance \_\_\_\_\_  
 Other \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Welding Parameters**

Layers	Process	Filler Metal		Electrical				Travel Speed Range
		Class	Diameter	Type and Polarity	Current Range	Wire Feed Speed	Voltage Range	

We, the undersigned, certify that the statements in this record are correct and the test welds were prepared, welded, and tested in accordance with the requirements of AWS B2.1/B2.1M, (\_\_\_\_\_), *Specification for Welding Procedure and Performance Qualification*.  
 (year)

Manufacturer or Contractor \_\_\_\_\_

Date \_\_\_\_\_ By \_\_\_\_\_  
 (Please Print) (Signature Required)

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**Figure F.2 (Continued)—Example of a Welding Procedure Specification**

**SAMPLE PROCEDURE QUALIFICATION RECORD (PQR)**

for SAW, SMAW, GMAW, GTAW, FCAW

Company \_\_\_\_\_ Approved by \_\_\_\_\_  
 (Signature Required)

PQR No. \_\_\_\_\_ Date \_\_\_\_\_

Welding Process(es) \_\_\_\_\_ Type(s) \_\_\_\_\_  
 (Manual, Semiautomatic, Automatic, Robotic, Mechanized)

**Joints (see 4.14.1)**

Joint Type \_\_\_\_\_

Backing \_\_\_\_\_

Backing Material (Type) \_\_\_\_\_

Groove Angle \_\_\_\_\_

Root Opening Radius: U  J

Root Face \_\_\_\_\_

Backgouging: Yes  No

Backgouging Method \_\_\_\_\_

**Joint Details**

Sketches, production drawings, welding symbols, or written description should show the general arrangement of the parts to be welded. Where applicable, the root details of the weld groove may be specified.

**Base Metals (see 4.14.2)**

M-No. \_\_\_\_\_ Group No. \_\_\_\_\_ or to M-No. \_\_\_\_\_ Group No. \_\_\_\_\_

Specification Type and Grade \_\_\_\_\_ to Specification Type and Grade \_\_\_\_\_

Thickness Range of Base Metal: Groove \_\_\_\_\_ Fillet \_\_\_\_\_

Pipe Diameter Range: Groove \_\_\_\_\_ Fillet \_\_\_\_\_

Other \_\_\_\_\_

**Filler Metals (see 4.14.3)**

Filler Metal F-No. \_\_\_\_\_ Other \_\_\_\_\_

AWS Classification \_\_\_\_\_ AWS Specification \_\_\_\_\_

Weld Metal Analysis A-No. \_\_\_\_\_ Other \_\_\_\_\_

Filler Metal Size \_\_\_\_\_ Electrode Flux (Class) \_\_\_\_\_

Weld Metal Thickness \_\_\_\_\_ Flux Trade Name \_\_\_\_\_

Consumable Insert \_\_\_\_\_ Other \_\_\_\_\_

**Positions (see 4.14.4)**

Position(s) of Groove \_\_\_\_\_

Position(s) of Fillet \_\_\_\_\_

Weld Progression \_\_\_\_\_

**Preheat (see 4.14.5)**

Preheat Temperature (Min.) \_\_\_\_\_

Temperature (Max.) \_\_\_\_\_

**PWHT (see 4.14.6)**

Temperature \_\_\_\_\_ Time \_\_\_\_\_

**Shielding (see 4.14.7)**

	Torch Shielding	Root Shielding	Trailing	Environmental Shielding
Gas(es)				
Composition				
Flow Rate				

**Figure F.3—Example of a Procedure Qualification Record**

**Electrical Characteristics and Welding Parameters  
(see 4.13.8)**

**Other Variables (see 4.14.9)**

Current Type/Polarity \_\_\_\_\_  
 Pulsing: Yes  No   
 Current (Range) \_\_\_\_\_  
 Voltage (Range) \_\_\_\_\_  
 Wire Feed Speed (Range) \_\_\_\_\_  
 Travel Speed (Range) \_\_\_\_\_  
 Tungsten Electrode Size/Type \_\_\_\_\_  
 Transfer Mode \_\_\_\_\_  
 Pulsing Parameters \_\_\_\_\_  
 Heat Input \_\_\_\_\_  
 Other \_\_\_\_\_

Cup or Nozzle Size \_\_\_\_\_  
 Collet Body  or Glass Lens   
 Cleaning Method \_\_\_\_\_  
 Technique: Stringer  or Weave Bead   
 Number of Electrodes \_\_\_\_\_  
 Number of Passes per Side \_\_\_\_\_  
 Other \_\_\_\_\_

**Test Results**

Visual Test Results \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Tensile Results**

Specimen No.	Width	Thickness	Area	Results		Failure Type and Location
				Maximum Load	Ultimate Tensile Strength	

<b>Guided Bend Tests</b>	<b>Qualification Results for Toughness Application</b>
Type and Figure Number	Type and Figure Number
Results	Results

<b>Fillet Weld Tests</b>	<b>Other Tests</b>
Type and Figure Number	Type and Figure Number
Results	Results

We, the undersigned, certify that the statements in this record are correct and the test welds were prepared, welded, and tested in accordance with the requirements of AWS B2.1/B2.1M, ( \_\_\_\_\_ ), *Specification for Welding Procedure and Performance Qualification*.  
 (year)

