This document is not an ASTM standard and is intended only to provide the user of an ASTM standard an indication of what changes have been made to the previous version. Because it may not be technically possible to adequately depict all changes accurately, ASTM recommends that users consult prior editions as appropriate. In all cases only the current version of the standard as published by ASTM is to be considered the official document.

Designation: ~~A240/A240M – 20a~~ A240/A240M – 22

Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications[1]

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 reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

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

1. Scope*

1.1 This specification[2] 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[3]

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

A1084 Test Method for Detecting Detrimental Phases in Lean 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

[1] 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.

Current edition approved ~~Nov. 15, 2020~~May 1, 2022. Published ~~December 2020~~May 2022. Originally approved in 1940. Last previous edition approved in 2020 as ~~A240/A240M – 20.~~A240/A240M – 20a. DOI: ~~10.1520/A0240_A0240M-20A.~~10.1520/A0240_A0240M-22.

[2] For ASME Boiler and Pressure Vessel Code applications see related Specification SA-240 in Section II of that Code.

[3] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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

Copyright © ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. United States

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

2.2 *SAE Standard:*[4]

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 rehearing,

3.1.14 Material test report,

3.1.15 Certification, and

3.1.16 Packaging, marking, and loading.

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.

5.3 When specified by the purchaser, 1 % offset yield strength shall be measured and reported in accordance with Supplementary Requirement S3.

[4] Available from SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096, http://www.sae.org.

TABLE 1 Chemical Composition Requirements, %[A]

UNS Desig.[B]	Type[C]	C[D]	Mn	P	S	Si	Cr	Ni	Mo	N	Cu	Other Elements[E,F]
Austenitic (Chromium-Nickel) (Chromium-Manganese-Nickel)												
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	Nb 8×C 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	Nb 8×C min 0.40 max
N08800	800[G]	0.10	1.50	0.045	0.015	1.00	19.0–23.0	30.0–35.0	. . .	. . .	0.75	Fe[H] 39.5 min Al 0.15–0.60 Ti 0.15–0.60
N08810	800H[G]	0.05–0.10	1.50	0.045	0.015	1.00	19.0–23.0	30.0–35.0	. . .	. . .	0.75	Fe[H] 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[H] 39.5 min Ti[I] 0.25–0.60 Al[I] 0.25–0.60
N08904	904L[G]	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	201LN[G]	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[J]	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	. . .	Nb 0.10–0.30 V 0.10–0.30
S21400	XM-31[J]	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[J]	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[J]	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	. . .	Nb 0.10–1.00
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	. . .	. . .
S21904	XM-11[J]	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[J]	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[G]	0.03	2.00	0.045	0.030	1.00	16.0–18.0	6.0–8.0	. . .	0.20	. . .	. . .
S30153	301LN[G]	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	0.08	2.00	0.045	0.030	0.75	18.0–20.0	8.0–11.0	. . .	0.10	. . .	. . .
S30403	304L	0.030	2.00	0.045	0.030	0.75	18.0–20.0	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	Nb 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[J]	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	Nb 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	. . .	. . .	. . .	. . .
S30909	309H[G]	0.04–0.10	2.00	0.045	0.030	0.75	22.0–24.0	12.0–15.0	. . .	. . .	. . .	. . .
S30940	309Cb[G]	0.08	2.00	0.045	0.030	0.75	22.0–24.0	12.0–16.0	. . .	. . .	. . .	Nb 10×C min, 1.10 max
S30941	309HCb[G]	0.04–0.10	2.00	0.045	0.030	0.75	22.0–24.0	12.0–16.0	. . .	. . .	. . .	Nb 10×C 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[G]	0.04–0.10	2.00	0.045	0.030	0.75	24.0–26.0	19.0–22.0	. . .	. . .	. . .	. . .
S31040	310Cb[G]	0.08	2.00	0.045	0.030	1.50	24.0–26.0	19.0–22.0	. . .	. . .	. . .	Nb 10×C min, 1.10 max
S31041	310HCb[G]	0.04–0.10	2.00	0.045	0.030	0.75	24.0–26.0	19.0–22.0	. . .	. . .	. . .	Nb 10×C min, 1.10 max
S31050	310MoLN[G]	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	. . .	. . .
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	. . .	Ce + La 0.025–0.070 B 0.001–0.010
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	. . .
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	W 1.50–2.50
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	. . .	. . .	. . .

