

ASTM - A240/A240M
Standard Specification for
Chromium and Chromium-Nickel Stainless Steel Plate,
Sheet, and Strip for Pressure Vessels and for General
Applications

This specification covers chromium, chromium-nickel, and chromium-manganese-nickel stainless steel plate, sheet, and strip for pressure vessels and for general applications.

A. Chemical Composition :-

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

Table 1^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	0.045	0.035	1	19.0–21.0	32.0–38.0	2.00–3.00	...	3.00–4.00	Cb [8×C min, 1 max]
N08367	...	0.03	2	0.04	0.03	1	20.0–22.0	23.5–25.5	6.0–7.0	0.18–0.25	0.75	...
N08700	...	0.04	2	0.04	0.03	1	19.0–23.0	24.0–26.0	4.3–5.0	...	0.5	Cb [8×C min, 0.4 max]
N08800	800 ^G	0.1	1.5	0.045	0.015	1	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	1.5	0.045	0.015	1	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	1.5	0.04	0.015	1	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]

					0.03			-				...
N08904	904L ^G	0.02	2	0.045	0.035	1	19.0–23.0	23.0–28.0	4.00–5.00	0.1	1.00–2.00	...
N08925	...	0.02	1	0.045		0.5	19.0–21.0	24.0	6.00–7.00	0.10	0.80–	
								26.0			1.50	0.20
								24.0		0.15–	0.50–	
	...	0.02	2			0.5	19.0–21.0	–	6.00–7.00	0.25	1.50	...
N08926				0.03	0.01			26.0				
S20100	201	0.15	5.50–7.50	0.06	0.03	1	16.0–18.0	3.5–5.5	...	0.25	...	...
S20103	...	0.03	5.50–7.50	0.045	0.03	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	...
S20161	...	0.15	4.00–6.00	0.04	0.04	3.00–4.00	15.0–18.0	4.0–6.0	...	0.08–0.20	...	...
S20200	202	0.15	7.50–10.00	0.06	0.03	1	17.0–19.0	4.0–6.0	...	0.25	...	...
S20400	...	0.03	7.00–9.00	0.04	0.03	1	15.0–17.0	1.50–3.00	...	0.15–0.30	...	...
S20431	...	0.12	5.00–7.00	0.045	0.03	1	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	0.03	1	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	0.03	1	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	0.04	0.03	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	0.03	0.30–1.00	17.0–18.5	1	...	0.35min	...	...

		0.08			0.03	0.75					...	...
S21600	XM-17 ^J	0.08	7.50–9.00	0.045	0.03	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	0.03	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	0.06	0.03	1	17.5–19.5	4.0–6.5	0.50–2.00	0.08–0.30	...	Cb [0.10–1.00]
S21800	...	0.1	7.00–9.00	0.06	0.03	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	0.06	0.03	0.75	19.0–21.5	5.5–7.5	...	0.15–0.40	...	...
S24000	XM-29 ^J		11.50 ⁺ 14.50 ⁻	0.06			17.0–19.0	2.3–3.7	...	0.20 ⁺ 0.40 ⁻		
S30100	301	0.15	2	0.045	0.03	1	16.0–18.0	6.0–8.0	...	0.1	...	...
S30103	301L ^G	0.03	2	0.045	0.03	1	16.0–18.0	6.0–8.0	...	0.2	...	...
S30153	301LN ^G	0.03	2	0.045	0.03	1	16.0–18.0	6.0–8.0	...	0.07–0.20	...	...
S30200	302	0.15	2	0.045	0.03	0.75	17.0–19.0	8.0–10.0	...	0.1	...	...
S30400	304	0.07	2	0.045	0.03	0.75	17.5–19.5	8.0–10.5	...	0.1	...	...
S30403	304L	0.03	2	0.045	0.03	0.75	17.5–19.5	8.0–12.0	...	0.1	...	...
S30409	304H	0.04–0.10	2	0.045	0.03	0.75	18.0–20.0	8.0–10.5	...	...	...	...
S30415	...	0.04–0.06	0.8	0.045	0.03	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	0.045	0.03	1	16.0–18.0	7.0–9.0	...	...	1.50–3.00	...
S30441	...	0.08	2	0.045	0.03	1.0–2.0	17.5–19.5	8.0–10.5	...	0.1	1.5–2.5	Cb [0.1–0.5], W [0.2–0.8]
S30451	304N	0.08	2	0.045	0.03	0.75	18.0–20.0	8.0–10.5	...	0.10–0.16	...	...
S30452	XM-21 ^J	0.08	2	0.045	0.03	0.75	18.0–20.0	8.0–10.5	...	0.16–0.30	...	...
S30453	304LN	0.03	2	0.045	0.03	0.75	18.0–20.0	8.0–12.0	...	0.10–0.16	...	...