Manufacturer or Contractor \_\_\_\_\_

Date \_\_\_\_\_ By \_\_\_\_\_  
 Please Print Signature Required

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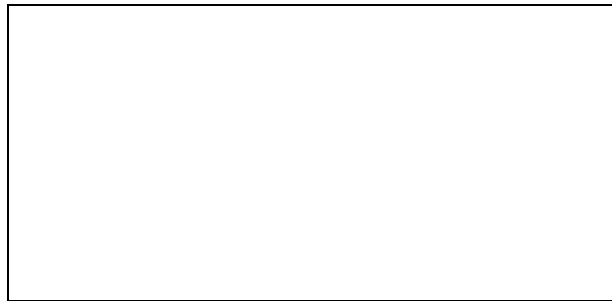
**Figure F.3 (Continued)—Example of a Procedure Qualification Record**

**STUD WELDING PROCEDURE SPECIFICATION (WPS) Yes**   
**OR PROCEDURE QUALIFICATION RECORD (PQR) Yes**   
**OR WELDER QUALIFICATION RECORD (WQR) Yes**

Company name \_\_\_\_\_  
 Supporting PQR no.(s) \_\_\_\_\_  
 Operator name \_\_\_\_\_  
 Stud material \_\_\_\_\_  
 Material specifications \_\_\_\_\_  
 Weld base diameter \_\_\_\_\_

Test no. \_\_\_\_\_  
 Revision no. \_\_\_\_\_ Date \_\_\_\_\_  
 By \_\_\_\_\_  
 Authorized by \_\_\_\_\_ Date \_\_\_\_\_

**Stud Base Sketch/Application Detail**



**Base material**

Specification \_\_\_\_\_  
 Alloy and temper \_\_\_\_\_  
 Group no. \_\_\_\_\_ Surface condition HR  CR   
 Coating \_\_\_\_\_  
 Cleaning method \_\_\_\_\_  
 Decking gage \_\_\_\_\_

**Shape**

Flat  Round  Tube  Angle   
 Thickness \_\_\_\_\_

**Ferrule**

Part no. \_\_\_\_\_  
 Ferrule description \_\_\_\_\_

**Position**

Overhead \_\_\_\_\_ Downhand \_\_\_\_\_ Sidehand \_\_\_\_\_  
 Angular \_\_\_\_\_ degrees from normal  
 Angle iron \_\_\_\_\_ Inside radius \_\_\_\_\_ Heel of angle \_\_\_\_\_

**Shielding gas**

Shielding gas(es) \_\_\_\_\_  
 Composition \_\_\_\_\_  
 Flow rate \_\_\_\_\_

**Machine data**

Power supply  
 Make \_\_\_\_\_ Model \_\_\_\_\_  
 Stud gun model \_\_\_\_\_  
 Weld time Secs. \_\_\_\_\_ Cycles \_\_\_\_\_  
 Current \_\_\_\_\_ ±5% OCV \_\_\_\_\_  
 Polarity \_\_\_\_\_ Lift \_\_\_\_\_  
 Plunge (protrusion) \_\_\_\_\_  
 Weld cable size \_\_\_\_\_ Length \_\_\_\_\_  
 Number of grounds (workpiece leads) \_\_\_\_\_

**WELD TEST RESULTS**

Stud No.	Visual Acceptance	Option #1 Bend Test	Option #2 Tension Test	Option #3 Torque Test*
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

\*Note: Torque test optional for threaded fasteners only.

Mechanical tests conducted by \_\_\_\_\_ Date \_\_\_\_\_  
 (Company)

We, the undersigned, certify that the statements in this record are correct and the test welds were prepared, welded, and tested in accordance with the requirements of AWS B2.1/B2.1M, (\_\_\_\_\_), *Specification for Welding Procedure and Performance Qualification*.  
 (year)

Signed by \_\_\_\_\_ Title \_\_\_\_\_ Date \_\_\_\_\_  
 (Contractor/Applicator)

Source: Adapted from AWS D1.1/D1.1M:2008, *Structural Welding Code—Steel*, Annex N Form N-9, American Welding Society.

**Figure F.4—Example of a Welding Procedure Specification and Procedure Qualification Record for Stud Welding**



**WPS QUALIFICATION TEST RECORD FOR  
ELECTROSLAG AND ELECTROGAS WELDING**

**PROCEDURE SPECIFICATION**

Material specification \_\_\_\_\_  
 Welding process \_\_\_\_\_  
 Position of welding \_\_\_\_\_  
 Filler metal specification \_\_\_\_\_  
 Filler metal classification \_\_\_\_\_  
 Filler metal \_\_\_\_\_  
 Flux \_\_\_\_\_  
 Shielding gas \_\_\_\_\_ Flow rate \_\_\_\_\_  
 Gas dew point \_\_\_\_\_  
 Thickness range this test qualifies \_\_\_\_\_  
 Single or multiple pass \_\_\_\_\_  
 Single or multiple arc \_\_\_\_\_  
 Welding current \_\_\_\_\_  
 Preheat temperature \_\_\_\_\_  
 Postheat temperature \_\_\_\_\_  
 Welder's name \_\_\_\_\_  
 Guide tube flex \_\_\_\_\_  
 Guide tube composition \_\_\_\_\_  
 Guide tube diameter \_\_\_\_\_  
 Vertical rise speed \_\_\_\_\_  
 Traverse length \_\_\_\_\_  
 Traverse speed \_\_\_\_\_  
 Dwell \_\_\_\_\_  
 Type of molding shoe \_\_\_\_\_

**VISUAL INSPECTION**

Appearance \_\_\_\_\_  
 Undercut \_\_\_\_\_  
 Piping porosity \_\_\_\_\_  
 Test date \_\_\_\_\_  
 Witnessed by \_\_\_\_\_

