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SURFACE VEHICLE STANDARD

SAE J405

REV. JUN1998

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Superseding J405 JAN89

An American National Standard

(R) Chemical Compositions of SAE Wrought Stainless Steels

***Foreword*—**This Document has also changed to comply with the new SAE Technical Standards Board Format.

***1. Scope*—**The chemical composition of standard types of wrought stainless steels are listed in ASTM Specification A240. The UNS 20000 series designates nickel-chromium manganese, corrosion resistant types that are nonhardenable by thermal treatment. The UNS 30000 series are nickel-chromium, corrosion resistant steels, nonhardenable by thermal treatment. The UNS 40000 however, includes both a hardenable, martensitic chromium steel and nonhardenable, ferritic, chromium steel. Reference to SAE J412 is suggested for general information and usage of these types of materials. See Table 1.

2. References

2.1 Applicable Publications—The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J412—General Characteristics and Heat Treatments of Steels

2.1.2 ASTM PUBLICATION—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM A 240—Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels

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TABLE 1—CHEMICAL COMPOSITION REQUIREMENTS, %[1]

UNS Designation[2]	Type[3]	Carbon[4]	Manganese	Phos-phorus	Sulfur	Silicon	Chromium	Nickel	Molybdenum	Nitrogen	Copper	Other Elements[5]
Austenitic (Chromium-Nickel) (Chromium-Manganese-Nickel)												
N08367	—	0.030	2.00	0.040	0.030	1.00	20.00–22.00	23.50–25.50	6.00–7.00	0.18–0.25	0.75	—
N08800	—	0.10	1.50	0.045	0.015	1.00	19.0–23.0	30.0–35.0	—	—	0.75	Al 0.15–0.60 Ti 0.15–0.60
N08810	—	0.05–0.10	1.50	0.045	0.015	1.00	19.0–23.0	30.0–35.0	—	—	0.75	Al 0.15–0.60 Ti 0.15–0.60
N08904	904L[6]	0.020	2.00	0.045	0.035	1.00	19.00–23.00	23.00–28.00	4.0–5.0	0.10	1.0–2.0	—
N08926	—	0.020	2.00	0.030	0.010	0.50	19.00–21.00	24.00–26.00	6.0–7.0	0.15–0.25	0.5–1.5	—
S20100	201	0.15	5.50–7.50	0.060	0.030	1.00	16.00–18.00	3.50–5.50	—	0.25	—	—
S20103	—	0.03	5.50–7.50	0.045	0.030	0.75	16.00–18.00	3.50–5.50	—	0.25	—	—