					0.03			-				...
S30500	305	0.12	2	0.045	0.03	0.75	17.0–19.0	10.5–13.0	...	...	...	...
S30530	...	0.08	2	0.045	0.03	0.50–2.50	17.0–20.5	8.5–11.5	0.75–1.50	...	0.75–3.50	...
S30600	...	0.018	2	0.02	0.02	3.7–4.3	17.0–18.5	14.0–15.5	0.2	...	0.5	...
S30601	...	0.015	0.50–0.80	0.03	0.013	5.0–5.6	17.0–18.0	17.0–18.0	0.2	0.05	0.35	...
S30615		0.16–0.24	2	0.03	0.03	3.2–4.0	17.0–19.5	13.5–16.0	...	...	...	Al [0.80–1.50]
S30815	...	0.05–0.10	0.8	0.04	0.03	1.40–2.00	20.0–22.0	10.0–12.0	...	0.14–0.20	...	Ce [0.03–0.08]

		0.08			0.03	0.75		-		...			...
S30908	309S		2	0.045			22.0–24.0	12.0	...	...	
S30909	309H ^G	0.04–0.10	2	0.045	0.03	0.75	22.0–24.0	15.0 12.0–15.0	...	...			...
S30940	309Cb ^G	0.08	2	0.045	0.03	0.75	22.0–24.0	12.0–16.0	...	...	...		Cb [10×Cmin,1.1 max]
S30941	309HCb ^G	0.04–0.10	2	0.045	0.03	0.75	22.0–24.0	12.0–16.0	...	...	...		Cb [10×Cmin,1.1 max]
S31008	310S	0.08	2	0.045	0.03	1.5	24.0–26.0	19.0–22.0	...	...	...		...
S31009	310H ^G	0.04–0.10	2	0.045	0.03	0.75	24.0–26.0	19.0–22.0	...	...	...		...
S31040	310Cb ^G	0.08	2	0.045	0.03	1.5	24.0–26.0	19.0–22.0	...	...	...		Cb [10×Cmin,1.1 max]
S31041	310HCb ^G	0.04–0.10	2	0.045	0.03	0.75	24.0–26.0	19.0–22.0	...	...	...		Cb [10×Cmin,1.1 max]
S31050	310 MoLN ^G	0.02	2	0.03	0.01	0.5	24.0–26.0	20.5–23.5	1.60–2.60	0.09–0.15	...		...
S31060	...	0.05–0.10	1	0.04	0.03	0.5	22.0–24.0	10.0–12.5	...	0.18–0.25	...		(Ce+La) [0.025–0.070], B [0.001–0.010]
S31254	...	0.02	1	0.03	0.01	0.8	19.5–20.5	17.5–18.5	6.0–6.5	0.18–0.25	0.50–1.00		...

