



Designation: A240/A240M – 16a

# Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications<sup>1</sup>

This standard is issued under the fixed designation A240/A240M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

*This standard has been approved for use by agencies of the U.S. Department of Defense.*

## 1. Scope\*

1.1 This specification<sup>2</sup> covers chromium, chromium-nickel, and chromium-manganese-nickel stainless steel plate, sheet, and strip for pressure vessels and for general applications including architectural, building, construction, and aesthetic applications.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.3 This specification is expressed in both inch-pound and SI units. However, unless the order specifies the applicable “M” specification designation (SI units), the material shall be furnished in inch-pound units.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>3</sup>

[A370 Test Methods and Definitions for Mechanical Testing of Steel Products](#)

[A480/A480M Specification for General Requirements for](#)

[Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip](#)

[A923 Test Methods for Detecting Detrimental Intermetallic Phase in Duplex Austenitic/Ferritic Stainless Steels](#)

[E112 Test Methods for Determining Average Grain Size](#)

[E140 Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness](#)

[E527 Practice for Numbering Metals and Alloys in the Unified Numbering System \(UNS\)](#)

2.2 *SAE Standard:*<sup>4</sup>

[J 1086 Practice for Numbering Metals and Alloys \(UNS\)](#)

## 3. General Requirements

3.1 The following requirements for orders for material furnished under this specification shall conform to the applicable requirements of the current edition of Specification [A480/A480M](#).

- 3.1.1 Definitions;
- 3.1.2 General requirements for delivery;
- 3.1.3 Ordering information;
- 3.1.4 Process;
- 3.1.5 Special tests;
- 3.1.6 Heat treatment;
- 3.1.7 Dimensions and permissible variations;
- 3.1.8 Workmanship, finish and appearance;
- 3.1.9 Number of tests/test methods;
- 3.1.10 Specimen preparation;
- 3.1.11 Retreatment;
- 3.1.12 Inspection;
- 3.1.13 Rejection and reheating;
- 3.1.14 Material test report;
- 3.1.15 Certification; and
- 3.1.16 Packaging, marking, and loading.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.17 on Flat-Rolled and Wrought Stainless Steel.

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<sup>2</sup> For ASME Boiler and Pressure Vessel Code applications see related Specification SA-240 in Section II of that Code.

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

<sup>4</sup> Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, <http://www.sae.org>.

\*A Summary of Changes section appears at the end of this standard

#### 4. Chemical Composition

4.1 The steel shall conform to the requirements as to chemical composition specified in **Table 1** and shall conform to applicable requirements specified in Specification **A480/A480M**.

#### 5. Mechanical Properties

5.1 The material shall conform to the mechanical properties specified in **Table 2**.

5.2 When specified by the purchaser, Charpy impact tests shall be performed in accordance with Supplementary Requirement S1.

#### 6. Materials for High-Temperature Service

6.1 The austenitic *H* Types shall conform to an average grain size of ASTM No. 7 or coarser as measured by Test Methods **E112**.

6.2 Supplementary Requirement S2 shall be invoked when non-H grade austenitic stainless steels are ordered for ASME Code applications for service above 1000°F [540°C].

6.3 Grade S31060, unless otherwise specified in the purchase order, shall conform to an average grain size of ASTM No. 7 or coarser, as measured by Test Methods **E112**.

#### 7. Keywords

7.1 architectural; building; chromium; chromium-nickel stainless steel; chromium-manganese-nickel stainless steel; construction; pressure vessels

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TABLE 1 Chemical Composition Requirements, %<sup>A</sup>

