Designation: A 276 – 02

Standard Specification for Stainless Steel Bars and Shapes[1]

This standard is issued under the fixed designation A 276; 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 Department of Defense.

1. Scope *

1.1 This specification covers hot-finished or cold-finished bars except bars for reforging (Note 1). It includes rounds, squares, and hexagons, and hot-rolled or extruded shapes, such as angles, tees, and channels in the more commonly used types of stainless steels. The free-machining types (Note 2), for general corrosion resistance and high-temperature service, are covered in a separate specification.

NOTE 1—For bars for reforging, see Specification A 314.

NOTE 2—For free-machining stainless bars designed especially for optimum machinability, see Specification A 582/A 582M.

NOTE 3—There are standards covering high nickel, chromium, austenitic corrosion, and heat resisting alloy materials. These standards are under the jurisdiction of ASTM Subcommittee B 02.07 and may be found in *Annual Book of ASTM Standards*, Vol. 02.04.

1.2 The values stated in inch-pound units are to be regarded as the standard.

2. Referenced Documents

2.1 *ASTM Standards:*

A 314 Specification for Stainless Steel Billets and Bars for Forging[2]

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products[2]

A 484/A 484M Specification for General Requirements for Stainless Steel Bars, Billets, and Forgings[2]

A 582/A582M Specification for Free-Machining Stainless Steel Bars[2]

A 751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products[2]

E 527 Practice for Numbering Metals and Alloys (UNS)[3]

2.2 *Other Document:*

SAE J 1086 Recommended Practice for Numbering Metals and Alloys[4]

3. Ordering Information

3.1 It is the responsibility of the purchaser to specify all requirements that are necessary for material ordered under this specification. Such requirements may include but are not limited to the following:

3.1.1 Quantity (weight or number of pieces),

3.1.2 Name of material: stainless steel,

3.1.3 Form (bars, angles, etc.),

3.1.4 Condition (Section 4.1),

3.1.5 Finish (Section 8 of Specification A 484/A 484M),

3.1.6 Surface preparation of shapes (Section 8 of Specification A 484/A 484M),

3.1.7 Applicable dimensions including size, thickness, width, and length,

3.1.8 Cross section (round, square, etc.),

3.1.9 Type or UNS designation (Table 1),

3.1.10 ASTM designation and date of issue, and

3.1.11 Whether bars are to be rolled as bars or cut from strip or plate.

3.1.12 Test for magnetic permeability when specified by customer purchase order when ordering Types 201 and 205.

3.1.13 Special requirements.

NOTE 4—A typical ordering description is as follows: 5000 lb (2268 kg) Stainless Steel Bars, Annealed and Centerless Ground, 1½ in. (38.10 mm) Round, 10 to 12 ft (3.05 to 3.66 m) in length, Type 304, ASTM Specification A 276 dated _____. End use: machined valve parts.

4. Manufacture

4.1 *Condition*:

4.1.1 Bars shall be furnished in one of the following conditions listed in the Mechanical Requirements table:

4.1.1.1 *Condition A*—Annealed

4.1.1.2 *Condition H*—Hardened and tempered at a relatively low temperature

4.1.1.3 *Condition T*—Hardened and tempered at a relatively high temperature

4.1.1.4 *Condition S—Strain Hardened*—Relatively light cold work

4.1.1.5 *Condition B*—Relatively severe cold work

5. Chemical Composition

5.1 The steel shall conform to the requirements for chemical composition specified in Table 1.

[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 Stainless Steel Products.

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[2] *Annual Book of ASTM Standards*, Vol 01.03.

[3] *Annual Book of ASTM Standards*, Vol 01.01.

[4] Available from Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.

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

5.2 Methods and practices relating to chemical analysis required by this specification shall be in accordance with Test Methods, Practices, and Terminology A 751.

6. Mechanical Properties Requirements

6.1 The material shall conform to the mechanical test requirements specified in Table 2.

6.2 The martensitic grades shall be capable of meeting the hardness requirements after heat treating as specified in Table 3.

6.3 Hardness measurements, when required, shall be made at a location midway between the surface and the center of the cross section.