**TEST RESULTS**

**Reduced-section tensile test**

Tensile strength, psi  
 1. \_\_\_\_\_  
 2. \_\_\_\_\_

**All-weld-metal tension test**

Tensile strength, psi \_\_\_\_\_  
 Yield point/strength, psi \_\_\_\_\_  
 Elongation in 2 in, % \_\_\_\_\_

**Side-bend tests**

1. \_\_\_\_\_ 3. \_\_\_\_\_  
 2. \_\_\_\_\_ 4. \_\_\_\_\_

**Radiographic-ultrasonic examination**

RT report no. \_\_\_\_\_  
 UT report no. \_\_\_\_\_

**Impact tests**

Size of specimen \_\_\_\_\_ Test temp \_\_\_\_\_  
 Ft-lb: 1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_  
 5. \_\_\_\_\_ 6. \_\_\_\_\_ Avg. \_\_\_\_\_  
 High \_\_\_\_\_ Low \_\_\_\_\_  
 Laboratory test no. \_\_\_\_\_

**WELDING PROCEDURE**

Pass No.	Electrode Size	Welding Current		Joint Detail
		Amperes	Volts	

We, the undersigned, certify that the statements in this record are correct and the test welds were prepared, welded, and tested in accordance with the requirements of AWS B2.1/B2.1M, (\_\_\_\_\_), *Specification for Welding Procedure and Performance Qualification*.  
 (year)

Procedure no. \_\_\_\_\_  
 Revision no. \_\_\_\_\_

Manufacturer or Contractor \_\_\_\_\_  
 Authorized by \_\_\_\_\_  
 Date \_\_\_\_\_

Source: Adapted from AWS D1.1/D1.1M:2008, *Structural Welding Code—Steel*, Annex N Form N-3, American Welding Society.

**Figure F.5—Example of a Welding Procedure Specification  
and Procedure Qualification Record for Electroslag and Electrogas Welding**

## Annex G (Informative)

### Macroetch Procedure (see 4.10.2 and 4.11.2)

This annex is not part of AWS B2.1/B2.1M:2014, *Specification for Welding Procedure and Performance Qualification*, but is included for informational purposes only.

#### G1. General

These procedures identify methods of macroetching specimens in preparation for macro-examination. The surfaces to be etched should be smoothed by filing, machining, or by grinding on emery paper. With different alloys, the etching period will vary from a few seconds to several minutes and should be continued until there is a clear definition of the macro-structure. After etching, the specimens should be thoroughly rinsed and then dried with a blast of warm air. Coating the surface with a thin, clear lacquer will preserve the appearance.

#### G2. Safety Procedures

**G2.1 Chemical Etchants.** All chemicals used as etchants are potentially hazardous. All persons using any etchant must be thoroughly familiar with all of the chemicals involved and the proper procedure for handling and mixing these chemicals.

**G2.2 Handling and Mixing Acids.** Precautions must be used in mixing all chemicals, especially strong acids. In all cases, chemicals should be added slowly **INTO** the water or solvent while stirring. **Never** add water to acid.

**G2.3 Hydrofluoric Acid (HF).** Hydrofluoric acid solutions should be mixed and used in polyethylene vessels.

**G2.4 Basic Recommendations for Handling of Etching Chemicals.** Protective clothing and equipment (gloves, apron, protective glasses or face shield, etc.) should always be used when pouring, mixing, or etching. Proper devices (glass or plastic) for weighing, mixing, containing, or storage of solutions should be used. All etching should be done under a fume hood. All spills should be wiped up or flushed immediately. Unidentified solutions **SHOULD NOT** be used. When in doubt, the solutions should be disposed of in accordance with the existing environmental laws covering the disposal of chemicals or chemical solutions. Chemicals should be stored and handled according to manufacturer's recommendations, and users should read carefully and observe any printed precautions on chemical containers. When in doubt about the proper use of a chemical, refer to the Material Safety Data Sheet for that chemical or contact your Safety Department or the supplier of the chemicals.

**G2.5 Disposal of Etchants.** Chemicals should be disposed of in accordance with federal, state, and local regulations.

#### G3. Etching Solutions and Procedures

**Caution:** Review **B2 Safety Procedures** for safe practices.

The following etching solutions, together with directions for their use, are suggested as applicable for the material being etched:

**G3.1 Carbon and Low-Alloy Steels.** Three etchants are suggested for use on carbon steel. These are listed below along with mixing and usage instructions.

(1) *Nitric Acid.* One to ten percent nitric acid in water or alcohol (alcohol is preferred). The solution shall be used at room temperature and applied with a glass stirring rod.

(2) *Ammonium Persulfate.* One part of ammonium persulfate to nine parts of water by weight. The solution should be used at room temperature, and should be applied by vigorously rubbing the surface to be etched with a piece of cotton saturated with the solution.

(3) *Iodine and Potassium Iodide.* One part of powdered iodine, two parts of powdered potassium iodide, and ten parts of water, all by weight. The solution should be used at room temperature and applied by brushing.

**G3.2 Stainless Steels.** One etchant that is an effective macroetch for stainless steels is a ferric chloride, nitric acid, and water mixture. The solution contains:

Ferric chloride ( $\text{FeCl}_3$ )	200 g
Nitric acid ( $\text{HNO}_3$ )	300 mL
Water ( $\text{H}_2\text{O}$ )	100 mL

The solution should be used at room temperature and applied by swabbing.

**G3.3 Aluminum and Aluminum Alloys.** One etchant is suggested for use on metals of the aluminum family and their alloys. Its mix and use is provided below:

The following solution is to be used at room temperature.

Etching is accomplished by either swabbing or immersing the specimen.