UNS Designation <sup>B</sup>	Type <sup>C</sup>	Carbon <sup>D</sup>	Manganese	Phosphorus	Sulfur	Austenitic (Chromium-Nickel) (Chromium-Manganese-Nickel)				Nitrogen	Copper	Other Elements <sup>E, F</sup>
						Silicon	Chromium	Nickel	Molybdenum			
N08020	...	0.07	2.00	0.045	0.035	1.00	19.0-21.0	32.0-38.0	2.00-3.00	...	3.00-4.00	Cb 8xC min, 1.00 max
N08367	...	0.030	2.00	0.040	0.030	1.00	20.0-22.0	23.5-25.5	6.0-7.0	0.18-0.25	0.75	...
N08700	...	0.04	2.00	0.040	0.030	1.00	19.0-23.0	24.0-26.0	4.3-5.0	...	0.50	Cb 8xC min 0.40 max
N08800	800 <sup>G</sup>	0.10	1.50	0.045	0.015	1.00	19.0-23.0	30.0-35.0	...	...	0.75	Fe <sup>H</sup> 39.5 min Al 0.15-0.60 Ti 0.15-0.60
N08810	800H <sup>G</sup>	0.05-0.10	1.50	0.045	0.015	1.00	19.0-23.0	30.0-35.0	...	...	0.75	Fe <sup>H</sup> 39.5 min Al 0.15-0.60 Ti 0.15-0.60
N08811	...	0.06-0.10	1.50	0.040	0.015	1.00	19.0-23.0	30.0-35.0	...	...	0.75	Fe <sup>H</sup> 39.5 min Ti 0.25-0.60 Al 0.25-0.60
N08904	904L <sup>G</sup>	0.020	2.00	0.045	0.035	1.00	19.0-23.0	23.0-28.0	4.00-5.00	0.10	1.00-2.00	...
N08925	...	0.020	1.00	0.045	0.030	0.50	19.0-21.0	24.0-26.0	6.00-7.00	0.10-0.20	0.80-1.50	...
N08926	...	0.020	2.00	0.030	0.010	0.50	19.0-21.0	24.0-26.0	6.00-7.00	0.15-0.25	0.50-1.50	...
S20100	201	0.15	5.50-7.50	0.060	0.030	1.00	16.0-18.0	3.5-5.5	...	0.25	...	...
S20103	...	0.03	5.50-7.50	0.045	0.030	0.75	16.0-18.0	3.5-5.5	...	0.25	...	...
S20153	...	0.03	6.40-7.50	0.045	0.015	0.75	16.0-17.5	4.0-5.0	...	0.10-0.25	1.00	...
S20161	...	0.15	4.00-6.00	0.040	0.040	3.00-4.00	15.0-18.0	4.0-6.0	...	0.08-0.20	...	...
S20200	202	0.15	7.50-10.00	0.060	0.030	1.00	17.0-19.0	4.0-6.0	...	0.25	...	...
S20400	...	0.030	7.00-9.00	0.040	0.030	1.00	15.0-17.0	1.50-3.00	...	0.15-0.30	...	...
S20431	...	0.12	5.00-7.00	0.045	0.030	1.00	17.0-18.0	2.0-4.0	...	0.10-0.25	1.50-3.50	...
S20432	...	0.08	3.00-5.00	0.045	0.030	1.00	17.0-18.0	4.0-6.0	...	0.05-0.20	2.00-3.00	...
S20433	...	0.08	5.50-7.50	0.045	0.030	1.00	17.0-18.0	3.5-5.5	...	0.10-0.25	1.50-3.50	...
S20910	XM-19 <sup>J</sup>	0.06	4.00-6.00	0.040	0.030	0.75	20.5-23.5	11.5-13.5	1.50-3.00	0.20-0.40	...	Cb 0.10-0.30 V 0.10-0.30
S21400	XM-31 <sup>J</sup>	0.12	14.00-16.00	0.045	0.030	0.30-1.00	17.0-18.5	1.00	...	0.35 min	...	...
S21600	XM-17 <sup>J</sup>	0.08	7.50-9.00	0.045	0.030	0.75	17.5-22.0	5.0-7.0	2.00-3.00	0.25-0.50	...	...