7. Magnetic Permeability

7.1 When required by the purchase order, the magnetic permeability of Types 201 and 205 in the annealed condition shall not exceed 1.2 as tested by a Severn-type indicator.

8. General Requirements

8.1 In addition to the requirements of this specification, all requirements of the current edition of Specification A 484/A 484M shall apply. Failure to comply with the general requirements of Specification A 484/A 484M constitutes nonconformance to this specification.

9. Certification

9.1 Upon request of the purchaser in the contract or order, the producer's certification that the material was manufactured and tested in accordance with this specification, together with a certified report of the test results shall be furnished at the time of the shipment.

10. Keywords

10.1 austenitic stainless steel; austenitic-ferritic duplex stainless steel; ferritic stainless steel; martensitic stainless steel; stainless steel bars; stainless steel shapes

SUMMARY OF CHANGES

This section contains principal changes that have been incorporated since the –00a edition.

(1) Tensile strength of S32205 increased in Table 2.

(2) Addition of new grade, S20162, to Tables 1 and 2.

TABLE 1 Chemical Requirements[A]

UNS Designation[B]	Type	Composition, %									
		Carbon	Manganese	Phosphorus	Sulfur	Silicon	Chromium	Nickel	Molybdenum	Nitrogen	Other Elements
Austenitic Grades											
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	Cu 0.75
S20100	201	0.15	5.5–7.5	0.060	0.030	1.00	16.0–18.0	3.5–5.5	...	0.25	...
S20161	...	0.15	4.0–6.0	0.045	0.030	3.0–4.0	15.0–18.0	4.0–6.0	...	0.08–0.20	...
S20162	...	0.15	4.0–8.0	0.040	0.040	2.5–4.5	16.5–21.0	6.0–10.0	0.50–2.50	0.05–0.25	...
S20200	202	0.15	7.5–10.0	0.060	0.030	1.00	17.0–19.0	4.0–6.0	...	0.25	...
S20500	205	0.12–0.25	14.0–15.5	0.060	0.030	1.00	16.5–18.0	1.0–1.7	...	0.32–0.40	...
S20910	XM-19	0.06	4.0–6.0	0.045	0.030	1.00	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
S21800	...	0.10	7.0–9.0	0.060	0.030	3.5–4.5	16.0–18.0	8.0–9.0	...	0.08–0.18	...
S21900	XM-10	0.08	8.0–10.0	0.045	0.030	1.00	19.0–21.5	5.5–7.5	...	0.15–0.40	...
S21904	XM-11	0.04	8.0–10.0	0.045	0.030	1.00	19.0–21.5	5.5–7.5	...	0.15–0.40	...
S24000	XM-29	0.08	11.5–14.5	0.060	0.030	1.00	17.0–19.0	2.3–3.7	...	0.20–0.40	...
S24100	XM-28	0.15	11.0–14.0	0.045	0.030	1.00	16.5–19.0	0.50–2.50	...	0.20–0.45	...
S28200	...	0.15	17.0–19.0	0.045	0.030	1.00	17.0–19.0	...	0.75–1.25	0.40–0.60	Cu 0.75–1.25
S30200	302	0.15	2.00	0.045	0.030	1.00	17.0–19.0	8.0–10.0	...	0.10	...
S30215	302B	0.15	2.00	0.045	0.030	2.00–3.00	17.0–19.0	8.0–10.0	...	0.10	...
S30400	304	0.08	2.00	0.045	0.030	1.00	18.0–20.0	8.0–11.0	...	...	...
S30403	304L[C]	0.030	2.00	0.045	0.030	1.00	18.0–20.0	8.0–12.0	...	...	...
S30451	304N	0.08	2.00	0.045	0.030	1.00	18.0–20.0	8.0–11.0	...	0.10–0.16	...
S30452	XM-21	0.08	2.00	0.045	0.030	1.00	18.0–20.0	8.0–10.0	...	0.16–0.30	...
S30453	304LN	0.030	2.00	0.045	0.030	1.00	18.0–20.0	8.0–11.0	...	0.10–0.16	...
S30454	...	0.03	2.00	0.045	0.030	1.00	18.0–20.0	8.0–11.0	...	0.16–0.30	...
S30500	305	0.12	2.00	0.045	0.030	1.00	17.0–19.0	11.0–13.0	...	...	...
S30800	308	0.08	2.00	0.045	0.030	1.00	19.0–21.0	10.0–12.0	...	...	...
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
S30900	309	0.20	2.00	0.045	0.030	1.00	22.0–24.0	12.0–15.0	...	...	...
S30908	309S	0.08	2.00	0.045	0.030	1.00	22.0–24.0	12.0–15.0	...	...	...
S30940	309Cb	0.08	2.00	0.045	0.030	1.00	22.0–24.0	12.0–16.0	...	...	Cb 10×C-1.10
S31000	310	0.25	2.00	0.045	0.030	1.50	24.0–26.0	19.0–22.0	...	...	...
S31008	310S	0.08	2.00	0.045	0.030	1.50	24.0–26.0	19.0–22.0	...	...	...
S31040	310Cb	0.08	2.00	0.045	0.030	1.50	24.0–26.0	19.0–22.0	...	...	Cb 10×C-1.10
S31254	...	0.020	1.00	0.030	0.010	0.80	19.5–20.5	17.5–18.5	6.0–6.5	0.18–0.22	Cu 0.50–1.00
S31400	314	0.25	2.00	0.045	0.030	1.50–3.00	23.0–26.0	19.0–22.0	...	...	...
S31600	316	0.08	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	2.00–3.00	...	...