S20153	—	0.03	6.40–7.50	0.045	0.015	0.75	16.00–17.50	4.00–5.00	—	0.10–0.25	1.00	—
S20161	—	0.15	4.00–6.00	0.040	0.040	3.00–4.00	15.00–18.00	4.00–6.00	—	0.08–0.20	—	—
S20200	202	0.15	7.50–10.0	0.060	0.030	1.00	17.00–19.00	4.00–6.00	—	0.25	—	—
S20400	—	0.030	7.00–9.00	0.040	0.030	1.00	15.00–17.00	1.50–3.00	—	0.15–0.30	—	—
S20910	XM-19[7]	0.06	4.00–6.00	0.040	0.030	0.75	20.50–23.50	11.50–13.50	1.50–3.00	0.20–0.40	—	Cb 0.10–0.30 V 0.10–0.30
S21400	XM-31[7]	0.12	14.00–16.00	0.045	0.030	0.30–1.00	17.00–18.50	1.00	—	0.35 min	—	—
S21600	XM-17[7]	0.08	7.50–9.00	0.045	0.030	0.75	16.50–22.00	5.00–7.00	2.00–3.00	0.25–0.50	—	—
S21603	XM-18[7]	0.03	7.50–9.00	0.045	0.030	0.75	17.50–22.00	5.00–7.00	2.00–3.00	0.25–0.50	—	—
S21800	—	0.10	7.00–9.00	0.060	0.030	3.50–4.50	16.00–18.00	8.00–9.00	—	0.08–0.18	—	—
S24000	XM-29[7]	0.08	11.50–14.50	0.060	0.030	0.75	17.00–19.00	2.25–3.75	—	0.20–0.40	—	—
S30100	301	0.15	2.00	0.045	0.030	1.00	16.00–18.00	6.00–8.00	—	0.10	—	—
S30200	302	0.15	2.00	0.045	0.030	0.75	17.00–19.00	8.00–10.00	—	0.10	—	—
S30400	304	0.08	2.00	0.045	0.030	0.75	18.00–20.00	8.00–10.50	—	0.10	—	—
S30403	304L	0.030	2.00	0.045	0.030	0.75	18.00–20.00	8.00–12.00	—	0.10	—	—
S30409	304H	0.04–0.10	2.00	0.045	0.030	0.75	18.00–20.00	8.00—10.50	—	—	—	—
S30415	—	0.04–0.06	0.80	0.045	0.030	1.00–2.00	18.00–19.00	9.00–10.00	—	0.12–0.18	—	Ce 0.03–0.08
S30451	304N	0.08	2.00	0.045	0.030	0.75	18.00–20.00	8.00–10.50	—	0.10–0.16	—	—
S30452	XM-21	0.08	2.00	0.045	0.030	0.75	18.00–20.00	8.00–10.50	—	0.16–0.30	—	—
S30453	304LN	0.030	2.00	0.045	0.030	0.75	18.00–20.00	8.00–12.00	—	0.10–0.16	—	—
S30500	305	0.12	2.00	0.045	0.030	0.75	17.00–19.00	10.50–13.00	—	—	—	—
S30600	—	0.018	2.00	0.20	0.020	3.7–4.3	17.0–18.5	14.0–15.5	0.20	—	0.50	—
S30601	—	0.015	0.50–0.80	0.030	0.013	5.00–5.60	17.00–18.00	17.00–18.00	0.20	0.050	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 0.8–1.5
S30815	—	0.05–0.10	0.80	0.040	0.030	1.40–2.00	20.00—22.00	10.00–12.00	—	0.14–0.20	—	Ce 0.03–0.08
S30908	309S	0.08	2.00	0.045	0.030	0.75	22.00–24.00	12.00–15.00	—	—	—	—
S30909	309H[6]	0.04–0.10	2.00	0.045	0.030	0.75	22.00–24.00	12.00–15.00	—	—	—	—
S30940	309Cb[6]	0.08	2.00	0.045	0.030	0.75	22.00–24.00	12.00–16.00	—	—	—	Cb 10 x C min, 1.10 max

