

**SPECIFICATION FOR CHROMIUM AND
CHROMIUM-NICKEL STAINLESS STEEL PLATE, SHEET,
AND STRIP FOR PRESSURE VESSELS AND FOR
GENERAL APPLICATIONS**



SA-240/SA-240M



(Identical with ASTM Specification A240/A240M-17.)

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

1. Scope

1.1 This specification 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:

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:

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.

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.

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

TABLE 1 Chemical Composition Requirements, %^A

| UNS Designation ^B | Type ^C | Carbon ^D | Manganese | Phosphorus | Sulfur | Silicon | Chromium | Nickel | Molybdenum | Nitrogen | Copper | 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 | 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 ^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 | ... | 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 | ... | Cb 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 | ... | Cb 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 | 0.07 | 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 ^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 | 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 ^a | Type ^c | Carbon ^d | Manganese | Phosphorus | Sulfur | Silicon | Chromium | Nickel | Molybdenum | Nitrogen | Copper | Other Elements ^{e, f} |
|------------------------------|-----------------------|---------------------|-----------|------------|--------|-----------|-----------|-----------|------------|-----------|-----------|---|
| 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 | ... | ... | ... | Cb 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 | ... | ... | ... | Cb 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 | ... | ... | ... | Cb 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 | ... | ... | ... | Cb 10×C min, 1.10 max |
| S31050 | 310 MoLN ^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 | ... | ... | ... |
| 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 | ... | Cb 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 Cb 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 |
| 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 | ... | Cb 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 | ... | Cb 0.10 |
| S34700 | 347 | 0.08 | 2.00 | 0.045 | 0.030 | 0.75 | 17.0–19.0 | 9.0–13.0 | ... | ... | ... | Cb 10 × C min, 1.00 max |

TABLE 1 Continued

| UNS Designation ^B | Type ^C | Carbon ^D | Manganese | Phosphorus | Sulfur | Silicon | Chromium | Nickel | Molybdenum | Nitrogen | Copper | Other Elements ^{E, F} |
|------------------------------------|---------------------|---------------------|-----------|------------|--------|-----------|-----------|-----------|------------|----------------------|-----------|--|
| S34709 | 347H | 0.04–0.10 | 2.00 | 0.045 | 0.030 | 0.75 | 17.0–19.0 | 9.0–13.0 | ... | ... | ... | Cb 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 | ... | Cb 0.20–0.50, 15 × C min |
| S34800 | 348 | 0.08 | 2.00 | 0.045 | 0.030 | 0.75 | 17.0–19.0 | 9.0–13.0 | ... | ... | ... | (Cb + 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 | ... | ... | ... | (Cb + 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 | ... | ... | Cb 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 | ... | Cb 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,D} | 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 | ... |
| 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 | ... | Cb 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 | | | | | | | | | | | |

TABLE 1 *Continued*

| UNS Designation ^B | Type ^C | Carbon ^D | Manganese | Phosphorus | Sulfur | Silicon | Chromium | Nickel | Molybdenum | Nitrogen | Copper | Other Elements ^{E, F} |
|------------------------------|-------------------|---------------------|-----------|------------|--------|---------|-----------|-----------|------------|----------|-----------|---|
| 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; Ti 0.05 min |
| S40945 | ... | 0.030 | 1.00 | 0.040 | 0.030 | 1.00 | 10.5–11.7 | 0.50 | ... | 0.030 | ... | Cb 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 6x(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 | ... | 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 ^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 | ... | ... | Cb 5xC 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+(3xC)] 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 |