Hydrochloric acid (concentrated)	15 mL
Hydrofluoric acid (concentrated)	10 mL
Water	85 mL

**G3.4 Copper and Copper Alloys.** *Concentrated Nitric Acid* is recommended for etching the copper and copper base alloys. The procedure for use is provided below:

Etching with the solution at room temperature is accomplished by either flooding or immersing the specimen for several seconds. After thorough rinsing with water, the process is repeated with a 50-50 solution of concentrated nitric acid and water. In the case of the silicon bronze alloys, it may be necessary to swab the surface with alcohol or water to remove a white ( $\text{SiO}_2$ ) deposit.

**G3.5 Nickel and Nickel-Base Alloys.** Three etchants are suggested for use on nickel and nickel base alloys. These are listed below along with mixing and usage instructions.

**G3.5.1** The following solution should be used on nickel, copper-nickel, nickel-chromium-iron, and nickel-copper material. The solution should be freshly mixed, and the specimen should be immersed for 30–120 seconds. The solution is mixed as follows:

- One part  $\text{H}_2\text{O}_2$  (30%) hydrogen peroxide
- Two parts HCl hydrochloric acid
- Three parts  $\text{H}_2\text{O}$  water

**G3.5.2** The following solution called Lepito's etch is suitable for use on nickel, nickel-chromium-iron, or on nickel-copper materials. It is applied by swabbing or immersion of the specimen. It is mixed as follows:

- (1) *Solution #1.* 15 g of ammonium sulphate ( $(\text{NH}_4)_2\text{SO}_4$ ) is dissolved in 100 mL of water.
- (2) *Solution #2.* 250 g of ferric chloride is dissolved in 100 mL of warm hydrochloric acid (concentrated).
- (3) Solution #1 and #2 are then mixed and, after mixing, 30 mL of nitric acid (concentrated) is added. The resulting solution is Lepito's etch.

**G3.5.3** The following etchant is used on nickel-chromium-molybdenum, nickel-chromium-molybdenum-iron, and nickel-molybdenum alloys. The solution should be freshly mixed, and the reaction time may be decreased by heating the specimen. The specimen should be immersed for 30–120 seconds. The solution contains the following:

1 part H<sub>2</sub>O<sub>2</sub> (30%) hydrogen peroxide

4 parts HCl hydrochloric acid

**G3.6 Titanium and Titanium Alloys.** Two general purpose etchants are suggested for use on titanium and titanium alloys. These are the Kroll's and Keller's etches listed below. Both are applied at room temperature by swabbing or immersion of the specimen. The treatments are followed by a rinse in cold water.

(1) *Kroll's Etch*

Hydrofluoric acid (48%)	1 mL to 3 mL
Nitric acid (concentrated)	2 mL to 6 mL
Water	to make 100 mL

(2) *Keller's Etch*

Hydrofluoric acid (48%)	1/2 mL
Nitric acid (concentrated)	2-1/2 mL
Hydrochloric acid (concentrated)	1-1/2 mL
Water	to make 100 mL

**G3.7 Zirconium and Zirconium Alloys.** One etchant is suggested for use on the zirconium and zirconium alloy metals. The solution is shown below and is applied by either swabbing or immersion of the specimen.

Hydrofluoric acid (concentrated)	3 mL
Nitric acid (concentrated)	22 mL
Water	22 mL

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# Annex H (Informative)

## Guidelines for the Preparation of Technical Inquiries

This annex is not part of AWS B2.1/B2.1M:2014, *Specification for Welding Procedure and Performance Qualification*, but is included for informational purposes only.

### H1. Introduction

The American Welding Society (AWS) Board of Directors has adopted a policy whereby all official interpretations of AWS standards are handled in a formal manner. Under this policy, all interpretations are made by the committee that is responsible for the standard. Official communication concerning an interpretation is directed through the AWS staff member who works with that committee. The policy requires that all requests for an interpretation be submitted in writing. Such requests will be handled as expeditiously as possible, but due to the complexity of the work and the procedures that must be followed, some interpretations may require considerable time.

### H2. Procedure

All inquiries shall be directed to:

Managing Director  
Technical Services Division  
American Welding Society  
8669 NW 36 St, # 130  
Miami, FL 33166

All inquiries shall contain the name, address, and affiliation of the inquirer, and they shall provide enough information for the committee to understand the point of concern in the inquiry. When the point is not clearly defined, the inquiry will be returned for clarification. For efficient handling, all inquiries should be typewritten and in the format specified below.

**H2.1 Scope.** Each inquiry shall address one single provision of the standard unless the point of the inquiry involves two or more interrelated provisions. The provision(s) shall be identified in the scope of the inquiry along with the edition of the standard that contains the provision(s) the inquirer is addressing.

**H2.2 Purpose of the Inquiry.** The purpose of the inquiry shall be stated in this portion of the inquiry. The purpose can be to obtain an interpretation of a standard's requirement or to request the revision of a particular provision in the standard.

**H2.3 Content of the Inquiry.** The inquiry should be concise, yet complete, to enable the committee to understand the point of the inquiry. Sketches should be used whenever appropriate, and all paragraphs, figures, and tables (or annex) that bear on the inquiry shall be cited. If the point of the inquiry is to obtain a revision of the standard, the inquiry shall provide technical justification for that revision.

**H2.4 Proposed Reply.** The inquirer should, as a proposed reply, state an interpretation of the provision that is the point of the inquiry or provide the wording for a proposed revision, if this is what the inquirer seeks.