TABLE 1—CHEMICAL COMPOSITION REQUIREMENTS, %[1] (CONTINUED)

UNS Designation[2]	Type[3]	Carbon[4]	Manganese	Phos-phorus	Sulfur	Silicon	Chromium	Nickel	Molybdenum	Nitrogen	Copper	Other Elements[5]
S30941	309HCb[6]	0.04–0.10	2.00	0.045	0.030	0.75	22.00–24.00	12.00–16.00	—	—	—	Cb 10 x C min, 1.10 max
S31008	310S	0.08	2.00	0.045	0.030	1.50	24.00–26.00	19.00–22.00	—	—	—	—
S31009	310H[6]	0.04–0.10	2.00	0.045	0.030	0.75	24.00–26.00	19.00–22.00	—	—	—	—
S31040	310Cb[6]	0.08	2.00	0.045	0.030	1.50	24.00–26.00	19.00–22.00	—	—	—	Cb 10 x C min, 1.10 max
S31041	310HCb[6]	0.04–0.10	2.00	0.045	0.030	0.75	24.00–26.00	19.00–22.00	—	—	—	Cb 10 x C min, 1.10 max
S31050	310 MoLN[6]	0.030	2.00	0.030	0.010	0.50	24.00–26.00	21.00–23.00	2.00–3.00	0.10–0.16	—	—
S31254	—	0.020	1.00	0.030	0.010	0.80	19.50–20.50	17.50–18.50	6.00–6.50	0.18–0.22	0.50–1.00	—
S31266	—	0.030	2.00–4.00	0.035	0.020	1.00	23.00–25.00	21.00–24.00	5.00–7.00	0.35–0.60	0.50–3.00	W 1.00–3.00
S31600	316	0.08	2.00	0.045	0.030	0.75	16.00–18.00	10.00–14.00	2.00–3.00	0.10	—	—
S31603	316L	0.030	2.00	0.045	0.030	0.75	16.00–18.00	10.00–14.00	2.00–3.00	0.10	—	—
S31609	316H	0.04–0.10	2.00	0.045	0.030	0.75	16.00–18.00	10.00–14.00	2.00–3.00	—	—	—
S31635	316Ti[6]	0.08	2.00	0.045	0.030	0.75	16.00–18.00	10.00–14.00	2.0–3.0	0.10	—	Ti 5 x (C + N) min, 0.70 max
S31640	316Cb[6]	0.08	2.00	0.045	0.030	0.75	16.00–18.00	10.00–14.00	2.0–3.0	0.10	—	Cb 10 x C min, 1.10 max
S31651	316N	0.08	2.00	0.045	0.030	0.75	16.00–18.00	10.00–14.00	2.00–3.00	0.10–0.16	—	—
S31653	316LN	0.030	2.00	0.045	0.030	0.75	16.00–18.00	10.00–14.00	2.00–3.00	0.10–0.16	—	—
S31700	317	0.08	2.00	0.045	0.030	0.75	18.00–20.00	11.00–15.00	3.00–4.00	0.10	—	—
S31703	317L	0.030	2.00	0.045	0.030	0.75	18.00–20.00	11.00–15.00	3.00–4.00	0.10	—	—
S31725	—	0.030	2.00	0.045	0.030	0.75	18.00–20.00	13.50–17.50	4.0–5.0	0.20	—	—
S31726	—	0.030	2.00	0.045	0.030	0.75	17.00–20.00	13.50–17.50	4.0–5.0	0.10–0.20	—	—
S31753	317LN[6]	0.030	2.00	0.045	0.030	0.75	18.00–20.00	11.00–15.00	3.00–4.00	0.10–0.22	—	—
S32100	321	0.08	2.00	0.045	0.030	0.75	17.00–19.00	9.00–12.00	—	0.10	—	Ti 5 x (C + N) min, 0.70 max
S32109	321H	0.04–0.10	2.00	0.045	0.030	0.75	17.00–19.00	9.00–12.00	—	—	—	Ti 4 x (C + N) min, 0.70 max
S32615	—	0.07	2.00	0.045	0.030	4.8–6.0	16.5–19.5	19.0–22.0	0.30–1.5	—	1.5–2.5	—
S32654	—	0.020	2.00–4.00	0.030	0.005	0.50	24.00–25.00	21.00–23.00	7.00–8.00	0.45–0.55	0.30–0.60	—
S33228	—	0.04–0.08	1.00	0.020	0.015	0.030	26.0–28.0	31.0–33.0	—	—	—	Ce 0.05–0.10 Cb 0.6–1.0 Al 0.025
S34565	—	0.030	5.00–7.00	0.030	0.010	1.00	23.00–25.00	16.00–18.00	4.00–5.00	0.40–0.60	—	Cb 0.10
S34700	347	0.08	2.00	0.045	0.030	0.75	17.00–19.00	9.00–13.00	—	—	—	Cb 10 x C min, 1.00 max
S34709	347H	0.04–0.10	2.00	0.045	0.030	0.75	17.00–19.00	9.00–13.00	—	—	—	Cb 8 x C min, 1.00 max
S34800	348	0.08	2.00	0.045	0.030	0.75	17.00–19.00	9.00–13.00	—	—	—	Cb + Ta 10 x C min, 1.00 max Ta 0.10 max Co 0.20
S34809	348H	0.04–0.10	2.00	0.045	0.030	0.75	17.00–19.00	9.00–13.00	—	—	—	Cb + Ta 8 x C min, 1.00 max Ta 0.10 max Co 0.20