TABLE 1 *Continued*

UNS Designation[B]	Type	Composition, %									
		Carbon	Manganese	Phosphorus	Sulfur	Silicon	Chromium	Nickel	Molybdenum	Nitrogen	Other Elements
S31603	316L[C]	0.030	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	2.00–3.00	...	...
S31635	316Ti	0.08	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	2.00–3.00	0.10	Ti 5×(C+N)-0.70
S31640	316Cb	0.08	2.00	0.045	0.030	1.00	16.0–18.0	10.0–14.0	2.00–3.00	0.10	Cb 10×C-1.10
S31651	316N	0.08	2.00	0.045	0.030	1.00	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	1.00	16.0–18.0	10.0–13.0	2.00–3.00	0.10–0.16	...
S31654	...	0.03	2.00	0.045	0.030	1.00	16.0–18.0	10.0–13.0	2.00–3.00	0.16–0.30	...
S31700	317	0.08	2.00	0.045	0.030	1.00	18.0–20.0	11.0–15.0	3.0–4.0	0.10	...
S31725	...	0.030	2.00	0.045	0.030	1.00	18.0–20.0	13.5–17.5	4.0–5.0	0.20	...
S31726	...	0.030	2.00	0.045	0.030	1.00	17.0–20.0	14.5–17.5	4.0–5.0	0.10–0.20	...
S32100	321	0.08	2.00	0.045	0.030	1.00	17.0–19.0	9.0–12.0	...	...	Ti 5×(C+N)-0.70[D]
S32654	...	0.020	2.0–4.0	0.030	0.005	0.50	24.0–25.0	21.0–23.0	7.0–8.0	0.45–0.55	Cu 0.30–0.60
S34565	...	0.030	5.0–7.0	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	1.00	17.0–19.0	9.0–12.0	...	...	Cb 10×C–1.10
S34800	348	0.08	2.00	0.045	0.030	1.00	17.0–19.0	9.0–12.0	...	...	Cb 10×C–1.10, Ta 0.10 Co 0.20
						Austenitic-Ferritic Grades					
S31100	XM-26	0.06	1.00	0.045	0.030	1.00	25.0–27.0	6.0–7.0	...	...	Ti 0.25
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	...
S32205	...	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	...	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	Cu 0.05–0.60
S32550	...	0.04	1.50	0.040	0.030	1.0	24.0–27.0	4.5–6.5	2.9–3.9	0.10–0.25	Cu 1.50–2.50
S32760[E]	...	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	Cu 0.50–1.00 W 0.50–1.00
						Ferritic Grades					
S40500	405	0.08	1.00	0.040	0.030	1.00	11.5–14.5	0.50	...	...	Al 0.10–0.30
S40976	...	0.030	1.00	0.040	0.030	1.00	10.5–11.7	0.75–1.00	...	0.040	Cb 10×(C+N)-0.80
S42900	429	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	...	...	...	...
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)-0.80
S44600	446	0.20	1.50	0.040	0.030	1.00	23.0–27.0	0.75	...	0.25	...
S44627	XM-27[F]	0.010[G]	0.40	0.020	0.020	0.40	25.0–27.5	0.50	0.75–1.50	0.015[G]	Cu 0.20 Cb 0.05–0.20
S44700	...	0.010	0.30	0.025	0.020	0.20	28.0–30.0	0.15	3.5–4.2	0.020	C+N 0.025 Cu 0.15
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	C+N 0.025 Cu 0.15
						Martensitic Grades					
S40300	403	0.15	1.00	0.040	0.030	0.50	11.5–13.0	...	...	...	...
S41000	410	0.15	1.00	0.040	0.030	1.00	11.5–13.5	...	...	...	...
S41040	XM-30	0.18	1.00	0.040	0.030	1.00	11.0–13.0	...	...	...	Cb 0.05–0.30
S41400	414	0.15	1.00	0.040	0.030	1.00	11.5–13.5	1.25–2.50	...	...	...
S41425	...	0.05	0.50–1.00	0.020	0.005	0.50	12.0–15.0	4.0–7.0	1.50–2.00	0.06–0.12	Cu 0.30
S41500	[H]	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	...	...	...	...
S42010	...	0.15–0.30	1.00	0.040	0.030	1.00	13.5–15.0	0.35–0.85	0.40–0.85	...	...
S43100	431	0.20	1.00	0.040	0.030	1.00	15.0–17.0	1.25–2.50	...	...	...
S44002	440A	0.60–0.75	1.00	0.040	0.030	1.00	16.0–18.0	...	0.75	...	...
S44003	440B	0.75–0.95	1.00	0.040	0.030	1.00	16.0–18.0	...	0.75	...	...
S44004	440C	0.95–1.20	1.00	0.040	0.030	1.00	16.0–18.0	...	0.75	...	...