### **H3. Interpretation of Provisions of the Standard**

Interpretations of provisions of the standard are made by the relevant AWS technical committee. The secretary of the committee refers all inquiries to the chair of the particular subcommittee that has jurisdiction over the portion of the standard addressed by the inquiry. The subcommittee reviews the inquiry and the proposed reply to determine what the response to the inquiry should be. Following the subcommittee's development of the response, the inquiry and the response are presented to the entire committee for review and approval. Upon approval by the committee, the interpretation is an official interpretation of the Society, and the secretary transmits the response to the inquirer and to the *Welding Journal* for publication.

### **H4. Publication of Interpretations**

All official interpretations will appear in the *Welding Journal* and will be posted on the AWS web site.

### **H5. Telephone Inquiries**

Telephone inquiries to AWS Headquarters concerning AWS standards should be limited to questions of a general nature or to matters directly related to the use of the standard. The AWS Board of Directors' policy requires that all AWS staff members respond to a telephone request for an official interpretation of any AWS standard with the information that such an interpretation can be obtained only through a written request. Headquarters staff cannot provide consulting services. However, the staff can refer a caller to any of those consultants whose names are on file at AWS Headquarters.

### **H6. AWS Technical Committees**

The activities of AWS technical committees regarding interpretations are limited strictly to the interpretation of provisions of standards prepared by the committees or to consideration of revisions to existing provisions on the basis of new data or technology. Neither AWS staff nor the committees are in a position to offer interpretive or consulting services on (1) specific engineering problems, (2) requirements of standards applied to fabrications outside the scope of the document, or (3) points not specifically covered by the standard. In such cases, the inquirer should seek assistance from a competent engineer experienced in the particular field of interest.

# Annex I (Informative)

## Guidelines for Requesting Adoption of New Materials Under the AWS B2.1 Standard

This annex is not part of AWS B2.1/B2.1M:2014, *Specification for Welding Procedure and Performance Qualification*, but is included for information purposes only.

### I1. Introduction

AWS policy requires all requests to adopt materials for inclusion to be handled in a formal manner. Official communication concerning requests for material adoption is through the AWS staff member who works with that committee. The policy requires that all requests be submitted in writing. Requests will be handled as expeditiously as possible, but due to the complexity of the work and the procedures that must be followed, some requests may require considerable time.

It is the policy of the AWS B2 Committee to adopt for inclusion in the standard only such specifications as have been adopted by recognized national or international organizations. The committee will consider requests to adopt new materials only from other codes and standards, or fabricators and other end users. In addition, such requests should be for materials for which there is a reasonable expectation of use in AWS standards.

### I2. Procedure

All requests for the adoption of materials or for extended coverage of existing materials must be directed to:

Managing Director  
Technical Services Division  
American Welding Society  
8669 NW 36 St, # 130  
Miami, FL 33166

All requests must contain the name, address, and affiliation of the inquirer, and they must provide the necessary information for the committee to consider the request.

**I2.1 Scope.** The inquiry shall identify the material or materials for which consideration is being requested and the AWS codes and standards for which the material is considered applicable. The inquirer shall identify the general usage of the material and the temperature range of the application. The inquirer shall also identify all product forms, size ranges, and specifications for which incorporation is desired.

**I2.2 Content of the Inquiry.** The inquiry should be concise, yet complete, addressing mechanical properties, weldability, and other pertinent information.

**I2.2.1 Mechanical Properties.** Together with the specification for the material, the inquirer shall furnish the committee with adequate data for inclusion in the applicable tables. The data shall include values of ultimate tensile strength, yield strength, reduction of area, and elongation. Any heat treatment that is required to produce the mechanical properties should be fully described.



The inquirer shall submit a proposed entry for Table C.2 of the standard. Note that the minimum tensile and yield strength values specified in Table C.2 are minimum welded values.

Fracture toughness data shall be provided for materials for which fracture toughness rules would be expected to apply. The data shall include test results for the intended lowest service metal temperature and for the range of material thicknesses desired. The fracture toughness data shall include the results of fracture toughness tests of weld heat-affected zones in the material.

**12.1.2 Weldability.** The inquirer shall furnish complete data on the weldability of the proposed material, including data on procedure qualification tests made in accordance with the requirements of recognized national or international organizations. Welding tests shall cover the full range of thickness in which the material is to be used. Data may be provided from documented references, standards, or codes.

**12.1.3 Pertinent Information.** The inquirer should provide any information that may affect the classification and use of the materials such as required heat treatments, susceptibility to air hardening, effect of welding procedure and heat-affected zone and weld metal fracture toughness, and the amount of experience with welding the material. Information describing service experience will be useful to the committee.

### 13. Material Inquiry Checklist

To assist inquirers desiring the adoption of new materials or the extended coverage of existing materials, the committee provides the following summary of items that must be addressed for each inquiry. The committee reserves the right to request additional information.

- (1) Identification of the inquirer is required.
- (2) The material must be covered by a specification issued by a recognized national or international organization and an English language version must be provided.
- (3) The code or standard where the material is expected to be used shall be identified.
- (4) The material shall be defined as ferrous or nonferrous and the application must be identified (product forms, size range, and specification).
- (5) Mechanical property data must be submitted (ultimate tensile strength, yield strength, reduction of area, and elongation).
- (6) A proposed entry for Table C.2 of the standard shall be submitted. Note that the minimum tensile and yield strength values specified in Table C.2 are minimum welded values.
- (7) If applicable, appropriate fracture toughness data shall be submitted.
- (8) Procedure qualification test data or other supporting documentation shall be submitted.

### 14. Publication of Adopted Material

Materials that are officially adopted for inclusion in the standard will appear online at <http://www.aws.org/w/a/technical>.