TABLE 1—CHEMICAL COMPOSITION REQUIREMENTS, %[1] (CONTINUED)

UNS Designation[2]	Type[3]	Carbon[4]	Manganese	Phos-phorus	Sulfur	Silicon	Chromium	Nickel	Molybdenum	Nitrogen	Copper	Other Elements[5]
S35315	—	0.04–0.08	2.00	0.040	0.030	1.20–2.00	24.00–26.00	34.00–36.00	—	0.12–0.18	—	Ce 0.03–0.08
S38100	XM-15[7]	0.08	2.00	0.030	0.030	1.50–2.50	17.00–19.00	17.50–18.50	—	—	—	—
						Duplex (Austenitic-Ferritic)						
S31200	—	0.030	2.00	0.045	0.030	1.00	24.0–26.0	5.5–6.5	1.2–2.0	0.14–0.20	—	—
S31260	—	0.03	1.00	0.030	0.030	0.75	24.0–26.0	5.50–7.50	2.50–3.50	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	4.50–6.50	2.50–3.50	0.08–0.20	—	—
S32205	—	0.030	2.00	0.030	0.020	1.00	22.0–23.0	4.50–6.50	3.00–3.50	0.14–0.20	—	—
S32304	—	0.030	2.50	0.040	0.030	1.00	21.5—24.5	3.00–5.00	0.05–0.60	0.05–0.20	0.05–3.00	—
S32520	—	0.030	1.50	0.035	0.020	0.80	24.00–26.00	5.50–8.00	3.00–5.00	0.20–0.35	0.50–3.00	—
S32550	—	0.04	1.5	0.040	0.030	1.0	24.0–27.0	4.5–6.5	2.9–3.9	0.10–0.25	1.5–2.5	—
S32750	—	0.030	1.20	0.035	0.020	0.80	24.0–26.0	6.00–8.00	3.00–5.00	0.24–0.32	0.50	—
S32760	—	0.030	1.00	0.030	0.010	1.00	24.00–26.00	6.00–8.00	3.00–4.00	0.20–0.30	0.50–1.00	W 0.50–1.00 Cr + 3.3 Mo + 16 N = 40 min
S32900	329	0.08	1.00	0.040	0.030	0.75	23.00–28.00	2.50–5.00	1.0–2.0	—	—	—
S32950	—	0.03	2.00	0.035	0.010	0.60	26.00–29.00	3.50–5.20	1.00–2.50	015–0.35	—	—
						Ferritic or Martensitic (Chromium)						
S32803	—	0.015	0.50	0.020	0.0035	0.55	28.00–29.00	3.0–4.0	1.8–2.5	0.020 (C + N) 0.030 max	—	Cb 0.15–0.50 12 (C + N) min
S40500	405	0.08	1.00	0.040	0.030	1.00	11.50–14.50	0.60	—	—	—	Al 0.10–0.30
S40900	409	0.08	1.00	0.045	0.030	1.00	10.50–11.75	0.50	—	—	—	Ti 6 x C min; 0.75 max
S40945	—	0.030	1.00	0.040	0.030	1.00	10.50–11.75	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	10.50–11.75	0.50–1.00	—	0.030	—	Ti 6 (C + N) min and 0.75 max
S41000	410	0.15	1.00	0.040	0.030	1.00	11.50–13.50	0.75	—	—	—	—
S41003	—	0.03	1.50	0.040	0.030	1.00	10.50–12.50	1.50	—	—	—	N 0.030 max
S41008	410S	0.08	1.00	0.040	0.030	1.00	11.50–13.50	0.60	—	—	—	—
S41045	—	0.030	1.00	0.040	0.030	1.00	12.00–13.00	0.50	—	0.030	—	Cb 9 (C + N) min,0.60 max
S41050	—	0.040	1.00	0.045	0.030	1.00	10.50–12.50	0.60–1.10	—	0.10	—	—
S41500[5]	—	0.05	0.5–1.0	0.030	0.030	0.60	11.5–14.0	3.5–5.5	0.5–1.0	—	—	—
S42900	429[6]	0.12	1.00	0.040	0.030	1.00	14.00–16.00	—	—	—	—	—
S43000	430	0.12	1.00	0.040	0.030	1.00	16.00–18.00	0.75	—	—	—	—
S43035	439	0.07	1.00	0.040	0.030	1.00	17.00–19.00	0.50	—	0.04	—	Ti 0.20 + 4 (C + N) min; 1.10 max Al 0.15 max
S43400	—	0.12	1.00	0.040	0.030	1.00	16.00–18.00	—	0.75–1.25	—	—	—
S43600	—	0.12	1.00	0.040	0.030	1.00	16.00–18.00	—	0.75–1.25	—	—	Cb 5 x C min; 0.80 max
S43932	—	0.030	1.00	0.040	0.030	1.00	17.0–19.0	0.50	—	0.030	—	Ti + Cb 0.20 + 4 (C + N) min; 0.75 max Al 0.15 max

