STAINLESS STEEL PLATES - CHEMICAL COMPOSITION

UNS Designation [B]	Type[C]	Carbon [D]	Manganese	Phos-Phorus	Sulphur	Silicon	Chromium	Nickel	Molybdenum	Nitrogen	Copper	Other Elements[E,F]
S31041	310HCb[G]	0.04-0.10	2.00	0.045	0.030	0.75	24.0-26.0	19.0-22.0	...	...	...	Cb 10xc min, 1.10 max
S31050	310MoLN[G]	0.020	2.00	0.030	0.010	0.50	24.0-26.0	20.5-23.5	1.60-2.60	0.09-0.15	...	...
S31254	...	0.020	1.00	0.030	0.010	0.80	19.5-20.5	17.5-18.5	6.0-6.5	0.18.022	0.50-1.00	...
S31266	...	0.030	2.0-4.0	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
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	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 5xc (C+N) min 0.70 max
S31640	316Cb	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 10xc 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	...	...
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	...	...
S31753	317LN	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	...
S32100	321	0.08	2.00	0.045	0.030	0.75	17.0-19.0	9.0-12.0	....	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	17.0-19.0	9.0-12.0	9.0-12.0	...	...	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	0.30-150	...	1.50-2.50	...
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	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	...	...	...	Ce0.05-0.10 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
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	0.75	17.0-19.0	9.0-13.0	....	...	...	Cb 10 x c min 1.00 max
S34709	347H	0.04-0.10	2.00	0.045	0.030	0.75	17.0-19.0	9.0-13.0	...	...	..	Cb 8 x c min 1.00 max
S34800	348	0.08	2.00	0.045	0.030	0.75	17.0-19.0	9.0-13.0	...	...	...	(Cb+Ta) 10 x c min 1.00 max Ta0.10 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 x c min 1.00 max Ta0.10 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
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
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	0.08	2.00	0.030	0.030	1.50-2.50	17.0-19.0	17.0-18.0	...	....	...	...
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	W0.10-0.50
S31803	...	0.03	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	4.0-6.0	0.040	0.030	1.00	19.5-21.5	1.00-3.00	0.60	0.05-0.17	1.00	...
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	...	...

UNS Designation[B]	Type[C]	Carbon[D]	Manganese	Phos-phorus	Sulphur	Silicon	Chromium	Nickel	Molybdenum	Nitrogen	Copper	Other
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	0.05-0.60	0.05-0.60	...
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]	0.040	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]	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	...	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
S32900	329	0.080	1.00	0.040	0.030	0.75	23.0-28.0	2.0-5.00	1.00-2.00	...	...	...
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	...	...
Ferritic or Martensitic (Chromium)												
S32803	...	0.015	0.50	0.020	0.035	0.55	28.0-29.0	3.0-4.0	1.80-2.50	0.020	min, 0.15-0.50	Cb 12x(C+N)
S40500	405	0.08	1.00	0.040	0.030	1.00	11.5-14.5	0.60	(C+N)0.030 ...	...	...	Al 0.10-0.30
S40900[A]	409											
S40910	...	0.030	1.00	0.040	0.020	1.00	10.5-11.7	0.50	...	0.030	...	Ti 6x(C+N) min,
S40920	...	0.030	1.00	0.040	0.020	1.00	10.5-11.7	0.50	...	0.030	0.50 max, Cb 0.17 ... Ti 0.15-0.50	Ti 8x(C+N) min,
S40930	...	0.030	1.00	0.040	0.020	1.00	10.5-11.7	0.50	...	0.030	Cb 0.10 ... x(C+N)] min 0.75 max	(Ti+Cb)[0.08+8
S40945	...	0.030	1.00	0.040	0.030	1.00	10.5-11.7	0.50	...	0.030	Ti 0.05 min ...	Cb 0.18-0.40
S40975	...	0.030	1.00	0.040	0.030	1.00	10.5-11.7	0.50-1.00	...	0.030	Ti 0.05-0.20 ...	Ti 6x (C+N)
S40977	...	0.030	1.50	0.040	0.015	1.00	10.5-12.5	0.30-1.00	...	0.030	min, 0.75 max ...	...
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	...	...
S41006	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)
S41050	...	0.04	1.00	0.045	0.030	1.00	10.5-12.5	0.60-1.10	...	0.10	min, 0.50 max ...	...
S41500[M]	...	0.05	50-1.00	0.030	0.030	0.60	11.5-14.0	3.5-5.5	0.50-1.00	...	...	...
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
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	0.07	1.00	0.040	0.030	1.00	17.0-19.0	0.50	...	0.04	... [0.20+4(C+N)] min, 1.10 max Al 0.15	Ti
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
S43932	...	0.030	1.00	0.040	0.030	1.00	17.0-19.0	0.50	...	0.030	min,0.80 max ... [0.20+4(C+N)] min, 0.75 max Al 0.15	(Ti+Cb)
S43940	...	0.030	1.00	0.040	0.015	1.00	17.5-18.5	...	...	..	... [0.30+(3xC)] min	Ti 0.10-0.60Cb
S44400	444	0.025	1.00	0.040	0.030	1.00	17.5-19.5	1.00	1.75-2.50	0.035	... 0.20+4 (C+N)]	(Ti+Cb) [