S21603	XM-18 <sup>J</sup>	0.03	7.50-9.00	0.045	0.030	0.75	17.5-22.0	5.0-7.0	2.00-3.00	0.25-0.50	...	...
S21640	...	0.08	3.50-6.50	0.060	0.030	1.00	17.5-19.5	4.0-6.5	0.50-2.00	0.08-0.30	...	...
S21800	...	0.10	7.00-9.00	0.060	0.030	3.5-4.5	16.0-18.0	8.0-9.0	...	0.08-0.18	...	Cb 0.10-1.00
S21904	XM-11 <sup>J</sup>	0.04	8.00-10.00	0.060	0.030	0.75	19.0-21.5	5.5-7.5	...	0.15-0.40	...	...
S24000	XM-29 <sup>J</sup>	0.08	11.50-14.50	0.060	0.030	0.75	17.0-19.0	2.3-3.7	...	0.20-0.40	...	...
S30100	301	0.15	2.00	0.045	0.030	1.00	16.0-18.0	6.0-8.0	...	0.10	...	...
S30103	301L <sup>G</sup>	0.03	2.00	0.045	0.030	1.00	16.0-18.0	6.0-8.0	...	0.20	...	...
S30153	301LN <sup>G</sup>	0.03	2.00	0.045	0.030	1.00	16.0-18.0	6.0-8.0	...	0.07-0.20	...	...
S30200	302	0.15	2.00	0.045	0.030	0.75	17.0-19.0	8.0-10.0	...	0.10	...	...
S30400	304	0.07	2.00	0.045	0.030	0.75	17.5-19.5	8.0-10.5	...	0.10	...	...
S30403	304L	0.030	2.00	0.045	0.030	0.75	17.5-19.5	8.0-12.0	...	0.10	...	...
S30409	304H	0.04-0.10	2.00	0.045	0.030	0.75	18.0-20.0	8.0-10.5	...	...	...	...
S30415	...	0.04-0.06	0.80	0.045	0.030	1.00-2.00	18.0-19.0	9.0-10.0	...	0.12-0.18	...	Ce 0.03-0.08
S30435	...	0.08	2.00	0.045	0.030	1.00	16.0-18.0	7.0-9.0	...	...	1.50-3.00	...
S30441	...	0.08	2.00	0.045	0.030	1.0-2.0	17.5-19.5	8.0-10.5	...	0.10	1.5-2.5	Cb 0.1-0.5 W 0.2-0.8
S30451	304N	0.08	2.00	0.045	0.030	0.75	18.0-20.0	8.0-10.5	...	0.10-0.16	...	...
S30452	XM-21 <sup>J</sup>	0.08	2.00	0.045	0.030	0.75	18.0-20.0	8.0-10.5	...	0.16-0.30	...	...
S30453	304LN	0.030	2.00	0.045	0.030	0.75	18.0-20.0	8.0-12.0	...	0.10-0.16	...	...
S30500	305	0.12	2.00	0.045	0.030	0.75	17.0-19.0	10.5-13.0	...	...	...	...
S30530	...	0.08	2.00	0.045	0.030	0.50-2.50	17.0-20.5	8.5-11.5	0.75-1.50	...	0.75-3.50	...
S30600	...	0.018	2.00	0.020	0.020	3.7-4.3	17.0-18.5	14.0-15.5	0.20	...	0.50	...
S30616	...	0.020	1.50	0.030	0.015	3.9-4.7	16.5-18.5	13.0-15.5	0.50	...	0.40	Cb 0.30-0.70
S30601	...	0.015	0.50-0.80	0.030	0.013	5.0-5.6	17.0-18.0	17.0-18.0	0.20	0.05	0.35	...
S30615	...	0.16-0.24	2.00	0.030	0.030	3.2-4.0	17.0-19.5	13.5-16.0	...	...	...	Al 0.80-1.50
S30815	...	0.05-0.10	0.80	0.040	0.030	1.40-2.00	20.0-22.0	10.0-12.0	...	0.14-0.20	...	Ce 0.03-0.08
S30908	309S	0.08	2.00	0.045	0.030	0.75	22.0-24.0	12.0-15.0	...	...	...	...