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0.04 0.03 1

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S31266	...	0.03	2.00-4.00	0.035	0.02	1	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	...	0.02	3	0.03	0.01	0.5	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	0.045	0.03	0.75	16.0-18.0	10.0-14.0	2.00-3.00	0.1	...	...
S31603	316L	0.03	2	0.045	0.03	0.75	16.0-18.0	10.0-14.0	2.00-3.00	0.1	...	...
S31609	316H	0.04-0.10	2	0.045	0.03	0.75	16.0-18.0	10.0-14.0	2.00-3.00	...	...	...
S31635	316Ti ^G	0.08	2	0.045	0.03	0.75	16.0-18.0	10.0-14.0	2.00-3.00	0.1	...	Ti [5×(C+N) min, 0.7 max]
S31640	316Cb ^G		2	0.045			16.0-18.0	10.0-14.0	2.00-3.00	0.1		Cb [10×Cmin, 1.1 max]
S31651	316N	0.08	2	0.045	0.03	0.75	16.0-18.0	10.0	2.00-3.00	0.10-0.16		...
S31653	316LN	0.03	2	0.045	0.03	0.75	16.0-18.0	10.0-14.0	2.00-3.00	0.10-0.16	...	...
S31700	317	0.08	2	0.045	0.03	0.75	18.0-20.0	11.0-15.0	3.0-4.0	0.1	...	...
S31703	317L	0.03	2	0.045	0.03	0.75	18.0-20.0	11.0-15.0	3.0-4.0	0.1	...	...

		0.08	0.03 0.75				...					
S31725	317LM ^G	0.03	2	0.045	0.03	0.75	18.0–20.0	13.5–17.5	4.0–5.0	0.2	...	...
S31726	317LMN ^G	0.03	2	0.045	0.03	0.75	17.0–20.0	13.5–17.5	4.0–5.0	0.10–0.20	...	...
S31727	...	0.03	1	0.03	0.03	1	17.5–19.0	14.5–16.5	3.8–4.5	0.15–0.21	2.80–4.00	...
S31753	317LN ^G	0.03	2	0.045	0.03	0.75	18.0–20.0	11.0–15.0	3.0–4.0	0.10–0.22	...	...
S32050	...	0.03	1.5	0.035	0.02	1	22.0–24.0	20.0–23.0	6.0–6.8	0.21–0.32	0.4	...
S32053	...	0.03	1	0.03	0.01	1	22.0–24.0	24.0–26.0	5.0–6.0	0.17–0.22	...	...
S32100	321	0.08	2	0.045	0.03	0.75	17.0–19.0	9.0–12.0	...	0.1	...	Ti [5×(C+N) min, 0.7 max]
S32109	321H	0.04–0.10	2	0.045	0.03	0.75	17.0–19.0	9.0–12.0	...	...	...	Ti [4×(C+N) min, 0.7 max]
S32615	...	0.07	2	0.045	0.03	4.80–6.00	16.5–19.5	19.0–22.0	0.30–1.50	...	1.50–2.50	...
S32654	...	0.02	2.00–4.00	0.03	0.005	0.5	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	0.02	0.015	0.3	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	0.03	0.015	1	18.0–20.0	19.0–21.0	...	...	...	Al [0.15–0.60], Ti [0.15–0.60]
S33425	...	0.08	1.5	0.045	0.02	1	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 [0.05–0.15], 20.0	1.5	25.0–28.0 0.25	16.5 ... (La+Ce) [0.025–0.070]	0.18– Cb