[A] Maximum, unless range or minimum is indicated.

[B] Designations established in accordance with Practice E 527 and SAE J 1086.

[C] For some applications, the substitution of Type 304L for Type 304, or Type 316L for Type 316 may be undesirable because of design, fabrication, or service requirements. In such cases, the purchaser should so indicate on the order.

[D] Nitrogen content is to be reported for this grade.

[E] % Cr + 3.3 × % Mo + 16 × % N ≥ 40.

[F] Nickel plus copper shall be 0.50 % max.

[G] Product analysis tolerance over the maximum limit for carbon and nitrogen shall be 0.002 %.

[H] Wrought version of CA 6NM.

TABLE 2 Mechanical Requirements

Type	Condition	Finish	Diameter or Thickness, in. (mm)	Tensile Strength, min		Yield Strength,[A] min		Elongation in 2 in. (50 mm)[B] or 4D min %	Reduction of Area,[C] min, %	Brinell Hardness,[D] max
				ksi	MPa	ksi	MPa			
Austenitic Grades										
N08367	A	hot-finished or cold-finished	all	95	655	45	310	30	50	...
201, 202	A	hot-finished or cold-finished	all	75	515	40	275	40	45	...
S20161	A	hot-finished	all	125	860	50	345	40	40	255
		cold-finished	all	125	860	50	345	40	40	311
S20162	A	hot-finished or cold finished	all	100	690	50	345	50	60	...
205	A	hot-finished or cold-finished	all	100	690	60	414	40	50	...
XM-19	A	hot-finished or cold-finished	all	100	690	55	380	35	55	...
	As hot-rolled	hot-finished or cold-finished	up to 2 (50.8), incl	135	930	105	725	20	50	...
			over 2 to 3 (50.8 to 76.2), incl	115	795	75	515	25	50	...
			over 3 to 8 (76.2 to 203.2), incl	100	690	60	415	30	50	...
S21800	A	hot-finished or cold-finished	all	95	655	50	345	35	55	241
XM-10, XM-11	A	hot-finished or cold-finished	all	90	620	50	345	45	60	...
XM-29	A	hot-finished or cold-finished	all	100	690	55	380	30	50	...
XM-28	A	hot-finished or cold-finished	all	100	690	55	380	30	50	...
S24565	A	hot-finished or cold-finished	all	115	795	60	415	35	40	...
S28200	A	hot-finished or cold finished	all	110	760	60	410	35	55	...
302, 302B, 304, 304LN, 305, 308, 309, 309S, 309Cb, 310, 310S, 310Cb, 314, 316, 316LN, 316Cb, 316TI, 317, 321, 347, 348	A	hot-finished	all	75[E]	515	30[E]	205	40[F]	50	...
		cold-finished	up to ½ (12.70) incl	90	620	45	310	30	40	...
			over ½(12.70)	75[E]	515	30[E]	205	30	40	...
304L, 316L	A	hot-finished	all	70	485	25	170	40[F]	50	...
		cold-finished	up to ½ (12.70) incl.	90	620	45	310	30	40	...
			over ½ (12.70)	70	485	25	170	30	40	...
304N, 316N	A	hot-finished or cold-finished	all	80	550	35	240	30	...	...
202, 302, 304, 304N, 316, 316N	B	cold-finished	up to ¾ (19.05) incl	125	860	100	690	12	35	...
			over ¾ (19.05) to 1 (25.40)	115	795	80	550	15	35	...
			over 1 (25.40) to 1¼ (31.75)	105	725	65	450	20	35	...
			over 1¼ (31.75) to 1½ (38.10)	100	690	50	345	24	45	...
			over 1½ (38.10) to 1¾ (44.45)	95	655	45	310	28	45	...
304, 304N, 316, 316N	S	cold-finished	up to 2 (50.8) incl	95	650	75	515	25	40	...
			over 2 to 2½ (50.8 to 63.5) incl	90	620	65	450	30	40	...
			over 2½ to 3 (63.5 to 76.2) incl	80	550	55	380	30	40	...
XM-21, S30454, S31654	A	hot-finished or cold-finished	all	90	620	50	345	30	50	...
XM-21, S30454 S31654	B	cold-finished	up to 1 (25.40) incl	145	1000	125	860	15	45	...
			over 1 (25.40) to 1¼ (31.75)	135	930	115	795	16	45	...
			over 1¼ (31.75) to 1½ (38.10)	135	895	105	725	17	45	...
			over 1½ (38.10) to 1¾ (44.45)	125	860	100	690	18	45	...