TABLE 1 Continued

UNS Designation <sup>B</sup>	Type <sup>C</sup>	Carbon <sup>D</sup>	Manganese	Phosphorus	Sulfur	Silicon	Chromium	Nickel	Molybdenum	Nitrogen	Copper	Other Elements <sup>E, F</sup>
S30909	309H <sup>G</sup>	0.04-0.10	2.00	0.045	0.030	0.75	22.0-24.0	12.0-15.0	...	...	...	...
S30940	309Cb <sup>G</sup>	0.08	2.00	0.045	0.030	0.75	22.0-24.0	12.0-16.0	...	...	...	Cb 10xC min, 1.10 max
S30941	309HCb <sup>G</sup>	0.04-0.10	2.00	0.045	0.030	0.75	22.0-24.0	12.0-16.0	...	...	...	Cb 10xC min, 1.10 max
S31008	310S	0.08	2.00	0.045	0.030	1.50	24.0-26.0	19.0-22.0	...	...	...	...
S31009	310H <sup>G</sup>	0.04-0.10	2.00	0.045	0.030	0.75	24.0-26.0	19.0-22.0	...	...	...	...
S31040	310Cb <sup>G</sup>	0.08	2.00	0.045	0.030	1.50	24.0-26.0	19.0-22.0	...	...	...	Cb 10xC min, 1.10 max
S31041	310HCb <sup>G</sup>	0.04-0.10	2.00	0.045	0.030	0.75	24.0-26.0	19.0-22.0	...	...	...	Cb 10xC min, 1.10 max
S31050	310 MolN <sup>G</sup>	0.020	2.00	0.030	0.010	0.50	24.0-26.0	20.5-23.5	1.60-2.60	0.09-0.15	...	Ce + La
S31060	...	0.05-0.10	1.00	0.040	0.030	0.50	22.0-24.0	10.0-12.5	...	0.18-0.25	...	0.025-0.070
S31254	...	0.020	1.00	0.030	0.010	0.80	19.5-20.5	17.5-18.5	6.0-6.5	0.18-0.25	0.50-1.00	B 0.001-0.010
S31266	...	0.030	2.00-4.00	0.035	0.020	1.00	23.0-25.0	21.0-24.0	5.2-6.2	0.35-0.60	1.00-2.50	...
S31277	...	0.020	3.00	0.030	0.010	0.50	20.5-23.0	26.0-28.0	6.5-8.0	0.30-0.40	0.50-1.50	...
S31600	316	0.08	2.00	0.045	0.030	0.75	16.0-18.0	10.0-14.0	2.00-3.00	0.10	...	...
S31603	316L	0.030	2.00	0.045	0.030	0.75	16.0-18.0	10.0-14.0	2.00-3.00	0.10	...	...
S31609	316H	0.04-0.10	2.00	0.045	0.030	0.75	16.0-18.0	10.0-14.0	2.00-3.00	...	...	...
S31635	316Ti <sup>G</sup>	0.08	2.00	0.045	0.030	0.75	16.0-18.0	10.0-14.0	2.00-3.00	0.10	...	Ti 5 x (C + N)
S31640	316Cb <sup>G</sup>	0.08	2.00	0.045	0.030	0.75	16.0-18.0	10.0-14.0	2.00-3.00	0.10	...	min, 0.70 max
S31651	316N	0.08	2.00	0.045	0.030	0.75	16.0-18.0	10.0-14.0	2.00-3.00	0.10-0.16	...	Cb 10 x C