	...			1						...		
	...		0.04	0.03	1		-			...		
S34565		0.03	5.00-7.00	0.03	0.01		23.0-25.0	16.0 - 18.0	4.0-5.0	0.40- 0.60		Cb [0.1]
S34700	347	0.08	2	0.045	0.03	0.75	17.0-19.0	9.0-13.0	...	...	...	Cb [10×Cmin,1 max]
S34709	347H	0.04-0.10	2	0.045	0.03	0.75	17.0-19.0	9.0-13.0	...	...	...	Cb [8×Cmin,1 max]
S34751	347LN	0.005- 0.020	2	0.045	0.03	1	17.0-19.0	9.0-13.0	...	0.06- 0.10	...	Cb [0.2-0.5]
S34800	348	0.08	2	0.045	0.03	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	0.045	0.03	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	1.5	0.045	0.015	1	25.0-29.0	32.0- 37.0	...	...	0.75	Al [0.15-0.60], Ti [0.15-0.60]
S35115	...	0.03	1	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	...	0.1	1.00-1.50	0.045	0.015	0.5	20.0-23.0	31.0- 35.0	2.00-3.00	...	...	Cb [0.25-0.60]
S35135	...	0.08	1	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	...	0.1	1.00-3.00	0.045	0.03	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	0.04	0.03	1.20- 2.00	24.0-26.0	34.0- 36.0	...	0.12- 0.18	...	Ce [0.03-0.10]

	0.08		0.03	0.75		...
						...

S38100	XM-15 ^J	0.08	2	0.03	0.03	1.50–2.50	17.0–19.0	17.5–18.5	...	...	...	...
S38815	...	0.03	2	0.04	0.02	5.50–6.50	13.0–15.0	13.0–17.0	0.75–1.50	...	0.75–1.50	Al [0.30]
Duplex (Austenitic-Ferritic)												
S31200	...	0.03	2	0.045	0.03	1	24.0–26.0	5.5–6.5	1.20–2.00	0.14–0.20	...	...
S31260	...	0.03	1	0.03	0.03	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]

	...				1							
S31803		0.03	2	0.03	0.02		21.0–23.0	4.5–6.5	2.5–3.5	0.08– 0.20		...
S32001		0.03	4.00–6.00	0.04	0.03		19.5–21.5	–	0.6	0.05– 0.17	1	...
S32003				0.03	0.02			3.00				
	...	0.03	2			1	19.5–22.5	3.0–4.0	1.50–2.00	0.14– 0.20	...	...
S32101	...	0.04	4.00–6.00	0.04	0.03	1	21.0–22.0	1.35– 1.70	0.10–0.80	0.20– 0.25	0.10– 0.80	...
S32202	...	0.03	2	0.04	0.01	1	21.5–24.0	1.00– 2.80	0.45	0.18– 0.26	...	...
S32205	2205 ^G	0.03	2	0.03	0.02	1	22.0–23.0	4.5–6.5	3.0–3.5	0.14– 0.20	...	...
S32304	2304 ^G	0.03	2.5	0.04	0.03	1	21.5–24.5	3.0–5.5	0.05–0.60	0.05– 0.20	0.05– 0.60	
S32506	...	0.03	1	0.04	0.015	0.9	24.0–26.0	5.5–7.2	3.0–3.5	0.08– 0.20	...	W [0.05–0.30]
S32520	...	0.03	1.5	0.035	0.02	0.8	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	1.5	0.04	0.03	1	24.0–27.0	4.5–6.5	2.9–3.9	0.10– 0.25	1.50– 2.50	...
S32750	2507 ^{G.O}	0.03	1.2	0.035	0.02	0.8	24.0–26.0	6.0–8.0	3.0–5.0	0.24– 0.32	0.5	...