TABLE 1 *Continued*

| UNS Designation ^B | Type ^C | Carbon ^D | Manganese | Phosphorus | Sulfur | Silicon | Chromium | Nickel | Molybdenum | Nitrogen | Copper | Other Elements ^{E, F} |
|------------------------------|--------------------|---------------------|-----------|------------|--------|---------|-----------|-----------|------------|--------------------|--------|--|
| S44536 | ... | 0.015 | 1.00 | 0.040 | 0.030 | 1.00 | 20.0–23.0 | 0.5 | ... | 0.015 | ... | (Ti+Cb) 8X(C+N)–0.8, Cb 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 Cb 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 |
| 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 | Cb 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+Cb) [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+Cb) 0.20 – 1.00, Ti + Cb 6x(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+Cb) ≥8x(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+Cb) 0.20–1.00, (Ti+Cb) 6x (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 Cb 0.10–0.60 (Ti+Cb) [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 relate 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 + 16 N = 40 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.

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 | ... |

TABLE 2 Continued

| 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 | |
| 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 |
| S30941 | 309HCb ^F | 75 | 515 | 30 | 205 | 40 | 217 | 95 HRBW | not required |
| S31008 | 310S | 75 | 515 | 30 | 205 | 40 | 217 | 95 HRBW | not required |
| S31009 | 310H ^F | 75 | 515 | 30 | 205 | 40 | 217 | 95 HRBW | not required |
| S31040 | 310Cb ^F | 75 | 515 | 30 | 205 | 40 | 217 | 95 HRBW | not required |
| S31041 | 310HCb ^F | 75 | 515 | 30 | 205 | 40 | 217 | 95 HRBW | not required |
| S31050 | 310 MoLN ^F | | | | | | | | |
| | t ≤ 0.25 in. | 84 | 580 | 39 | 270 | 25 | 217 | 95 HRBW | not required |
| | t > 0.25 in. | 78 | 540 | 37 | 255 | 25 | 217 | 95 HRBW | not required |
| S31060 | ... | 87 | 600 | 41 | 280 | 40 | 217 | 95 HRBW | not required |
| S31254 | | | | | | | | | |
| Sheet and Strip | | 100 | 690 | 45 | 310 | 35 | 223 | 96 HRBW | not required |
| Plate | | 95 | 655 | 45 | 310 | 35 | 223 | 96 HRBW | not required |
| S31266 | ... | 109 | 750 | 61 | 420 | 35 | ... | ... | not required |
| S31277 | ... | 112 | 770 | 52 | 360 | 40 | ... | ... | not required |
| S31600 | 316 | 75 | 515 | 30 | 205 | 40 | 217 | 95 HRBW | not required |
| S31603 | 316L | 70 | 485 | 25 | 170 | 40 | 217 | 95 HRBW | not required |
| S31609 | 316H | 75 | 515 | 30 | 205 | 40 | 217 | 95 HRBW | not required |
| S31635 | 316Ti ^F | 75 | 515 | 30 | 205 | 40 | 217 | 95 HRBW | not required |
| S31640 | 316Cb ^F | 75 | 515 | 30 | 205 | 30 | 217 | 95 HRBW | not required |
| S31651 | 316N | 80 | 550 | 35 | 240 | 35 | 217 | 95 HRBW | not required |
| S31653 | 316LN | 75 | 515 | 30 | 205 | 40 | 217 | 95 HRBW | not required |
| S31655 | ... | 92 | 635 | 45 | 310 | 35 | 241 | 100 HRBW | not required |
| S31700 | 317 | 75 | 515 | 30 | 205 | 35 | 217 | 95 HRBW | not required |
| S31703 | 317L | 75 | 515 | 30 | 205 | 40 | 217 | 95 HRBW | not required |
| S31725 | 317LM ^F | 75 | 515 | 30 | 205 | 40 | 217 | 95 HRBW | not required |
| S31726 | 317LMN ^F | 80 | 550 | 35 | 240 | 40 | 223 | 96 HRBW | not required |
| S31727 | ... | 80 | 550 | 36 | 245 | 35 | 217 | 96 HRBW | not required |
| S31730 | ... | 70 | 480 | 25 | 175 | 35 | ... | 90 HRBW | not required |
| S31753 | 317LN | 80 | 550 | 35 | 240 | 40 | 217 | 95 HRBW | not required |
| S32050 | ... | 98 | 675 | 48 | 330 | 40 | 250 | ... | not required |
| S32053 | ... | 93 | 640 | 43 | 295 | 40 | 217 | 96 HRBW | not required |
| S32100 | 321 | 75 | 515 | 30 | 205 | 40 | 217 | 95 HRBW | not required |
| S32109 | 321H | 75 | 515 | 30 | 205 | 40 | 217 | 95 HRBW | not required |
| S32615 ^K | ... | 80 | 550 | 32 | 220 | 25 | ... | ... | not required |