### 15. Telephone Inquiries

Telephone inquiries to AWS Headquarters concerning the adoption or extended coverage of existing materials should be limited to questions of a general nature or directly related to the submission of all of the information required for the official inquiry. The Board of Directors' policy requires that all AWS staff members respond to a telephone request for an official interpretation of any AWS standard with the information that such an interpretation can be obtained only through a written request. The headquarters staff cannot provide consulting services. The staff can, however, refer a caller to any of these consultants whose names are on file at AWS Headquarters.

## **I6. The AWS Technical Committee**

The activities of AWS technical committees in regard to interpretations are limited strictly to the interpretation of provisions of standards prepared by committee or to consideration of revision to existing provisions on the basis of new data or technology. Neither the committee nor the staff is in a position to offer interpretive or consulting services on (1) specific engineering problems, or (2) requirements of standards applied to fabrications outside the scope of the document or points not specifically covered by the standard. In such cases, the inquirer should seek assistance from a competent engineer experienced in the particular field of interest.

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## List of AWS Documents on Procedure and Performance Qualification

Designation	Title
B2.1/B2.1M	<i>Specification for Welding Procedure and Performance Qualification</i>
B2.1/B2.1M-BMG	<i>Base Metal Grouping for Welding Procedure and Performance Qualification</i>
B2.1-1-001	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 3/16 through 3/4 inch in the As-Welded Condition, With Backing</i>
B2.1-1-002	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 3/16 through 7/8 inch in the As-Welded Condition, With or Without Backing</i>
B2.1-1-003	<i>Standard Welding Procedure Specification (SWPS) for Gas Metal Arc Welding (Short Circuiting Transfer Mode) of Galvanized Steel (M-1), 18 through 10 Gauge, in the As-Welded Condition, with or without Backing</i>
B2.1-1-004	<i>Standard Welding Procedure Specification (SWPS) for Gas Metal Arc Welding (Short Circuiting Transfer Mode) of Carbon Steel (M-1, Group 1), 18 through 10 Gauge, in the As-Welded Condition, with or without Backing</i>
B2.1-8-005	<i>Standard Welding Procedure Specification (SWPS) for Gas Metal Arc Welding (Short Circuiting Transfer Mode) of Austenitic Stainless Steel (M-8, P-8, or S-8), 18 through 10 Gauge, in the As-Welded Condition, with or without Backing</i>
B2.1-1/8-006	<i>Standard Welding Procedure Specification (SWPS) for Gas Metal Arc Welding (Short Circuiting Transfer Mode) of Carbon Steel to Austenitic Stainless Steel (M-1 to M-8, P-8, or S-8), 18 through 10 Gauge, in the As-Welded Condition, with or without Backing</i>
B2.1-1-007	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding of Galvanized Steel (M-1), 18 through 10 Gauge, in the As-Welded Condition, with or without Backing</i>
B2.1-1-008	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding of Carbon Steel (M-1, P-1, or S-1), 18 through 10 Gauge, in the As-Welded Condition, with or without Backing</i>
B2.1-8-009	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding of Austenitic Stainless Steel (M-8, P-8, or S-8), 18 through 10 Gauge, in the As-Welded Condition, with or without Backing</i>
B2.1-1/8-010	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding of Carbon Steel to Austenitic Stainless Steel (M-1, P-1, or S-1 to M-8, P-8, or S-8), 18 through 10 Gauge, in the As-Welded Condition, with or without Backing</i>
B2.1-1-011	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Galvanized Steel (M-1), 10 through 18 Gauge, in the As-Welded Condition, with or without Backing</i>
B2.1-1-012	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1, P-1, or S-1 to M-1, P-1, or S-1), 10 through 18 Gauge, in the As-Welded Condition, with or without Backing</i>
B2.1-8-013	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 10 through 18 Gauge, in the As-Welded Condition, with or without Backing</i>
B2.1-1/8-014	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel to Austenitic Stainless Steel (M-1 to M-8/P-8/S-8, Group 1), 10 through 18 Gauge, in the As-Welded Condition, with or without Backing</i>

### List of AWS Documents on Procedure and Performance Qualification (Continued)

<b>Designation</b>	<b>Title</b>
B2.1-22-015	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding of Aluminum (M/P-22 to M/P-22), 18 through 10 Gauge, ER4043 or R4043, in the As-Welded Condition, with or without Backing</i>
B2.1-1-016	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 1-1/2 inch Thick, E7018, As-Welded or PWHT Condition</i>
B2.1-1-017	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S, Group 1 or 2), 1/8 through 1-1/2 inch Thick, E6010, As-Welded or PWHT Condition</i>
B2.1-1-018	<i>Standard Welding Procedure Specification (SWPS) for Self-Shielded Flux Cored Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 1-1/2 inch Thick, E71T-8, As-Welded Condition</i>
B2.1-1-019	<i>Standard Welding Procedure Specification (SWPS) for CO<sub>2</sub> Shielded Flux Cored Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8 through 1-1/2 inch Thick, E70T-1 and E71T-1, As-Welded Condition</i>
B2.1-1-020	<i>Standard Welding Procedure Specification (SWPS) for 75% Ar/25% CO<sub>2</sub> Shielded Flux Cored Arc Welding of Carbon Steel (M-1/P-1, Group 1 or 2), 1/8 through 1-1/2 inch Thick, E70T-1 and E71T-1, As-Welded or PWHT Condition</i>
B2.1-1-021	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding Followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 1 1/2 inch Thick, ER70S-2 and E7018, As-Welded or PWHT Condition</i>
B2.1-1-022	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 1-1/2 inch Thick, E6010 (Vertical Uphill) Followed by E7018, As-Welded or PWHT Condition</i>
B2.1-8-023	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 through 1-1/2 inch Thick, As-Welded Condition</i>
B2.1-8-024	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/16 through 1-1/2 inch Thick, ER3XX, As-Welded Condition, Primarily Plate and Structural Applications</i>
B2.1-8-025	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding followed by Shielded Metal Arc Welding of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 through 1-1/2 inch Thick, ER3XX and E3XX-XX, As-Welded Condition, Primarily Plate and Structural Applications</i>
B2.1-1-026	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 1-1/2 inch Thick, E6010 (Vertical Downhill) Followed by E7018, As-Welded or PWHT Condition</i>
B2.1-1-027	<i>Standard Welding Procedure Specification (SWPS) for Self-Shielded Flux Cored Arc Welding of Carbon Steel (M-1 or P-1, Groups 1 and 2), 1/8 through 1/2 inch Thick, E71T-11, As-Welded Condition, Primarily Plate and Structural Applications</i>
B2.1-1-201	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 3/4 inch Thick, E6010 (Vertical Uphill) Followed by E7018 (Vertical Uphill), As-Welded Condition, Primarily Pipe Applications</i>