S32760 ^K	...	0.03	1	0.03	0.01	1	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	...	0.03	1.1	0.03	0.01	0.5	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	0.04	0.03	0.75	23.0–28.0	2.0–5.00	1.00–2.00	...	...	...
S32906	...	0.03	0.80–1.50	0.03	0.03	0.8	28.0–30.0	5.8–7.5	1.50–2.60	0.30–0.40	0.8	...
S32950	...	0.03	2	0.035	0.01	0.6	26.0–29.0	3.5–5.2	1.00–2.50	0.15–0.35	...	...
S39274	...	0.03	1	0.03	0.02	0.8	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		0.03	2.00–4.00				19.0–22.0	2.0–4.0	1.00–2.00	0.14 ⁻		...
S82011		0.03	2.00–3.00	0.04	0.02		20.5–23.5	1.0–2.0	0.10–1.00	0.20 0.15–0.27	0.5	...
S82012	...	0.05	2.00–4.00	0.04	0.005	0.8	19.0–20.5	0.8–1.5	0.10–0.60	0.16–0.26	1	...
S82031	...	0.05	2.5	0.04	0.005	0.8	19.0–22.0	2.0–4.0	0.60–1.40	0.14–0.24	1	...
S82121	...	0.035	1.00–2.50	0.04	0.01	1	21.0–23.0	2.0–4.0	0.30–1.30	0.15–0.25	0.20–1.20	...
S82122	...	0.03	2.0–4.0	0.04	0.02	0.75	20.5–21.5	1.5–2.5	0.6	0.15–0.20	0.50–1.50	...
S82441	...	0.03	2.50–4.00	0.035	0.005	0.7	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	0.5	0.02	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)]

	...			0.04	0.03	1				...		
	...					1						
S40500	405	0.08	1	0.04	0.03	1	11.5–14.5	0.6	...	...	...	Al (0.10–0.30)
S40900 ^L	409 ^L											
S40910	...	0.03	1	0.04	0.02	1	10.5–11.7	0.5	...	0.03	...	Ti [6×(C+N) min, 0.50 max]; Cb [0.17]
S40920	...	0.03	1	0.04	0.02	1	10.5–11.7	0.5	...	0.03	...	Ti 8×(C+N) min, Ti [0.15–0.50]; Cb [0.10]
S40930	...	0.03	1	0.04	0.02	1	10.5–11.7	0.5	...	0.03	...	(Ti+Cb) {[0.08+8 ×(C+N)] min, 0.75 max}; Ti [0.05 min]
S40945	...	0.03	1	0.04	0.03	1	10.5–11.7	0.5	...	0.03	...	Cb [0.18–0.40], Ti [0.05–0.20]
S40975	...	0.03	1	0.04	0.03	1	10.5–11.7	0.50–1.00	...	0.03	...	Ti [6×(C+N) min, 0.75 max]
S40977	...	0.03	1.5	0.04	0.015	1	10.5–12.5	0.30–1.00	...	0.03	...	...
S41000	410	0.08–0.15	1	0.04	0.03	1	11.5–13.5	0.75	...	...	...	...
S41003	...	0.03	1.5	0.04	0.03	1	10.5–12.5	1.5	...	0.03	...	...
S41008	410S	0.08	1	0.04	0.03	1	11.5–13.5	0.6	...	...	...	...
S41045		0.03	1	0.04	0.03	1	12.0–13.0	0.5	...	0.03	...	Cb [9×(C+N) min, 0.60 max]
S41050	...	0.04	1	0.045	0.03	1	10.5–12.5	0.60–1.10	...	0.1	...	...
S41500 ^M	...	0.05	0.50–1.00	0.03	0.03	0.6	11.5–14.0	3.5–5.5	0.50–1.00	...	...	...
S42035	...	0.08	1	0.045	0.03	1	13.5–15.5	1.0–2.5	0.2–1.2	...	...	Ti [0.30–0.50]
S42900	429 ^G	0.12	1	0.04	0.03	1	14.0–16.0	...	...	...	...	...
S43000	430	0.12	1	0.04	0.03	1	16.0–18.0	0.75	...	...	...	...
S43035	439	0.03	1	0.04	0.03	1	17.0–19.0	0.5	...	0.03	...	Ti {[0.20+4(C+N)] min, 1.10 max}; Al [0.15]
S43400	434	0.12	1	0.04	0.03	1	16.0–18.0	...	0.75–1.25	...	...	...