TABLE 2 Continued

| 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 | |
| S32654 | ... | 109 | 750 | 62 | 430 | 40 | 250 | ... | not required |
| S33228 | ... | 73 | 500 | 27 | 185 | 30 | 217 | 95 HRBW | not required |
| S33400 | 334 ^F | 70 | 485 | 25 | 170 | 30 | ... | 92 HRBW | not required |
| S33425 | ... | 75 | 515 | 30 | 205 | 40 | ... | ... | not required |
| S33550 | ... | 87 | 600 | 41 | 280 | 35 | 217 | 95 HRBW | not required |
| S34565 | ... | 115 | 795 | 60 | 415 | 35 | 241 | 100 HRBW | not required |
| S34700 | 347 | 75 | 515 | 30 | 205 | 40 | 201 | 92 HRBW | not required |
| S34709 | 347H | 75 | 515 | 30 | 205 | 40 | 201 | 92 HRBW | not required |
| S34751 | 347LN | 75 | 515 | 30 | 205 | 40 | 201 | 92 HRBW | not required |
| S34800 | 348 | 75 | 515 | 30 | 205 | 40 | 201 | 92 HRBW | not required |
| S34809 | 348H | 75 | 515 | 30 | 205 | 40 | 201 | 92 HRBW | not required |
| S35045 | ... | 70 | 485 | 25 | 170 | 35 | ... | ... | not required |
| S35115 | ... | 85 | 585 | 40 | 275 | 40 | 241 | 100 HRBW | not required |
| S35125 | ... | 70 | 485 | 30 | 205 | 35 | ... | ... | not required |
| S35135 | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Sheet and Strip | ... | 80 | 550 | 30 | 205 | 30 | ... | ... | not required |
| Plate | ... | 75 | 515 | 30 | 205 | 30 | ... | ... | not required |
| S35140 | ... | 90 | 620 | 40 | 275 | 30 | 241 | 100 HRBW | not required |
| S35315 | ... | 94 | 650 | 39 | 270 | 40 | 217 | 95 HRBW | not required |
| S38100 | XM-15 ^J | 75 | 515 | 30 | 205 | 40 | 217 | 95 HRBW | not required |
| S38815 | ... | 78 | 540 | 37 | 255 | 30 | ... | ... | not required |
| Duplex (Austenitic-Ferritic) | | | | | | | | | |
| S31200 | ... | 100 | 690 | 65 | 450 | 25 | 293 | 31 HRC | not required |
| S31260 | ... | 100 | 690 | 70 | 485 | 20 | 290 | ... | ... |
| S31803 | ... | 90 | 620 | 65 | 450 | 25 | 293 | 31 HRC | not required |
| S32001 | ... | 90 | 620 | 65 | 450 | 25 | ... | 25 HRC | not required |
| S32003 | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| | t ≤ 0.187 in. [5.00 mm] | 100 | 690 | 70 | 485 | 25 | 293 | 31 HRC | not required |
| | t > 0.187 in. [5.00 mm] | 95 | 655 | 65 | 450 | 25 | 293 | 31 HRC | not required |
| S32101 | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| | t ≤ 0.187 in. [5.00 mm] | 101 | 700 | 77 | 530 | 30 | 290 | 31 HRC | not required |
| | t > 0.187 in. [5.00 mm] | 94 | 650 | 65 | 450 | 30 | 290 | 31 HRC | not required |
| S32202 | ... | 94 | 650 | 65 | 450 | 30 | 290 | 31 HRC | not required |
| S32205 | 2205 ^F | 95 | 655 | 65 | 450 | 25 | 293 | 31 HRC | not required |
| S32304 | 2304 ^F | 87 | 600 | 58 | 400 | 25 | 290 | 32 HRC | not required |
| S32506 | ... | 90 | 620 | 65 | 450 | 18 | 302 | 32 HRC | not required |
| S32520 | ... | 112 | 770 | 80 | 550 | 25 | 310 | 32 HRC | not required |
| S32550 | 255 ^F | 110 | 760 | 80 | 550 | 15 | 302 | 32 HRC | not required |
| S32750 | 2507 ^F | 116 | 795 | 80 | 550 | 15 | 310 | 32 HRC | not required |
| S32760 | ... | 108 | 750 | 80 | 550 | 25 | 310 | 32 HRC ^R | not required |
| S32808 | ... | 101 | 700 | 72 | 500 | 15 | 310 | 32 HRC | not required |
| S32900 | 329 | 90 | 620 | 70 | 485 | 15 | 269 | 28 HRC | not required |
| S32906 | ... | 116 | 800 | 94 | 650 | 25.0 | 310 | 32 HRC | not required |
| | t < 0.4 in. [10.0 mm] | ... | ... | ... | ... | ... | ... | ... | ... |
| | t ≥ 0.4 in. [10.0 mm] | 109 | 750 | 80 | 550 | 25.0 | 310 | 32 HRC | not required |