## List of AWS Documents on Procedure and Performance Qualification (Continued)

Designation	Title
B2.1-1-202	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 3/4 inch Thick, E6010 (Vertical Downhill) Followed by E7018 (Vertical Uphill), As-Welded Condition, Primarily Pipe Applications</i>
B2.1-1-203	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 3/4 inch Thick, E6010 (Vertical Uphill), As-Welded Condition, Primarily Pipe Applications</i>
B2.1-1-204	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 3/4 inch Thick, E6010 (Vertical Downhill Root with the Balance Vertical Uphill), As-Welded Condition, Primarily Pipe Applications</i>
B2.1-1-205	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 1-1/2 inch Thick, E6010 (Vertical Uphill) Followed by E7018 (Vertical Uphill), As-Welded or PWHT Condition, Primarily Pipe Applications</i>
B2.1-1-206	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 1-1/2 inch Thick, E6010 (Vertical Downhill) Followed by E7018 (Vertical Uphill), As-Welded or PWHT Condition, Primarily Pipe Applications</i>
B2.1-1-207	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 1-1/2 inch Thick, ER70S-2, As-Welded or PWHT Condition, Primarily Pipe Applications</i>
B2.1-1-208	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 1-1/2 inch Thick, E7018, As-Welded or PWHT Condition, Primarily Pipe Applications</i>
B2.1-1-209	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding Followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 1 1/2 inch Thick, ER70S-2 and E7018, As-Welded or PWHT Condition, Primarily Pipe Applications</i>
B2.1-1-210	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding with Consumable Insert Root of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 1-1/2 inch Thick, INMs-1 and ER70S-2, As-Welded or PWHT Condition, Primarily Pipe Applications</i>
B2.1-1-211	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding with Consumable Insert Root followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 1-1/2 inch Thick, INMs-1, ER70S-2, and E7018, As-Welded Condition, Primarily Pipe Applications</i>
B2.1-8-212	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/16 through 1-1/2 inch Thick, ER3XX, As-Welded Condition, Primarily Pipe Applications</i>
B2.1-8-213	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 through 1-1/2 inch Thick, E3XX-XX, As-Welded Condition, Primarily Pipe Applications</i>
B2.1-8-214	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding followed by Shielded Metal Arc Welding of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 through 1-1/2 inch Thick, ER3XX and E3XX-XX, As-Welded Condition, Primarily Pipe Applications</i>
B2.1-8-215	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding with Consumable Insert Root of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 through 1 1/2 inch Thick, IN3XX and ER3XX, As-Welded Condition, Primarily Pipe Applications</i>