S43600	436	0.12	1	0.04	0.03	1	16.0–18.0	...	0.75–1.25	...	...	Cb [5×C min, 0.80 max]
S43932	...	0.03	1	0.04	0.03	1	17.0–19.0	0.5	...	0.03	...	(Ti+Cb) {[0.20+4(C+N)] min, 0.75 max}; Al [0.15]
S43940	...	0.03	1	0.04	0.015	1	17.5–18.5	...	...	...	...	Ti [0.10–0.60], Cb [0.30+(3×C)] min
S44100	...	0.03	1	0.04	0.03	1	17.5–19.5	1	...	0.03	...	Ti [0.1–0.5] Cb {[0.3 + (9× C)] min, 0.90 max}
S44330	...	0.025	1	0.04	0.03	1	20.0–23.0	...	...	0.025	0.30–0.80	(Ti+Cb) [8×(C+N) min, 0.80 max]
S44400	444	0.025	1	0.04	0.03	1	17.5–19.5	1	1.75–2.50	0.035	...	(Ti+Cb) {[0.20+4(C+N)] min, 0.80 max}
S44500	...	0.02	1	0.04	0.012	1	19.0–21.0	0.6	...	0.03	0.30–0.60	Cb [10×(C+N) min, 0.80 max]
S44535	...	0.03	0.30–0.80	0.05	0.02	0.5	20.0–24.0	...	...	...	...	La [0.04–0.20], Ti [0.03–0.20], Al [0.50]
S44536	...	0.015	1	0.04	0.03	1	20.0–23.0	0.5	...	0.015	...	(Ti+Cb) [8X(C+N)–0.8], Cb [0.05 min]
S44537	...	0.03	0.8	0.05	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	0.04	0.02	0.75	25.0–27.0	0.5	0.75–1.50	0.04	0.2	Ti [0.20–1.00]; Ti [7(C+N) min]
S44627	XM-27 ^J	0.010 ^N	0.4	0.02	0.02	0.4	25.0–27.5	0.5	0.75–1.50	0.015 ^N	0.2	Cb [0.05–0.20], (Ni + Cu) [0.50]
S44635	...	0.025	1	0.04	0.03	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}

0.04 0.03

S44660	.....	0.03	1			1	25.0–28.0	1.0–3.5	3.0–4.0	0.04	...	(Ti+Cb) [0.20 – 1.00], (Ti + Cb) [6×(C+N) min]
S44700	..	0.01	0.3	0.025	0.02	0.2	28.0–30.0	0.15	3.5–4.2	0.02	0.15	(C+N) 0.025
S44725	...	0.015	0.4	0.04	0.02	0.04	25.0–28.5	0.3	1.5–2.5	0.018	...	(Ti+Cb) ≥ 8×(C+N)
S44735	...	0.03	1	0.04	0.03	1	28.0–30.0	1	3.6–4.2	0.045	...	(Ti+Cb) [0.20–1.00], (Ti+Cb) [6× (C+N) min]
S44800	...	0.01	0.3	0.025	0.02	0.2	28.0–30.0	2.00– 2.50	3.5–4.2	0.02	0.15	(C+N) 0.025
S46800	...	0.03	1	0.04	0.03	1	18.0–20.0	0.5	...	0.03	...	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.

^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.

B. Mechanical Properties :-

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

Table 2

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 B	
Austenitic (Chromium-Nickel) (Chromium-Manganese-Nickel)									
N08020	...	80	550	35	240	30 ^E	217	95	not required
N08367									
	Sheet and Strip	100	690	45	310	30	...	100	not required
	Plate	95	655	45	310	30	241	...	not required
N08700	...	80	550	35	240	30	192	90	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	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	...
S20100	201-2 ^I	95	655	45	310	40	241	100	...
S20103	201L ^F	95	655	38	260	40	217	95	not required
S20153	201LN ^F	95	655	45	310	45	241	100	not required
S20161	...	125	860	50	345	40	255	25 ^J	not required
S20200	202	90	620	38	260	40	241	...	...
S20400	...	95	655	48	330	35	241	100	not required
S20431	...	90	620	45	310	40	241	100	not required