TABLE 2 Continued

| 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 | |
| S32950 ^L | ... | 100 | 690 | 70 | 485 | 15 | 293 | 32 HRC | not required |
| S39274 | ... | 116 | 800 | 80 | 550 | 15 | 310 | 32 HRC | not required |
| S81921 | ... | 90 | 620 | 65 | 450 | 25 | 293 | 31 HRC | not required |
| S82011 | ... | 101 | 700 | 75 | 515 | 30 | 293 | 31 HRC | not required |
| | t ≤ 0.187 in. [5.00 mm] | | | | | | | | |
| | t > 0.187 in. [5.00 mm] | 95 | 655 | 65 | 450 | 30 | 293 | 31 HRC | not required |
| S82012 | t > 0.187 in. [5.00 mm] | 94 | 650 | 58 | 400 | 35 | 290 | | |
| | t ≤ 0.187 in. [5.00 mm] | 102 | 700 | 73 | 500 | 35 | | 31 HRC | not required |
| S82013 | ... | 90 | 620 | 65 | 450 | 30 | 293 | 31 ^J | not required |
| S82031 | t > 0.187 in. [5.00 mm] | 94 | 650 | 58 | 400 | 35 | 290 | | not required |
| | t ≤ 0.187 in. [5.00 mm] | 102 | 700 | 73 | 500 | 35 | | 31 HRC | not required |
| S82121 | ... | 94 | 650 | 65 | 450 | 25 | 286 | 30 HRC | not required |
| S82122 | t < 0.118 in. [3.00 mm] | 101 | 700 | 72 | 500 | 25 | 290 | 32 HRC | not required |
| | t ≥ 0.118 in. [3.00 mm] | 87 | 600 | 58 | 400 | 30 | 290 | 32 HRC | not required |
| S82441 | ... | | | | | | | | |
| | t < 0.4 in. [10.0 mm] | 107 | 740 | 78 | 540 | 25 | 290 | 31 HRC | not required |
| | t ≥ 0.4 in. [10.0 mm] | 99 | 680 | 70 | 480 | 25 | 290 | 31 HRC | not required |
| Ferritic or Martensitic (Chromium) | | | | | | | | | |
| S32803 | ... | 87 | 600 | 72 | 500 | 16 | 241 | 100 HRBW | not required |
| S40300 | 403 | 70 | 485 | 30 | 205 | 25 ^N | 217 | 96 HRBW | 180 |
| S40500 | 405 | 60 | 415 | 25 | 170 | 20 | 179 | 88 HRBW | 180 |
| S40900 ^M | 409 ^M | | | | | | | | |
| S40910 | ... | 55 | 380 | 25 | 170 | 20 | 179 | 88 HRBW | 180 |
| S40920 | ... | 55 | 380 | 25 | 170 | 20 | 179 | 88 HRBW | 180 |
| S40930 | ... | 55 | 380 | 25 | 170 | 20 | 179 | 88 HRBW | 180 |
| S40945 | ... | 55 | 380 | 30 | 205 | 22 | ... | 80 HRBW | 180 |
| S40975 | ... | 60 | 415 | 40 | 275 | 20 | 197 | 92 HRBW | 180 |
| S40977 | ... | 65 | 450 | 41 | 280 | 18 | 180 | 88 HRBW | not required |
| S41000 | 410 | 65 | 450 | 30 | 205 | 20 | 217 | 96 HRBW | 180 |
| S41003 | ... | 66 | 455 | 40 | 275 | 18 | 223 | 20 HRC | not required |
| S41008 | 410S | 60 | 415 | 30 | 205 | 22 ^N | 183 | 89 HRBW | 180 |
| S41045 | ... | 55 | 380 | 30 | 205 | 22 | ... | 80 HRBW | 180 |
| S41050 | ... | 60 | 415 | 30 | 205 | 22 | 183 | 89 HRBW | 180 |
| S41500 | ... | 115 | 795 | 90 | 620 | 15 | 302 | 32 HRC | not required |
| S42000 | 420 | 100 ^O | 690 ^O | ... | ... | 15 | 217 | 96 HRBW | not required |
| S42035 | ... | 80 | 550 | 55 | 380 | 16 | 180 | 88 HRBW | not required |
| S42200 | 422 | ... | ... | ... | ... | ... | 248 | 24 HRC | not required |
| S42900 | 429 ^P | 65 | 450 | 30 | 205 | 22 ^N | 183 | 89 HRBW | 180 |
| S43000 | 430 | 65 | 450 | 30 | 205 | 22 ^N | 183 | 89 HRBW | 180 |
| S43035 | 439 | 60 | 415 | 30 | 205 | 22 | 183 | 89 HRBW | 180 |