TABLE 1—CHEMICAL COMPOSITION REQUIREMENTS, %[1] (CONTINUED)

UNS Designation[2]	Type[3]	Carbon[4]	Manganese	Phos-phorus	Sulfur	Silicon	Chromium	Nickel	Molybdenum	Nitrogen	Copper	Other Elements[5]
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	19.00–21.00	0.60	—	0.03	0.30–0.60	Cb 10 (C + N) –0.80
S44626	XM-33[7]	0.06	0.75	0.040	0.020	0.75	25.00–27.00	0.50	0.75–1.50	0.04	0.20	Ti 0.20–1.00 7 (C + N) min
S44627	SM-27[7]	0.010[6]	0.40	0.020	0.020	0.40	25.00–27.50	0.50	0.75–1.50	0.015[5]	0.20	Cb 0.05–0.20 Ni + Cu 0.50 max
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
S44660	—	0.030	1.00	0.040	0.030	1.00	25.0–28.0	1.0–3.50	3.00–4.00	0.040	—	Ti + Cb = 0.20 –1.00 and 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 max
S44735	—	0.030	1.00	0.040	0.030	1.00	28.00–30.00	1.00	3.60–4.20	0.045	—	Ti + Cb = 0.20–1.00 and 6 (C + N) min
S44800	—	0.010	0.30	0.025	0.020	0.20	28.0–30.0	2.0–2.5	3.5–4.2	0.020	0.15	(C + N) 0.025 max
S46800	—	0.030	1.00	0.040	0.030	1.00	18.00–20.00	0.50	—	—	—	Ti 0.07–0.30 Cb 0.10–0.60 N 0.030 max Ti + Cb = 0.20 + 4 (C + N) min; 0.80 max

1. Maximum, unless range or minimum is indicated.
2. Designation established in accordance with Practice E 527 and SAE J1086.
3. Unless otherwise indicated, a grade designation originally assigned by the American Iron and Steel Institute (AISI).
4. Carbon analysis shall be reported to nearest 0.01% except for the low-carbon types, which shall be reported to nearest 0.001%.
5. The terms Columbium (Cb) and Niobium (Nb) both relate to the same element.
6. Common name, not a trademark, widely used, not associated with any one producer.
7. Naming system developed and applied by ASTM.