STAINLESS STEEL PLATES - CHEMICAL COMPOSITION

UNS Designation [B]	Type[C]	Carbon [D]	Manganese	Phos-phorus	Sulphur	Silicon	Chromium	Nickel	Molybdenum	Nitrogen	Copper	Other Elements[E,F]
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
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
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 6 x (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
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) 6 x (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.

B) Designation established in accordance with practice E 527 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 type, which shall be reported to nearest 0.001 %

E) The terms Columbium (Cb) and Niobium (Nb) both related 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 arithmatically 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 other specifying S40900 or Type 409 shall be satisfied by any one of S40910, S 40920 or S40930 at the option of the seller. Material meeting the requirements of S40910, S40920 or S40930, may at the option the manufacturer by 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 %.

STAINLESS STEEL PLATES - MECHANICAL PROPERTIES

UNS Designation	Type	Tensile Strength, min		Yield Strength, min		Elongation in 2 in. or 50 mm, min,%	Hardness, max[C]		Cold Bend[DD]
		Ksi	MPa	Ksi	MPa		Brinell	Rockwell B	
		Austenitic (Chromium-Nickel) (Chromium- Manganese-Nickel)							
N08020	...	80	550	35	240	30.0	217	95	not required
N08367									
Sheet and Strip		100	690	45	310	30.0	...	100	not required
Plate		95	655	45	310	30.0	241	...	not required
N08800	800[F]	75	520	30	205	30.0	...	...	not required
N08810	800H[F]	65	450	25	170	30.0	...	...	not required
N08811	...	65	450	25	170	30.0	...	...	not required
N08904	904L[F]	71	490	31	220	35.0	...	90	not required
N08926	...	94	650	43	295	35.0	...	...	not required
S20100	201-1[I]	75	515	38	260	40.0	...	95	...
S20100	201-2[I]	95	655	45	310	40.0	217	100	...
S20103	201L[F]	95	655	38	260	40.0	217	95	not required
S20153	201LN[F]	95	655	45	310	45.0	241	100	not required
S20161	...	125	860	50	345	40.0	255	25	not required
S20200	202	90	620	38	260	40.0	241	...	...
S20400	...	95	655	48	330	35.0	241	100	not required
S30100	301	75	515	30	205	40.0	217	95	not required
S30103	301L[F]	80	550	32	220	45.0	241	100	not required
S30153	30LN[F]	80	550	35	240	45.0	241	100	not required
S30200	302	75	515	30	205	40.0	201	92	not required
S30400	304	75	515	30	205	40.0	201	92	not required
S30403	304L	70	485	25	170	40.0	201	92	not required
S30409	304H	75	515	30	205	40.0	201	92	not required
S30415	...	87	600	42	290	40.0	217	95	not required
S30451	304N	80	550	35	240	30.0	201	92	not required
S30453	304LN	75	515	30	205	40.0	201	92	not required
S30500	305	70	485	25	170	40.0	183	88	not required
S30600	...	78	540	35	240	40.0	...	...	...
S30601	...	78	540	37	255	30.0	...	...	not required
S30615	...	90	620	40	275	35.0	217	95	not required
S30815	...	87	600	45	310	40.0	217	95	...
S30908	309S	75	515	30	205	40.0	217	95	not required
S30909	309H[F]	75	515	30	205	40.0	217	95	not required
S30940	309Cb[F]	75	515	30	205	40.0	217	95	not required
S30941	309HCb[F]	75	515	30	205	40.0	217	95	not required
S31008	310S	75	515	30	205	40.0	217	95	not required
S31009	310H[F]	75	515	30	205	40.0	217	95	not required
S31040	310Cb[F]	75	515	30	205	40.0	217	95	not required
S31.41	310HCb[F]	75	515	30	205	40.0	217	95	not required
S31254									
Sheet and Strip		100	690	45	310	35.0	223	96	not required
Plate		95	655	45	310	35.0	223	96	not required
S31266		109	750	61	420	35.0	...	...	not required
S31600	316	75	515	30	205	40.0	217	95	not required
S31603	316L	70	485	25	170	40.0	217	95	not required
S31653	316LN	75	515	30	205	40.0	217	95	not required
S31609	316H	75	515	30	205	40.0	217	95	not required
S31635	316Ti[F]	75	515	30	205	30.0	217	95	not required
S31640	316Cb[F]	75	515	30	205	30.0	217	95	not required
S31651	316N	80	550	35	240	30.0	217	95	not required