TABLE 2 Continued

| 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 | |
| S43037 | ... | 50 | 360 | 30 | 205 | 22 | 183 | 89 | 180 |
| S43100 | 431 | ... | ... | ... | ... | ... | 285 | 29 HRC | not required |
| S43400 | 434 | 65 | 450 | 35 | 240 | 22 | ... | 89 HRBW | 180 |
| S43600 | 436 | 65 | 450 | 35 | 240 | 22 | ... | 89 HRBW | 180 |
| S43932 | ... | 60 | 415 | 30 | 205 | 22 | 183 | 89 HRBW | 180 |
| S43940 | ... | 62 | 430 | 36 | 250 | 18 | 180 | 88 HRBW | not required |
| S44330 | ... | 56 | 390 | 30 | 205 | 22 | 187 | 90 HRBW | not required |
| S44100 | ... | 60 | 414 | 35 | 241 | 20 | 190 | 90 HRBW | not required |
| S44200 | 442 | 65 | 515 | 40 | 275 | 20 | 217 | 96 HRBW | 180 |
| S44400 | ... | 60 | 415 | 40 | 275 | 20 | 217 | 96 HRBW | 180 |
| S44500 | ... | 62 | 427 | 30 | 205 | 22 | ... | 83 HRBW | 180 |
| S44535 | ... | 58 | 400 | 36 | 250 | 25 ^E | ... | 90 ^O HRBW | not required |
| S44536 | ... | 60 | 410 | 35 | 245 | 20 | 192 | 90 HRBW | 180 |
| S44537 | ... | 65 | 450 | 46 | 320 | 18 ^P | 200 | 93 HRBW | 180 |
| S44600 | 446 | 65 | 515 | 40 | 275 | 20 | 217 | 96 HRBW | 135 |
| S44626 | XM-33 ^J | 68 | 470 | 45 | 310 | 20 | 217 | 96 HRBW | 180 |
| S44627 | XM-27 ^J | 65 | 450 | 40 | 275 | 22 | 187 | 90 HRBW | 180 |
| S44635 | ... | 90 | 620 | 75 | 515 | 20 | 269 | 28 HRC | 180 |
| S44660 | ... | 85 | 585 | 65 | 450 | 18 | 241 | 100 HRBW | 180 |
| S44700 | ... | 80 | 550 | 60 | 415 | 20 | 223 | 20 HRC | 180 |
| S44725 | ... | 65 | 450 | 40 | 275 | 20 | 210 | 95 HRBW | 180 |
| S44735 | ... | 80 | 550 | 60 | 415 | 18 | 255 | 25 HRC | 180 |
| S44800 | ... | 80 | 550 | 60 | 415 | 20 | 223 | 20 HRC | 180 |
| S46800 | ... | 60 | 415 | 30 | 205 | 22 | ... | 90 HRBW | 180 |

^A Unless otherwise indicated, a grade designation originally assigned by the American Iron and Steel Institute (AISI).

^B Yield strength shall be determined by the offset method at 0.2 % in accordance with Test Methods and Definitions A370. Unless otherwise specified (see Specification A480/A480M, paragraph 4.1.11, Ordering Information), an alternative method of determining yield strength may be based on total extension under load of 0.5 %.