TABLE 1 *Continued*

UNS Desig.[B]	Type[C]	C[D]	Mn	P	S	Si	Cr	Ni	Mo	N	Cu	Other Elements[E,F]
S31635	316Ti[G]	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×(C+N) min, 0.70 max
S31640	316Cb[G]	0.08	2.00	0.045	0.030	0.75	16.0–18.0	10.0–14.0	2.00–3.00	0.10	. . .	Nb 10×C min, 1.10 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	. . .	. . .
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	. . .	. . .
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[G]	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[G]	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[G]	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×(C+N) min, 0.70 max
S32109	321H	0.04–0.10	2.00	0.045	0.030	0.75	17.0–19.0	9.0–12.0	. . .	. . .	. . .	Ti 4×(C+N) 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 Nb 0.6–1.0 Al 0.025
S33400	334[G]	0.08	1.00	0.030	0.015	1.00	18.0–20.0	19.0–21.0	. . .	. . .	. . .	Al 0.15–0.60 Ti 0.15–0.60
S33425	. . .	0.08	1.50	0.045	0.020	1.00	21.0–23.0	20.0–23.0	2.00–3.00	. . .	. . .	Al 0.15–0.60 Ti 0.15–0.60
S33426	. . .	0.030	1.00	0.030	0.015	0.80–1.50	19.5–22.0	19.0–21.0	1.80–2.20	. . .	. . .	. . .
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	. . .	Nb 0.05–0.15 La+Ce 0.025–0.070
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	. . .	Nb 0.10
S34700	347	0.08	2.00	0.045	0.030	0.75	17.0–19.0	9.0–13.0	. . .	. . .	. . .	Nb 10×C min, 1.00 max
S34709	347H	0.04–0.10	2.00	0.045	0.030	0.75	17.0–19.0	9.0–13.0	. . .	. . .	. . .	Nb 8×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	. . .	Nb 0.20–0.50, 15×C min
S34752	. . .	0.005–0.02	2.00	0.035	0.010	0.60	17.0–19.0	10.0–13.0	0.20–1.20	0.06–0.12	2.50–3.50	Nb 0.20-0.50 B 0.001-0.005 Nb/C ratio, min 15
S34800	348	0.08	2.00	0.045	0.030	0.75	17.0–19.0	9.0–13.0	. . .	. . .	. . .	(Nb+Ta) 10×C min, 1.00 max Ta 0.10 Co 0.20
S34809	348H	0.04–0.10	2.00	0.045	0.030	0.75	17.0–19.0	9.0–13.0	. . .	. . .	. . .	(Nb+Ta) 8×C min, 1.00 max Ta 0.10 Co 0.20
S35045	. . .	0.06–0.10	1.50	0.045	0.015	1.00	25.0–29.0	32.0–37.0	. . .	. . .	0.75	Al 0.15–0.60 Ti 0.15–0.60
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	. . .	. . .
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	. . .	. . .	Nb 0.25–0.60
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	. . .	0.75	Ti 0.40–1.00
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	. . .	Nb 0.25–0.75
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	. . .	Ce 0.03–0.10
S38100	XM-15[J]	0.08	2.00	0.030	0.030	1.50–2.50	17.0–19.0	17.5–18.5	. . .	. . .	. . .	. . .
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	. . .	0.75–1.50	Al 0.30
						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	0.20–0.80	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[G]	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[G]	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	0.50–2.00	. . .
S32550	255[G]	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[G,O]	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[K]	. . .	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	. . .