S31653	316LN	0.030	2.00	0.045	0.030	0.75	16.0-18.0	10.0-14.0	2.00-3.00	0.10-0.16	...	min, 1.10 max
S31655	...	0.030	2.00	0.045	0.015	1.00	19.5-21.5	8.0-9.5	0.50-1.50	0.14-0.25	1.00	...
S31700	317	0.08	2.00	0.045	0.030	0.75	18.0-20.0	11.0-15.0	3.0-4.0	0.10	...	...
S31703	317L	0.030	2.00	0.045	0.030	0.75	18.0-20.0	11.0-15.0	3.0-4.0	0.10	...	...
S31725	317LM <sup>G</sup>	0.030	2.00	0.045	0.030	0.75	18.0-20.0	13.5-17.5	4.0-5.0	0.20	...	...
S31726	317LMN <sup>G</sup>	0.030	2.00	0.045	0.030	0.75	17.0-20.0	13.5-17.5	4.0-5.0	0.10-0.20	...	...
S31727	...	0.030	1.00	0.030	0.030	1.00	17.5-19.0	14.5-16.5	3.8-4.5	0.15-0.21	2.80-4.00	...
S31730	...	0.030	2.00	0.040	0.010	1.00	17.0-19.0	15.0-16.5	3.0-4.0	0.045	4.0-5.0	...
S31753	317LN <sup>G</sup>	0.030	2.00	0.045	0.030	0.75	18.0-20.0	11.0-15.0	3.0-4.0	0.10-0.22	...	...
S32050	...	0.030	1.50	0.035	0.020	1.00	22.0-24.0	20.0-23.0	6.0-6.8	0.21-0.32	0.40	...
S32053	...	0.030	1.00	0.030	0.010	1.00	22.0-24.0	24.0-26.0	5.0-6.0	0.17-0.22	...	...
S32100	321	0.08	2.00	0.045	0.030	0.75	17.0-19.0	9.0-12.0	...	0.10	...	Ti 5 x (C + N)
S32109	321H	0.04-0.10	2.00	0.045	0.030	0.75	17.0-19.0	9.0-12.0	...	...	...	min, 0.70 max
S32615	...	0.07	2.00	0.045	0.030	4.80-6.00	16.5-19.5	19.0-22.0	0.30-1.50	...	1.50-2.50	...
S32654	...	0.020	2.00-4.00	0.030	0.005	0.50	24.0-25.0	21.0-23.0	7.0-8.0	0.45-0.55	0.30-0.60	...
S33228	...	0.04-0.08	1.00	0.020	0.015	0.30	26.0-28.0	31.0-33.0	...	...	...	Ce 0.05-0.10
S33400	334 <sup>G</sup>	0.08	1.00	0.030	0.015	1.00	18.0-20.0	19.0-21.0	...	...	...	Cb 0.6-1.0
S33425	...	0.08	1.50	0.045	0.020	1.00	21.0-23.0	20.0-23.0	2.00-3.00	...	...	Al 0.025
S33550	...	0.04-0.10	1.50	0.040	0.030	1.00	25.0-28.0	16.5-20.0	...	0.18-0.25	...	Al 0.15-0.60
S34565	...	0.030	5.00-7.00	0.030	0.010	1.00	23.0-25.0	16.0-18.0	4.0-5.0	0.40-0.60	...	Ti 0.15-0.60
S34700	347	0.08	2.00	0.045	0.030	0.75	17.0-19.0	9.0-13.0	...	...	...	Ti 0.15-0.60
												Cb 0.05-0.15
												La + Ce
												0.025-0.070
												Cb 0.10
												Cb 10 x C min, 1.00 max