## List of AWS Documents on Procedure and Performance Qualification (Continued)

Designation	Title
B2.1-8-216	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding with Consumable Insert Root followed by Shielded Metal Arc Welding of Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 through 1-1/2 inch Thick, IN3XX, ER3XX, and E3XX-XX, As-Welded Condition, Primarily Pipe Applications</i>
B2.1-4-217	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding of Chromium-Molybdenum Steel (M-4/P-4, Group 1 or 2), ER80S-B2, 1/8 through 1/2 in. Thick, As-Welded Condition; 1/8 through 3/4 in. Thick, PWHT Condition, Primarily Pipe Applications</i>
B2.1-4-218	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Chromium-Molybdenum Steel (M-4/P-4, Group 1 or 2), E8018-B2, 1/8 through 1/2 in. Thick, As-Welded Condition; 1/8 through 1-1/2 in. Thick, PWHT Condition, Primarily Pipe Applications</i>
B2.1-4-219	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding followed by Shielded Metal Arc Welding of Chromium-Molybdenum Steel (M-4/P-4, Group 1 or 2), 1/8 through 1/2 in. Thick, As-Welded Condition; 1/8 through 1-1/2 in. Thick, PWHT Condition, ER80S-B2 and E8018-B2, Primarily Pipe Applications</i>
B2.1-4-220	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding (Consumable Insert Root) of Chromium-Molybdenum Steel (M-4/P-4, Group 1 or 2), E8018-B2, 1/8 through 1/2 in. Thick, As-Welded Condition; 1/8 through 3/4 in. Thick, PWHT Condition, IN515 and ER80S-B2, Primarily Pipe Applications</i>
B2.1-4-221	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding (Consumable Insert Root) followed by Shielded Metal Arc Welding of Chromium-Molybdenum Steel (M-4/P-4, Group 1 or 2), 1/8 through 1/2 in. Thick, As-Welded Condition; 1/8 through 1-1/2 in. Thick, PWHT Condition, IN515, ER80S-B2, and E8018-B2, Primarily Pipe Applications</i>
B2.1-5A-222	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding of Chromium-Molybdenum Steel (M-5A/P-5A), ER90S-B3, 1/8 through 1/2 in. Thick, As-Welded Condition; 1/8 through 3/4 in. Thick, PWHT Condition, Primarily Pipe Applications</i>
B2.1-5A-223	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Chromium-Molybdenum Steel (M-5A/P-5A), E9018-B3, 1/8 through 1/2 in. Thick, As-Welded Condition; 1/8 through 1-1/2 in. Thick, PWHT Condition, Primarily Pipe Applications</i>
B2.1-5A-224	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding followed by Shielded Metal Arc Welding of Chromium-Molybdenum Steel (M-5A/P-5A), 1/8 through 1/2 in. Thick, As-Welded Condition; 1/8 through 1-1/2 in. Thick, PWHT Condition, ER90S-B3 and E9018-B3, Primarily Pipe Applications</i>
B2.1-5A-225	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding (Consumable Insert Root) of Chromium-Molybdenum Steel (M-5A/P-5A), 1/8 through 1/2 in. Thick, As-Welded Condition; 1/8 through 3/4 in. Thick, PWHT Condition, IN521 and ER90S-B3, Primarily Pipe Applications</i>
B2.1-5A-226	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding (Consumable Insert Root) followed by Shielded Metal Arc Welding of Chromium-Molybdenum Steel (M-5A/P-5A), 1/8 through 1/2 in. Thick, As-Welded Condition; 1/8 through 1-1/2 in. Thick, PWHT Condition, IN521, ER90S-B3, and E9018-B3, Primarily Pipe Applications</i>
B2.1-1/8-227	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding of Carbon Steel (M-1/P-1, Groups 1 or 2) to Austenitic Stainless Steel (M-8/P-8, Group 1), 1/16 through 1-1/2 inch Thick, ER309(L), As-Welded Condition, Primarily Pipe Applications</i>

## List of AWS Documents on Procedure and Performance Qualification (Continued)

Designation	Title
B2.1-1/8-228	<i>Standard Welding Procedure Specification (SWPS) for Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Groups 1 or 2) to Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 through 1-1/2 inch Thick, E309(L)-15, -16, or -17, As-Welded Condition, Primarily Pipe Applications</i>
B2.1-1/8-229	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1, Groups 1 or 2) to Austenitic Stainless Steel (M-8/P-8, Group 1), 1/8 through 1-1/2 inch Thick, ER309(L) and E309(L)15, 16, or -17, As-Welded Condition, Primarily Pipe Applications</i>
B2.1-1/8-230	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding with Consumable Insert Root of Carbon Steel (M-1/P-1, Groups 1 or 2) to Austenitic Stainless Steel (M-8/P-8, Group 1), 1/16 through 1-1/2 inch Thick, IN309 and ER309(L), As-Welded Condition, Primarily Pipe Applications</i>
B2.1-1/8-231	<i>Standard Welding Procedure Specification (SWPS) for Gas Tungsten Arc Welding with Consumable Insert Root followed by Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Groups 1 or 2) to Austenitic Stainless Steel (M-8/P-8/S-8, Group 1), 1/8 through 1-1/2 inch Thick, IN309, ER309, and E309-15, -16, or -17, or IN309, ER309(L), and ER309(L)-15, -16, or -17, As-Welded Condition, Primarily Pipe Applications</i>
B2.1-1-232	<i>Standard Welding Procedure Specification (SWPS) for Argon plus 25% Carbon Dioxide Shielded Gas Metal Arc Welding (Short Circuiting Transfer Mode) followed by Argon plus 25% Carbon Dioxide Shielded Flux Cored Arc Welding of Carbon Steel (M-1/P-1/S-1, Groups 1 and 2), 1/8 through 1-1/2 inch Thick, ER70S-3 and E7XT-X, As-Welded or PWHT Condition, Primarily Pipe Applications</i>
B2.1-1-233	<i>Standard Welding Procedure Specification (SWPS) for Argon plus 25% Carbon Dioxide Shielded Gas Metal Arc Welding (Short Circuiting Transfer Mode) followed by Argon plus 2% Oxygen Shielded Gas Metal Arc Welding (Spray Transfer Mode) of Carbon Steel (M-1/P-1/S-1, Groups 1 and 2), 1/8 through 1-1/2 inch Thick, ER70S-3, As-Welded or PWHT Condition, Primarily Pipe Applications</i>
B2.1-1-234	<i>Standard Welding Procedure Specification (SWPS) for Argon plus 25% Carbon Dioxide Shielded Flux Cored Arc Welding of Carbon Steel (M-1/P-1/S-1, Groups 1 and 2), 1/8 through 1-1/2 inch Thick, E7XT-X, As-Welded or PWHT Condition, Primarily Pipe Applications</i>
B2.1-1-235	<i>Standard Welding Procedure Specification (SWPS) for Argon plus 2% Oxygen Shielded Gas Metal Arc Welding (Spray Transfer Mode) of Carbon Steel (M-1/P-1/S-1, Groups 1 and 2), 1/8 through 1-1/2 inch Thick, ER70S-3, Flat Position Only, As-Welded or PWHT Condition, Primarily Pipe Applications</i>
B2.2/B2.2M	<i>Specification for Brazing Procedure and Performance Qualification</i>
B2.3/B2.3M	<i>Specification for Soldering Procedure and Performance Qualification</i>
B2.4	<i>Specification for Welding Procedure and Performance Qualification for Thermoplastics</i>



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