Mechanical Test Requirements

UNS Designation [A]	Type	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	Rockwell B	
S31725	317Lm[F]	75	515	30	205	40.0	217	95	not required
S31726	317LMN[F]	80	550	35	240	40.0	223	96	not required
S31703	317L	75	515	30	205	40.0	217	95	not required
S31753	317LN	80	550	35	240	40.0	217	95	not required
S32050	...	98	675	48	330	40.0	250	...	not required
S32100	321	75	515	30	205	40.0	217	95	not required
S32109	321H	75	515	30	205	40.0	217	95	not required
S32615	...	80	550	32	220	25.0	...	...	not required
S32654	...	109	750	62	430	40.0	250	...	not required
S33228	...	73	500	27	185	30.0	217	95	not required
S33400	334	70	485	25	170	30.0	...	92	not required
S34565	...	115	795	60	415	35.0	241	100	not required
S34700	347	75	515	30	205	40.0	201	92	not required
S34709	347H	75	515	30	205	40.0	201	92	not required
S34800	348	75	515	30	205	40.0	201	92	not required
S34809	348H	75	515	30	205	40.0	201	92	not required
S35045	...	70	485	25	170	35.0	...	...	not required
S35135									
Sheet and strip	...	80	550	30	205	30.0	...	..	not required
Plate	...	75	515	30	205	30.0	...	...	not required
S35315	...	94	650	39	270	40.0	217	95	not required
S38100	XM-15	75	515	30	205	40.0	217	95	not required
S30452	XM-21								
Sheet and Strip		90	620	50	345	30.0	241	100	not required
Plate		85	585	40	275	30.0	241	100	not required
S31050	310MoLN[F]								
	t ≤ 0.25 in	84	580	39	270	25.0	217	95	not required
	t > 0.25 in.	78	540	37	255	25.0	217	95	not required
S21600	XM-17[L]								
Sheet and Strip		100	690	60	415	40.0	241	100	not required
Plate		90	620	50	345	40.0	241	100	not required
S21603	XM-18[L]								
Sheet and Strip		100	690	60	415	40.0	241	100	not required
Plate		90	620	50	345	40.0	241	100	not required
S20910	XM-19[L]								
Sheet and Strip	...	105	725	60	415	30.0	241	100	not required
Plate		100	690	55	380	35.0	241	100	not required
S24000	XM-29[L]								
Sheet and Strip		100	690	60	415	40.0	241	100	not required
Plate		100	690	55	380	40.0	241	100	not required
S21400	XM-31[L]								
Sheet		125	860	70	485	40.0	...	...	not required
Strip		105	725	55	380	40.0	...	...	not required
S21800	...	95	655	50	345	35.0	241	100	not required
Duplex (Austenitic Ferritic)									
S31200	...	100	690	65	450	25.0	293	31[J]	not required
S31260	...	100	690	70	485	20.0	290	...	...
S31803	...	90	620	65	450	25.0	293	31[J]	not required
S32001	...	90	620	65	450	25.0	...	25[G]	not required
S32205	2205[F]	90	620	65	450	25.0	293	31[J]	not required
S32304	2304[F]	87	600	58	400	25.0	290	32[J]	not required
S32520	...	112	760	80	550	25.0	310	...	not required
S32550	255[F]	110	760	80	550	15.0	302	32[J]	not required
S32750	2507[F]	116	795	80	550	15.0	310	32[J]	not required