TABLE 1 *Continued*

UNS Desig.[B]	Type[C]	C[D]	Mn	P	S	Si	Cr	Ni	Mo	N	Cu	Other Elements[E,F]
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 (C+N) 0.030	. . .	Nb 12×(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	. . .	. . .	. . .	. . .
S40500	405	0.08	1.00	0.040	0.030	1.00	11.5–14.5	0.60	. . .	. . .	. . .	Al 0.10–0.30
S40900[L]	409[L]											
S40910	. . .	0.030	1.00	0.040	0.020	1.00	10.5–11.7	0.50	. . .	0.030	. . .	Ti 6×(C+N) min, 0.50 max; Nb 0.17
S40920	. . .	0.030	1.00	0.040	0.020	1.00	10.5–11.7	0.50	. . .	0.030	. . .	Ti 8×(C+N) min, Ti 0.15–0.50; Nb 0.10
S40930	. . .	0.030	1.00	0.040	0.020	1.00	10.5–11.7	0.50	. . .	0.030	. . .	(Ti+Nb) [0.08+8×(C+N)] min, 0.75 max; Ti 0.05 min
S40945	. . .	0.030	1.00	0.040	0.030	1.00	10.5–11.7	0.50	. . .	0.030	. . .	Nb 0.18–0.40 Ti 0.05–0.20
S40975	. . .	0.030	1.00	0.040	0.030	1.00	10.5–11.7	0.50–1.00	. . .	0.030	. . .	Ti 6×(C+N) min, 0.75 max
S40977	. . .	0.030	1.50	0.040	0.015	1.00	10.5–12.5	0.30–1.00	. . .	0.030	. . .	. . .
S41000	410	0.08–0.15	1.00	0.040	0.030	1.00	11.5–13.5	0.75	. . .	. . .	. . .	. . .
S41003	. . .	0.030	1.50	0.040	0.030	1.00	10.5–12.5	1.50	. . .	0.030	. . .	. . .
S41008	410S	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	. . .	Nb 9×(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[M]	. . .	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[G]	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	. . .	. . .	. . .	. . .
S43035	439	0.030	1.00	0.040	0.030	1.00	17.0–19.0	0.50	. . .	0.030	. . .	Ti [0.20+4(C+N)] min, 1.10 max; Al 0.15
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	. . .	. . .	Nb 5×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+Nb) [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 Nb [0.30+(3×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 Nb [0.3+(9×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+Nb) 8×(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+Nb)[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	Nb 10×(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
S44536	. . .	0.015	1.00	0.040	0.030	1.00	20.0–23.0	0.5	. . .	0.015	. . .	(Ti+Nb) 8X(C+N)–0.8, Nb min 0.05
S44537	. . .	0.030	0.8	0.050	0.006	0.1–0.6	20.0–24.0	0.5	. . .	0.04	0.5	Al 0.1 W 1.0–3.0 Nb 0.2–1.0 Ti 0.02–0.20 La 0.04–0.20
S44626	XM-33[J]	0.06	0.75	0.040	0.020	0.75	25.0–27.0	0.50	0.75–1.50	0.04	0.20	Ti 0.20–1.00; Ti 7(C+N) min