S30200	302	75	515	30	205	40	201	92	not required
S30400	304	75	515	30	205	40	201	92	not required
S30403	304L	70	485	25	170	40	201	92	not required
S30409	304H	75	515	30	205	40	201	92	not required
S30415	...	87	600	42	290	40	217	95	not required
S30435	...	65	450	23	155	45	187	90	...
S30441	...	75	515	30	205	40	201	92	not required
S30451	304N	80	550	35	240	30	217	95	not required
S30452	XM-21 ^K								
	Sheet and Strip	90	620	50	345	30	241	100	not required
	Plate	85	585	40	275	30	241	100	not required
S30453	304LN	75	515	30	205	40	217	95	not required
S30500	305	70	485	25	170	40	183	88	
S30530	...	75	515	30	205	40	201	92	

S31600	...	75	515	30	205	40	217	95	not required
S31603	316L	70	485	25	170	40	217	95	not required
S31609	316H	75	515	30	205	40	217	95	not required
S31635	316Ti ^F	75	515	30	205	40	217	95	not required
S31640	316Cb ^F	75	515	30	205	30	217	95	not required
S31651	316N	80	550	35	240	35	217	95	not required
S31653	316LN	75	515	30	205	40	217	95	not required
S31700	317	75	515	30	205	35	217	95	
S31703	317L	75	515	30	205	40	217	95	
S31725	317LM ^F	75	515	30	205		217	95	
S31726	317LMN ^F	80	550	35	240	40	223	96	
S31727	...	80	550	36	245	35	217	96	not required
S31753	317LN	80	550	35	240	40	217	95	not required
S32050	...	98	675	48	330	40	250	...	not required
S32053	...	93	640	43	295	40	217	96	not required
S32100	321	75	515	30	205	40	217	95	not required
S32109	321H	75	515	30	205	40	217	95	not required
S32615 ^L	...	80	550	32	220	25	...	...	not required
S32654	...	109	750	62	430	40	250	...	not required
S33228	...	73	500	27	185	30	217	95	not required
S33400	334 ^F	70	485	25	170	30	...	92	not required
S33425	...	75	515	30	205	40	...	...	not required
S33550	...	87	600	41	280	35	217	95	not required
S34565	...	115	795	60	415	35	241	100	not required
S34700	347	75	515	30	205	40	201	92	not required
S34709	347H	75	515	30	205	40	201	92	not required
S34751	347LN	75	515	30	205	40	201	92	not required

	t > 0.187 in. [5.00 mm]	95	655	65	450	25	293	31 ^J	not required
S32101	...								not required
	t ≤ 0.187 in. [5.00 mm]	101	700	77	530	30	290	...	not required
	t > 0.187 in. [5.00 mm]	94	650	65	450	30	290	...	not required
S32202	...	94	650	65	450	30	290	...	not required
S32205	2205 ^F	95	655	65	450	25	293	31 ^J	not required
S32304	2304 ^F	87	600	58	400	25	290	32 ^J	not required
S32506	...	90	620	65	450	18	302	32 ^J	not required
S32520	...	112	770	80	550	25	310	...	not required
S32550	255 ^F	110	760	80	550	15	302	32 ^J	not required
S32750	2507 ^F	116	795	80	550	15	310	32 ^J	not required
S32760	...	108	750	80	550	25	270	...	not required
S32808	...	101	700	72	500	15	310	32 ^J	not required
S32900	329	90	620	70	485	15	269	28 ^J	not required
S32906	...								
	t < 0.4 in. [10.0 mm]	116	800	94	650	25	310	32 ^J	not required
	t ≥ 0.4 in. [10.0 mm]	109	750	80	550	25	310	32 ^J	not required
S32950 ^M	...	100	690	70	485	15	293	32 ^J	not required
S39274	...	116	800	80	550	15	310	32 ^J	not required