TABLE 2 *Continued*

Type	Condition	Finish	Diameter or Thickness, in. (mm)	Tensile Strength, min		Yield Strength,[A] min		Elongation in 2 in. (50 mm)[B] or 4D min %	Reduction of Area,[C] min, %	Brinell Hardness,[D] max
				ksi	MPa	ksi	MPa			
S30815	A	hot-finished or cold-finished	all	87	600	45	310	40	50	...
				87	600	45	310	40	50	...
S31254	A	hot-finished or cold-finished	all	95	650	44	300	35	50	...
S31725	A	hot-finished or cold-finished	all	75	515	30	205	40	...	...
S31726	A	hot-finished or cold-finished	all	80	550	35	240	40	...	...
S32654	A	hot-finished or cold-finished	all	109	750	62	430	40	40	250
			Austenitic-Ferritic Grades							
XM-26	A	hot-finished or cold-finished	all	90	620	65	450	20	55	...
S31803	A	hot-finished	all	90	620	65	448	25	...	290
		cold-finished	all	90	620	65	448	25	...	290
S32205	A	hot-finished or cold-finished	all	95	655	65	450	25	...	290
S32304	A	hot-finished cold-finished	all	87	600	58	400	25	...	290
S32550	A	hot-finished or cold-finished	all	109	750	80	550	25	...	290
S32550	S	cold-finished	all	125	860	105	720	16	...	335
S32760	A	hot-finished or cold-finished	all	109	750	80	550	25	...	290
S32760	S	cold-finished	all	125	860	105	720	16	...	335
			Ferritic Grades							
405[G]	A	hot-finished	all	...	...	...	...	...	...	207
		cold-finished	all	...	...	...	...	...	...	217
429	A	hot-finished	all	70	480	40	275	20	45	...
		cold-finished	all	70	480	40	275	16	45	...
430	A	hot-finished or cold-finished	all	60	415	30	207	20	45	...
S40976	A	hot-finished or cold-finished	all	60	415	20	140	20	45	244
S44400	A	hot-finished	all	60	415	45	310	20	45	217
		cold-finished	all	60	415	45	310	16	45	217
446, XM-27	A	hot-finished	all	65	450	40	275	20	45	219
		cold-finished	all	65	450	40	275	16	45	219
S44700	A	hot-finished	all	70	480	55	380	20	40	...
		cold-finished	all	75	520	60	415	15	30	...
S44800	A	hot-finished	all	70	480	55	380	20	40	...
		cold-finished	all	75	520	60	415	15	30	...
			Martensitic Grades							
403, 410	A	hot-finished	all	70	480	40	275	20	45	...
		cold-finished	all	70	480	40	275	16	45	...
403, 410	T	hot-finished	all	100	690	80	550	15	45	...
		cold-finished	all	100	690	80	550	12	40	...
XM-30	T	hot-finished	all	125	860	100	690	13	45	302
		cold-finished	all	125	860	100	690	12	35	...
403, 410	H	hot-finished	all	120	830	90	620	12	40	...
		cold-finished	all (rounds only)	120	830	90	620	12	40	...
XM-30	A	hot-finished	all	70	480	40	275	13	45	235