TABLE 1 *Continued*

UNS Desig.[B]	Type[C]	C[D]	Mn	P	S	Si	Cr	Ni	Mo	N	Cu	Other Elements[E,F]
S44627	XM-27[J]	0.010[N]	0.40	0.020	0.020	0.40	25.0–27.5	0.50	0.75–1.50	0.015[N]	0.20	Nb 0.05–0.20 (Ni+Cu) 0.50
S44635	. . .	0.025	1.00	0.040	0.030	0.75	24.5–26.0	3.5–4.5	3.5–4.5	0.035	. . .	(Ti+Nb) [0.20+4 (C+N)] min, 0.80 max
S44600	446	0.20	1.50	0.040	0.030	1.00	23.0–27.0	0.75	. . .	0.25	. . .	. . .
S44660	. . .	0.030	1.00	0.040	0.030	1.00	25.0–28.0	1.0–3.5	3.0–4.0	0.040	. . .	(Ti+Nb) 0.20–1.00, Ti+Nb 6×(C+N) min
S44700	. . .	0.010	0.30	0.025	0.020	0.20	28.0–30.0	0.15	3.5–4.2	0.020	0.15	(C+N) 0.025
S44725	. . .	0.015	0.40	0.040	0.020	0.040	25.0–28.5	0.30	1.5–2.5	0.018	. . .	(Ti+Nb) ≥ 8×(C+N)
S44735	. . .	0.030	1.00	0.040	0.030	1.00	28.0–30.0	1.00	3.6–4.2	0.045	. . .	(Ti+Nb) 0.20–1.00, (Ti+Nb) 6×(C+N) min
S44800	. . .	0.010	0.30	0.025	0.020	0.20	28.0–30.0	2.00–2.50	3.5–4.2	0.020	0.15	(C+N) 0.025
S46800	. . .	0.030	1.00	0.040	0.030	1.00	18.0–20.0	0.50	. . .	0.030	. . .	Ti 0.07–0.30 Nb 0.10–0.60 (Ti+Nb) [0.20+4 (C+N)] min, 0.80 max

[A] Maximum, unless range or minimum is indicated. Where ellipses (. . .) appear in this table, there is no requirement and the element need not be determined or reported.
[B] Designation established in accordance with Practice E527 and SAE J 1086.
[C] Unless otherwise indicated, a grade designation originally assigned by the American Iron and Steel Institute (AISI).
[D] Carbon analysis shall be reported to nearest 0.01 % except for the low-carbon types, which shall be reported to nearest 0.001 %.
[E] The terms columbium (Cb) and niobium (Nb) both refer to the same element.
[F] When two minimums or two maximums are listed for a single type, as in the case of both a value from a formula and an absolute value, the higher minimum or lower maximum shall apply.
[G] Common name, not a trademark, widely used, not associated with any one producer.
[H] Iron shall be determined arithmetically by difference of 100 minus the sum of the other specified elements.
[I] (Al + Ti) 0.85–1.20.
[J] Naming system developed and applied by ASTM.
[K] Cr + 3.3 (Mo + ½ W) + 16 N = 41 min.
[L] S40900 (Type 409) has been replaced by S40910, S40920, and S40930. Unless otherwise specified in the ordering information, an order specifying S40900 or Type 409 shall be satisfied by any one of S40910, S40920, or S40930 at the option of the seller. Material meeting the requirements of S40910, S40920, or S40930, may at the option of the manufacturer be certified as S40900.
[M] Plate version of CA-6NM.
[N] Product (check or verification) analysis tolerance over the maximum limit for C and N in XM-27 shall be 0.002 %.
[O] Cr + 3.3 Mo + 16 N = 41 min.

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-manganese-nickel stainless steel; chromium-nickel stainless steel; construction