not required

S81921	...	90	620	65	450	25	293	31 ^J	
S82011	t ≤ 0.187 in. [5.00 mm]	101	700	75	515	30	293	31 ^J	not required
	t > 0.187 in. [5.00 mm]	95	655	65	450	30	293	31 ^J	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 ^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 ^J	not required
S82121	...	94	650	65	450	25	286	30 ^J	not required
S82122	t < 0.118 in. [3.00 mm]	101	700	72	500	25	290	32 ^J	not required
	t ≥ 0.118 in. [3.00 mm]	87	600	58	400	30	290	32 ^J	not required
S82441	t < 0.4 in. [10.0 mm]	107	740	78	540	25	290	...	not required
	t ≥ 0.4 in. [10.0 mm]	99	680	70	480	25	290	...	not required
Ferritic or Martensitic (Chromium)									
S32803	...	87	600	72	500	16	241	100	not required
S40500	405	60	415	25	170	20	179	88	180
S40900 ^N	409 ^N								
S40910	...	55	380	25	170	20	179	88	180

S40920	...	55	380	25	170	20	179	88	180
S40930	...	55	380	25	170	20	179	88	180
S40945	...	55	380	30	205	22	...	80	180
S40975	...	60	415	40	275	20	197	92	180
S40977	...	65	450	41	280	18	180	88	not required
S41000	410	65	450	30	205	20	217	96	180
S41003	...	66	455	40	275	18	223	20 ^J	not required
S41008	410S	60	415	30	205	22 ^O	183	89	180
S41045	...	55	380	30	205	22	...	80	180
S41050	...	60	415	30	205	22	183	89	180
S41500	...	115	795	90	620	15	302	32 ^J	not required
S42035	...	80	550	55	380	16	180	88	not required
S42900	429 ^F	65	450	30	205	22 ^O	183	89	180
S43000	430	65	450	30	205	22 ^O	183	89	180
S43035	439	60	415	30	205	22	183	89	180
S43400	434	65	450	35	240	22	...	89	180
S43600	436	65	450	35	240	22	...	89	180
S43932	...	60	415	30	205	22	183	89	180
S43940	...	62	430	36	250	18	180	88	not required
S44330	...	56	390	30	205	22	187	90	not required
S44100	...	60	414	35	241	20	190	90	not required
S44400	...	60	415	40	275	20	217	96	180
S44500	...	62	427	30	205	22	...	83	180
S44535	...	58	400	36	250	25 ^E	...	50-90 ^P	not required
S44536	...	60	410	35	245	20	192	90	180
S44537	...	65	450	46	320	18 ^Q	200	93	180
S44626	XM-33 ^K	68	470	45	310	20	217	96	180
S44627	XM-27 ^K	65	450	40	275	22	187	90	180

S44635	...	90	620	75	515	20	269	28 ^J	180
S44660	...	85	585	65	450	18	241	100	180
S44700	...	80	550	60	415	20	223	20 ^J	180
S44725	...	65	450	40	275	20	210	95	180
S44735	...	80	550	60	415	18	255	25 ^J	180
S44800	...	80	550	60	415	20	223	20 ^J	180
S46800	...	60	415	30	205	22	...	90	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 Rockwell B Hardness is permissible.

^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 Rockwell C scale.

^K Naming system developed and applied by ASTM.

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

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

^N 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.

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

^P Hardness is required to be provided for information only, but is not required to meet a particular requirement. ^Q The minimum elongation for plates thicker than 0.630 in. (16 mm) shall be 8 %.

C. Materials for High-Temperature Service :-

1. The austenitic *H* Types shall conform to an average grain size of ASTM No. 7 or coarser as measured by Test Methods E112.
2. Supplementary Requirement D.2 shall be invoked when non-H grade austenitic stainless steels are ordered for ASME Code applications for service above 1000°F [540°C].
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.

D. Supplementary Requirements :- 1.

Charpy Impact Testing of Plate.

2. Materials for High-Temperature Service :-

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

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