TABLE 1 Continued

UNS Designation <sup>B</sup>	Type <sup>C</sup>	Carbon <sup>D</sup>	Manganese	Phosphorus	Sulfur	Silicon	Chromium	Nickel	Molybdenum	Nitrogen	Copper	Other Elements <sup>E, F</sup>
S34709	347H	0.04-0.10	2.00	0.045	0.030	0.75	17.0-19.0	9.0-13.0	...	...	...	Cb 8 x C min, 1.00 max
S34751	347LN	0.005-0.020	2.00	0.045	0.030	1.00	17.0-19.0	9.0-13.0	...	0.06-0.10	...	Cb 0.20-0.50, 15 x C min
S34800	348	0.08	2.00	0.045	0.030	0.75	17.0-19.0	9.0-13.0	...	...	...	(Cb + Ta) 10xC min, 1.00 max
S34809	348H	0.04-0.10	2.00	0.045	0.030	0.75	17.0-19.0	9.0-13.0	...	...	...	Ta 0.10
S35045	...	0.06-0.10	1.50	0.045	0.015	1.00	25.0-29.0	32.0-37.0	...	...	0.75	Co 0.20
S35115	...	0.030	1.00	0.045	0.015	0.50-1.50	23.0-25.0	19.0-22.0	1.50-2.50	0.20-0.30	...	Al 0.15-0.60
S35125	...	0.10	1.00-1.50	0.045	0.015	0.50	20.0-23.0	31.0-35.0	2.00-3.00	...	...	Ti 0.15-0.60
S35135	...	0.08	1.00	0.045	0.015	0.60-1.00	20.0-25.0	30.0-38.0	4.0-4.8	...	...	Cb 0.25-0.60
S35140	...	0.10	1.00-3.00	0.045	0.030	0.75	20.0-22.0	25.0-27.0	1.00-2.00	0.08-0.20	0.75	Ti 0.40-1.00
S35315	...	0.04-0.08	2.00	0.040	0.030	1.20-2.00	24.0-26.0	34.0-36.0	...	0.12-0.18	...	Cb 0.25-0.75
S38100	XM-15 <sup>V</sup>	0.08	2.00	0.030	0.030	1.50-2.50	17.0-19.0	17.5-18.5	...	...	...	Ce 0.03-0.10
S38815	...	0.030	2.00	0.040	0.020	5.50-6.50	13.0-15.0	15.0-17.0	0.75-1.50	...	...	...
Duplex (Austenitic-Ferritic)												
S31200	...	0.030	2.00	0.045	0.030	1.00	24.0-26.0	5.5-6.5	1.20-2.00	0.14-0.20	...	...
S31260	...	0.03	1.00	0.030	0.030	0.75	24.0-26.0	5.5-7.5	2.5-3.5	0.10-0.30	...	W 0.10-0.50
S31803	...	0.030	2.00	0.030	0.020	1.00	21.0-23.0	4.5-6.5	2.5-3.5	0.08-0.20	...	...
S32001	...	0.030	4.00-6.00	0.040	0.030	1.00	19.5-21.5	1.00-3.00	0.60	0.05-0.17	1.00	...
S32003	...	0.030	2.00	0.030	0.020	1.00	19.5-22.5	3.0-4.0	1.50-2.00	0.14-0.20	...	...
S32101	...	0.040	4.00-6.00	0.040	0.030	1.00	21.0-22.0	1.35-1.70	0.10-0.80	0.20-0.25	0.10-0.80	...
S32202	...	0.030	2.00	0.040	0.010	1.00	21.5-24.0	1.00-2.80	0.45	0.18-0.26	...	...
S32205	2205 <sup>G</sup>	0.030	2.00	0.030	0.020	1.00	22.0-23.0	4.5-6.5	3.0-3.5	0.14-0.20	...	...