^C Either Brinell or denoted Rockwell Hardness scale is permissible. For thin materials, see Specification A480/A480M (17.2.1) and Test Methods A370 (18.1.2) on superficial testing.

^D Bend tests are not required for chromium steels (ferritic or martensitic) thicker than 1 in. [25 mm] or for any austenitic or duplex (austenitic-ferritic) stainless steels regardless of thickness.

^E Elongation for thickness, less than 0.015 in. [0.38 mm] shall be 20 % minimum, in 1 in. [25.4 mm].

^F Common name, not a trademark, widely used, not associated with any one producer.

^G Yield strength requirements shall not apply to material under 0.020 in. [0.50 mm] in thickness.

^H Not applicable for thicknesses under 0.010 in. [0.25 mm].

^I Type 201 is generally produced with a chemical composition balanced for rich side (Type 201-1) or lean side (Type 201-2) austenite stability depending on the properties required for specific applications.

^J Naming system developed and applied by ASTM.

^K For S32615, the grain size as determined in accordance with the Test Methods E112, Comparison Method, Plate II, shall be No. 3 or finer.

^L Prior to Specification A240 – 89b, the tensile value for S32950 was 90 ksi.

^M 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.

^N Material 0.050 in. [1.27 mm] and under in thickness shall have a minimum elongation of 20 %.

^O Hardness is required to be provided for information only, but is not required to meet a particular requirement.

^P The minimum elongation for plates thicker than 0.630 in. (16 mm) shall be 8 %.

^Q Maximum. Type 420 is usually used in the heat-treated condition (quenched and tempered to a specific range of hardness or tensile strength).

^R Hardness conversion tables for superduplex stainless steels do not exist in ASTM E140. The conversion value from HBW to HRC has been added to maintain consistency with other ASTM standards for these superduplex stainless steels.

SUPPLEMENTARY REQUIREMENTS

A supplementary requirement shall apply only when specified in the purchase order.

S1. Charpy Impact Testing of Plate

S1.1 Charpy impact tests shall be conducted in accordance with Test Methods and Definitions A370.