TABLE 2 Mechanical Test Requirements

UNS Designation	Type[A]	Tensile Strength, min		Yield Strength,[B] min		Elongation in 2 in. or 50 mm, min, %	Hardness, max[C]		Cold Bend°[D]
		ksi	MPa	ksi	MPa		Brinell. HBW	Rockwell	
Austenitic (Chromium-Nickel) (Chromium-Manganese-Nickel)									
N08020	. . .	80	550	35	240	30[E]	217	95 HRBW	not required
N08367									
Sheet and Strip		100	690	45	310	30	. . .	100 HRBW	not required
Plate		95	655	45	310	30	241	. . .	not required
N08700	. . .	80	550	35	240	30	192	90 HRBW	not required
N08800	800[F]	75	520	30[G]	205[G]	30[H]	. . .	. . .	not required
N08810	800H[F]	65	450	25[G]	170[G]	30	. . .	. . .	not required
N08811	. . .	65	450	25	170	30	. . .	. . .	not required
N08904	904L[F]	71	490	31	220	35	. . .	90 HRBW	not required
N08925	. . .	87	600	43	295	40	. . .	. . .	not required
N08926	. . .	94	650	43	295	35	. . .	. . .	not required
S20100	201-1[I]	75	515	38	260	40	217	95 HRBW	. . .
S20100	201-2[I]	95	655	45	310	40	241	100 HRBW	. . .
S20103	201L[F]	95	655	38	260	40	217	95 HRBW	not required
S20153	201LN[F]	95	655	45	310	45	241	100 HRBW	not required
S20161	. . .	125	860	50	345	40	255	25 HRC	not required
S20200	202	90	620	38	260	40	241	. . .	. . .
S20400	. . .	95	655	48	330	35	241	100 HRBW	not required
S20431	. . .	90	620	45	310	40	241	100 HRBW	not required
S20432	. . .	75	515	30	205	40	201	92 HRBW	not required
S20433	. . .	80	550	35	240	40	217	95 HRBW	not required
S20910	XM-19[J]								
Sheet and Strip		105	725	60	415	30	241	100 HRBW	not required
Plate		100	690	55	380	35	241	100 HRBW	not required
S21600	XM-17[J]								
Sheet and Strip		100	690	60	415	40	241	100 HRBW	not required
Plate		90	620	50	345	40	241	100 HRBW	not required
S21603	XM-18[J]								
Sheet and Strip		100	690	60	415	40	241	100 HRBW	not required
Plate		90	620	50	345	40	241	100 HRBW	not required
S21640	. . .	95	650	45	310	40	. . .	. . .	not required
S21800	. . .	95	655	50	345	35	241	100 HRBW	not required
S21904	XM-11[J]								
Sheet and Strip		100	690	60	415	40	241	100 HRBW	not required
Plate		90	620	50	345	45	241	100 HRBW	not required
S24000	XM-29[J]								
Sheet and Strip		100	690	60	415	40	241	100 HRBW	not required
Plate		100	690	55	380	40	241	100 HRBW	not required
S30100	301	75	515	30	205	40	217	95 HRBW	not required
S30103	301L[F]	80	550	32	220	45	241	100 HRBW	not required
S30153	301LN[F]	80	550	35	240	45	241	100 HRBW	not required
S30200	302	75	515	30	205	40	201	92 HRBW	not required
S30400	304	75	515	30	205	40	201	92 HRBW	not required
S30403	304L	70	485	25	170	40	201	92 HRBW	not required
S30409	304H	75	515	30	205	40	201	92 HRBW	not required
S30415	. . .	87	600	42	290	40	217	95 HRBW	not required
S30435	. . .	65	450	23	155	45	187	90 HRBW	. . .
S30441	. . .	75	515	30	205	40	201	92 HRBW	not required
S30451	304N	80	550	35	240	30	217	95 HRBW	not required
S30452	XM-21[J]								
Sheet and Strip		90	620	50	345	30	241	100 HRBW	not required
Plate		85	585	40	275	30	241	100 HRBW	not required
S30453	304LN	75	515	30	205	40	217	95 HRBW	not required
S30500	305	70	485	25	170	40	183	88 HRBW	not required
S30530	. . .	75	515	30	205	40	201	92 HRBW	not required
S30600	. . .	78	540	35	240	40	. . .	. . .	. . .
S30616	. . .	86	590	36	245	40	241	100 HRBW	not required
S30601	. . .	78	540	37	255	30	. . .	. . .	not required
S30615	. . .	90	620	40	275	35	217	95 HRBW	not required
S30815	. . .	87	600	45	310	40	217	95 HRBW	. . .
S30908	309S	75	515	30	205	40	217	95 HRBW	not required
S30909	309H[F]	75	515	30	205	40	217	95 HRBW	not required
S30940	309Cb[F]	75	515	30	205	40	217	95 HRBW	not required