S32304	2304 <sup>G</sup>	0.030	2.50	0.040	0.030	1.00	21.5-24.5	3.0-5.5	0.05-0.60	0.05-0.20	0.05-0.60	...
S32506	...	0.030	1.00	0.040	0.015	0.90	24.0-26.0	5.5-7.2	3.0-3.5	0.08-0.20	...	W 0.05-0.30
S32520	...	0.030	1.50	0.035	0.020	0.80	24.0-26.0	5.5-8.0	3.0-4.0	0.20-0.35	...	...
S32550	255 <sup>G</sup>	0.04	1.50	0.040	0.030	1.00	24.0-27.0	4.5-6.5	2.9-3.9	0.10-0.25	1.50-2.50	...
S32750	2507 <sup>G, O</sup>	0.030	1.20	0.035	0.020	0.80	24.0-26.0	6.0-8.0	3.0-5.0	0.24-0.32	0.50	...
S32760 <sup>K</sup>	...	0.030	1.00	0.030	0.010	1.00	24.0-26.0	6.0-8.0	3.0-4.0	0.20-0.30	0.50-1.00	W 0.50-1.00
S32808	...	0.030	1.10	0.030	0.010	0.50	27.0-27.9	7.0-8.2	0.80-1.2	0.30-0.40	...	W 2.10-2.50
S32900	329	0.08	1.00	0.040	0.030	0.75	23.0-28.0	2.0-5.00	1.00-2.00	...	...	...
S32906	...	0.030	0.80-1.50	0.030	0.030	0.80	28.0-30.0	5.8-7.5	1.50-2.60	0.30-0.40	0.80	...
S32950	...	0.030	2.00	0.035	0.010	0.60	26.0-29.0	3.5-5.2	1.00-2.50	0.15-0.35	...	...
S39274	...	0.030	1.00	0.030	0.020	0.80	24.0-26.0	6.0-8.0	2.5-3.5	0.24-0.32	0.20-0.80	W 1.50-2.50
S81921	...	0.030	2.00-4.00	0.040	0.030	1.00	19.0-22.0	2.0-4.0	1.00-2.00	0.14-0.20	...	...
S82011	...	0.030	2.00-3.00	0.040	0.020	1.00	20.5-23.5	1.0-2.0	0.10-1.00	0.15-0.27	0.50	...
S82012	...	0.05	2.00-4.00	0.040	0.005	0.80	19.0-20.5	0.8-1.5	0.10-0.60	0.16-0.26	1.00	...
S82013	...	0.060	2.50-3.50	0.040	0.030	0.90	19.5-22.0	0.5-1.5	...	0.20-0.30	0.20-1.20	...
S82031	...	0.05	2.50	0.040	0.005	0.80	19.0-22.0	2.0-4.0	0.60-1.40	0.14-0.24	1.00	...
S82121	...	0.035	1.00-2.50	0.040	0.010	1.00	21.0-23.0	2.0-4.0	0.30-1.30	0.15-0.25	0.20-1.20	...
S82122	...	0.030	2.0-4.0	0.040	0.020	0.75	20.5-21.5	1.5-2.5	0.60	0.15-0.20	0.50-1.50	...
S82441	...	0.030	2.50-4.00	0.035	0.005	0.70	23.0-25.0	3.0-4.5	1.00-2.00	0.20-0.30	0.10-0.80	...
Ferritic or Martensitic (Chromium)												
S32803	...	0.015	0.50	0.020	0.0035	0.55	28.0-29.0	3.0-4.0	1.80-2.50	0.020	...	Cb 12x(C+N) min, 0.15-0.50
S40300	403	0.15	1.00	0.040	0.030	0.50	11.5-13.0	0.60	...	(C+N) 0.030	...	...
S40500	405	0.08	1.00	0.040	0.030	1.00	11.5-14.5	0.60	...	...	...	...
S40900 <sup>L</sup>	409 <sup>L</sup>	...	...	...	...	...	...	...	...	...	...	Al 0.10-0.30