Mechanical Test Requirements

UNS Designation [B]	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	Rockwell B	
S32760	...	108	750	80	550	25.0	270	...	not required
S32900	329	90	620	70	485	15.0	269	28	not required
S32950[M]	...	100	690	70	485	15.0	293	32	not required
Ferritic or Martensitic (chromium)									
S32803	...	87	600	72	500	16.0	241	100	not required
S40500	405	60	415	25	170	20.0	179	88	180
S40900[N]	409[N]								
S40910	...	55	380	25	170	20.0	179	88	180
S40920	...	55	380	25	170	20.0	179	88	180
S40930	...	55	380	25	170	20.0	179	88	180
S40945	...	55	380	30	205	22.0	...	80	180
S40975	...	60	415	40	275	20.0	197	92	180
S40977	...	65	450	41	280	18.0	180	88	not required
S41000	410	65	450	30	205	20.0	217	96	180
S41003	...	66	455	40	275	18.0	223	20	not required
S41008	410S	60	415	30	205	22.0	163	89	180
S41045	...	55	380	30	205	22.0	...	80	180
S41050	...	60	415	30	205	22.0	183	89	180
S41500	...	115	795	90	620	15.0	302	32	not required
S42035	...	90	550	55	380	16.0	180	88	not required
S42900	429[F]	65	450	30	205	22.0	183	89	180
S43000	430	65	450	30	205	22.0	183	89	180
S43035	439	60	415	30	205	22.0	183	89	180
S43400	434	65	450	35	240	22.0	...	89	180
S43600	436	65	450	35	240	22.0	...	89	180
S43932	...	60	415	30	205	22.0	183	89	180

Mechanical Test Requirements

UNS Designation [B]	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	Rockwell B	
S44400	...	60	415	40	275	20.0	217	96	180
S44500	...	62	427	30	205	22	...	83	180
S44626	xm-33[L]	68	470	45	310	20.0	217	96	180
S44627	xm-27[L]	65	450	40	275	22.0	187	90	180
S44635	...	90	620	75	515	20.0	269	28[F]	180
S44660	...	85	585	65	450	18.0	241	100	180
S44700	...	80	550	60	415	20.0	223	20[F]	180
S44735	...	80	550	60	415	18.0	255	25[F]	180
S44800	...	80	550	60	415	20.0	223	20[F]	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 with Test Definitions A 370. Unless otherwise specified (see specification A 480/A, 480, paragraph 4.1.11, Ordering information), an alternative method of determining yield strength may be based on total extension under load 0.5%.

C) Either Brinell or Rockwell B Hardness is permissible.

D) Bend test are required to 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 thickness under 0.010 in. (0.25 mm)

I) Type 201 is generally produced with CHEMICAL COMPOSITION BALANCED FOR RICH SIDE (type 201-1) OR LEAN SIDE (Type 201-2) AUSTE NITE STABILITY DEPENDING ON THE PROPERTIES REQUIRED FOR SPECIFIC APPLICATION.