S1.2 *Number of Tests*—One impact test (three specimens) shall be made from one plate per heat treatment lot in the final heat treated condition.

S1.3 *Orientation of Test Specimens*—Unless specified as transverse specimens (long axis of the specimen transverse to the final rolling direction, root of the notch perpendicular to the rolling face) on the purchase order, the orientation of the specimens shall be longitudinal (long axis of the specimen parallel to the final rolling direction, root of the notch perpendicular to the rolling face). The manufacturer is permitted to test transverse specimens provided that such tests meet the acceptance criteria applicable to longitudinal specimens. Unless otherwise specified on the purchase order, the specimens shall be taken so as to include the mid-thickness of the product.

S1.4 *Test Temperature*—The purchaser shall specify the test temperature. The manufacturer is permitted to test specimens at a temperature lower than that specified by the purchaser, provided that such tests shall meet the acceptance criteria applicable to specimens tested at the specified temperature (see the note below).

NOTE S1.1—Test Methods A923, Method B, applicable to some duplex (austenitic-ferritic) stainless steels as listed in Test Methods A923, uses a Charpy impact test for the purpose of determining the absence of detrimental intermetallic phases. Method B specifies a test temperature and acceptance criterion, expressed as impact energy, for each type of steel covered. It may be economical for the Charpy impact tests performed on duplex stainless steels covered in both Specification A240 and Test Methods A923 to be performed at the lower of the temperatures specified by this supplementary requirement and Test Methods A923 Method B, with measurement of both lateral expansion and impact energy.

S1.5 *Acceptance Limit*—Unless otherwise specified on the purchase order, each of the three specimens tested shall show a lateral expansion opposite the notch of not less than 0.015 in. [0.38 mm].

S1.6 *Records*—The recorded results shall include the specimen orientation, specimen size, test temperature, absorbed energy values (if required), and lateral expansion opposite the notch.

S2. Materials for High-Temperature Service

S2.1 Unless an H grade has been ordered, this supplementary requirement shall be specified for ASME Code applications for service above 1000°F [540°C].

S2.2 The user is permitted to use an austenitic stainless steel as the corresponding H grade when the material meets all requirements of the H grade including chemistry, annealing temperature, and grain size (see Section 6).

S2.3 The user is permitted to use an L grade austenitic stainless steel for service above 1000°F [540°C], subject to the applicable allowable stress table of the ASME Code, when the material meets all requirements of this specification and the grain size is ASTM No. 7 or coarser as determined in accordance with Test Methods E112. The grain size shall be reported on a Certified Test Report.

S3. One Percent Offset Yield Strength

S3.1 If reporting of 1 % offset yield strength is specified on the purchase order; the material shall meet the strength requirements shown in Table S3.1.

S3.2 The mechanical properties, including 1 % offset yield strength and all other required properties shall be reported on a Material Test Report.

TABLE S3.1 Tensile and Yield Strength Requirements

NOTE 1—These values apply only for material of 1.5 inches (38 mm) nominal thickness or less.

| UNS | Grade | Tensile Strength, min., Ksi [MPa] | 0.2 % Offset Yield Strength, Min., Ksi [MPa] | 1 % Offset Yield Strength, Min., Ksi [MPa] |
|--------|-------|--|--|--|
| S31603 | 316L | 70 [485] | 25 [170] | 38 [260] |
| S31600 | 316 | 75 [515] | 30 [205] | 38 [260] |
| S31653 | 316LN | 75 [515] | 30 [205] | 46 [320] |
| S30403 | 304L | 70 [485] | 25 [170] | 35 [240] |
| S30400 | 304 | 75 [515] | 30 [205] | 36 [250] |
| S30453 | 304LN | 75 [515] | 30 [205] | 45 [310] |
| S30451 | 304N | 80 [550] | 35 [240] | 45 [310] |
| S32100 | 321 | 75 [515] | 30 [205] | 35 [240] |