TABLE 1 Continued

UNS Designation <sup>B</sup>	Type <sup>C</sup>	Carbon <sup>D</sup>	Manganese	Phosphorus	Sulfur	Silicon	Chromium	Nickel	Molybdenum	Nitrogen	Copper	Other Elements <sup>E, F</sup>
S40910	...	0.030	1.00	0.040	0.020	1.00	10.5–11.7	0.50	...	0.030	...	Ti 6x(C+N) min, 0.50 max; Cb 0.17
S40920	...	0.030	1.00	0.040	0.020	1.00	10.5–11.7	0.50	...	0.030	...	Ti 8x(C+N) min, Ti 0.15–0.50; Cb 0.10
S40930	...	0.030	1.00	0.040	0.020	1.00	10.5–11.7	0.50	...	0.030	...	(Ti+Cb) [0.08+8x(C+N)] min, 0.75 max;
S40945	...	0.030	1.00	0.040	0.030	1.00	10.5–11.7	0.50	...	0.030	...	Ti 0.05 min
S40975	...	0.030	1.00	0.040	0.030	1.00	10.5–11.7	0.50–1.00	...	0.030	...	Cb 0.18–0.40
S40977	...	0.030	1.50	0.040	0.015	1.00	10.5–12.5	0.30–1.00	...	0.030	...	Ti 0.05–0.20
S41000	410	0.08–0.15	1.00	0.040	0.030	1.00	11.5–13.5	0.75	...	...	...	Ti 6x(C+N) min, 0.75 max
S41003	...	0.030	1.50	0.040	0.030	1.00	10.5–12.5	1.50	...	0.030	...	...
S41008	...	0.08	1.00	0.040	0.030	1.00	11.5–13.5	0.60	...	...	...	...
S41045	...	0.030	1.00	0.040	0.030	1.00	12.0–13.0	0.50	...	0.030	...	Cb 9x(C+N) min, 0.60 max
S41050	...	0.04	1.00	0.045	0.030	1.00	10.5–12.5	0.60–1.10	...	0.10	...	...
S41500 <sup>M</sup>	...	0.05	0.50–1.00	0.030	0.030	0.60	11.5–14.0	3.5–5.5	0.50–1.00	...	...	...
S42000	420	0.15 min	1.00	0.040	0.030	1.00	12.0–14.0	0.75	0.50	...	...	...
S42035	...	0.08	1.00	0.045	0.030	1.00	13.5–15.5	1.0–2.5	0.2–1.2	...	...	Ti 0.30–0.50
S42200	422	0.20–0.25	0.50–1.00	0.025	0.025	0.50	11.0–12.5	0.50–1.00	0.90–1.25	...	...	V 0.20–0.30, W 0.90–1.25
S42900	429 <sup>G</sup>	0.12	1.00	0.040	0.030	1.00	14.0–16.0	...	...	...	...	...
S43000	430	0.12	1.00	0.040	0.030	1.00	16.0–18.0	0.75	...	...	...	Ti [0.20+4(C+N)] min, 1.10 max; Al 0.15
S43035	439	0.030	1.00	0.040	0.030	1.00	17.0–19.0	0.50	...	0.030	...	...
S43037	...	0.030	1.00	0.040	0.030	1.00	16.0–19.0	...	...	...	...	Ti 0.10–1.00
S43100	431	0.20	1.00	0.040	0.030	1.00	15.0–17.0	1.25–2.50	...	...	...	...
S43400	434	0.12	1.00	0.040	0.030	1.00	16.0–18.0	...	0.75–1.25	...	...	...
S43600	436	0.12	1.00	0.040	0.030	1.00	16.0–18.0	...	0.75–1.25	...	...	Cb 5x C min, 0.80 max
S43932	...	0.030	1.00	0.040	0.030	1.00	17.0–19.0	0.50	...	0.030	...	(Ti+Cb) [0.20+4(C+N)] min, 0.75 max; Al 0.15
S43940	...	0.030	1.00	0.040	0.015	1.00	17.5–18.5	...	...	...	...	Ti 0.10–0.60 Cb [0.30+(3x C)] min
S44100	...	0.030	1.00	0.040	0.030	1.00	17.5–19.5	1.00	...	0.030	...	Ti 0.1–0.5 Cb [0.3 + (9x C)] min, 0.90 max
S44200	442	0.20	1.00	0.040	0.040	1.00	18.0–23.0	0.60	...	...	...	...
S44330	...	0.025	1.00	0.040	0.030	1.00	20.0–23.0	...	...	0.025	0.30–0.80	(Ti+Cb) 8x(C+N) min, 0.80 max
S44400	444	0.025	1.00	0.040	0.030	1.00	17.5–19.5	1.00	1.75–2.50	0.035	...	(Ti+Cb)[0.20+4(C+N)] min, 0.80 max
S44500	...	0.020	1.00	0.040	0.012	1.00	19.0–21.0	0.60	...	0.03	0.30–0.60	Cb 10x(C+N) min, 0.80 max
S44535	...	0.030	0.30–0.80	0.050	0.020	0.50	20.0–24.0	...	...	...	0.50	La 0.04–0.20, Ti 0.03–0.20, Al 0.50