		cold-finished	all	70	480	40	275	12	35	...
414	A	hot-finished or cold-finished	all	...	...	...	...	...	...	298
414	T	hot-finished or cold-finished	all	115	790	90	620	15	45	...
S41425	T	hot-finished	all	120	825	95	655	15	45	321
S41500	T	hot-finished or cold-finished	all	115	795	90	620	15	45	295
420	A	hot-finished	all	...	...	...	...	...	...	241
		cold-finished	all	...	...	...	...	...	...	255
S42010	A	hot-finished	all	...	...	...	...	...	...	235
		cold-finished	all	...	...	...	...	...	...	255
431	A	hot-finished or cold-finished	all	...	...	...	...	...	...	285

TABLE 2 *Continued*

Type	Condition	Finish	Diameter or Thickness, in. (mm)	Tensile Strength, min		Yield Strength,[A] min		Elongation in 2 in. (50 mm)[B] or 4D min %	Reduction of Area,[C] min, %	Brinell Hardness,[D] max
				ksi	MPa	ksi	MPa			
440A, 440B, and 440C	A	hot-finished	all	...	...	...	...	...	...	269
		cold-finished	all	...	...	...	...	...	...	285

[A] Yield strength shall be determined by the 0.2 % offset method in accordance with Test Methods and Definitions A 370. An alternative method of determining yield strength may be used based on a total extension under load of 0.5 %.

[B] For some specific products, it may not be practicable to use a 2-in. or 50-mm gage length. The use of sub-size test specimens, when necessary, is permissible in accordance with Test Methods and Definitions A 370.

[C] Reduction of area does not apply on flat bars 3⁄16 in. (4.76 mm) and under in thickness as this determination is not generally made in this product size.

[D] Or equivalent Rockwell hardness.

[E] For extruded shapes of all Cr-Ni grades of Condition A, the yield strength shall be 25 ksi (170 MPa) min and tensile strength shall be 70 ksi (480 MPa) min.

[F] For shapes having section thickness of ½ in. (12.5 mm) or less, 30% min. elongation is acceptable.

[G] Material shall be capable of being heat treated to a maximum Brinell hardness of 250 when oil quenched from 1750°F (953°C).

TABLE 3 Response to Heat Treatment

Type[A]	Heat Treatment Temperature[B] °F (°C), min	Quenchant	Hardness HRC, min
403	1750 (955)	Air	35
410	1750 (955)	Air	35
414	1750 (955)	Oil	42
420	1825 (995)	Air	50
S42010	1850 (1010)	Oil	48
431	1875 (1020)	Oil	40
440A	1875 (1020)	Air	55
440B	1875 (1020)	Oil	56
440C	1875 (1020)	Air	58

[A] Samples for testing shall be in the form of a section not exceeding ⅜ in. (9.50 mm) in thickness.

[B] Temperature tolerance is ±25°F (14°C).