J) Rockwell C scale.

K) For S32615, the grain size a determined in accordance with the Test Methods E 112, Comparison Method, Plate II, shall be No. 3 or liner.

L) Naming system developed and applied by ASTM

M) Prior to Specication A 240-89b, 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, 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 %.

CARBON STEEL PLATES - IS 8500 / SAILMA

CHEMICAL COMPOSITION

Grade IS 8500	Ladle Analysis C% Max	Mn% Max	S% Max	P% Max	Si% Max	C.E% Max
Fe 440	.20	1.30	.050 .040	.050 .040	45	40
Fe 440B	.20	1.30	.050 .040	.050 .040	45	40
Fe 490	.20	1.50	.050 .040	.050 .040	45	42
Fe 490B	.20	1.50	.050 .040	.050 .040	45	44
Fe 540	.20	1.60	.045 .040	.045 .040	45	44
Fe 540B	.20	1.60	.045 .040	.045 .040	45	44
Fe 570	.22	1.60	.045 .040	.045 .040	45	46
Fe 570B	.22	1.60	.045 .040	.045 .040	45	46
Fe 590	.22	1.60	.045 .040	.045 .040	45	48
Fe 590B	.22	1.80	.045 .040	.045 .040	45	48

MECHANICAL PROPERTIES

Grade IS 8500	Tensile Strength (Min) MPa	Yield Strength (Min) <16 mm MPa	16-40 mm MPa	41-63 mm MPa	>63 mm MPa	Elongation Percent (Min) $5.65\sqrt{So}$	Bend (Internal diameter) Min <12 mm	12-25 mm	Charpy V-notch Impact toughness Joules, Min (Average of 3 Values) Room Temp 20°C
Fe 440	440	300	290	280	By agreement	22	2t	3t	-
Fe 440B	440	300	290	280	-	22	2t	3t	50
Fe 490	490	350	330	320	-	22	2t	3t	-
Fe 490B	490	350	330	320	-	22	2t	3t	50
Fe 540	540	410	390	380	-	20	2t	3t	-
Fe 540B	540	410	390	380	-	20	2t	3t	50
Fe 570	570	450	430	420	-	20	2t	3t	-
Fe 570B	570	450	430	420	-	20	2t	3t	45
Fe 590	590	450	430	420	-	20	2t	3t	-
Fe 590B	590	450	430	420	-	20	2t	3t	45

SAILMA High Strength Micro Alloy Structural steel (Semi Killed)

CHEMICAL COMPOSITION

Grade	C% Max	Mn% Max	S% Max	P% Max	Nb+V+Ti% Max
SAILMA 300	0.25	1.50	0.055	0.055	0.20
SAILMA 300HI	0.20	1.50	0.040	0.040	0.20
SAILMA 350	0.25	1.50	0.040	0.040	0.20
SAILMA 350 HI	0.20	1.50	0.040	0.040	0.20
SAILMA 410	0.25	1.50	0.040	0.040	0.20
SAILMA 410HI	0.20	1.50	0.040	0.040	0.20
SAILMA 450	0.25	1.50	0.040	0.040	0.20
SAILMA 450HI	0.20	1.50	0.040	0.040	0.20

MECHANICAL PROPERTIES

Grade	UTS (MPa)	YS (MPa) Min	El.% Min $5.65\sqrt{So}$	IMPACT CHARPYV 0°C-20°C Joules (Min)		Bend Test
SAILMA 300	440-560	300	20			3T
SAILMA 300HI	440-560	300	21	40		3T
SAILMA 350	490-610	350	20	-		3T
SAILMA 350HI	490-610	350	21	40	30	3T
SAILMA 410	510-660	410	19	-		3T
SAILMA 410HI	540-660	410	20	35	25	3T
SAILMA 450	570-720	450	18	-		3T
SAILMA 450 HI	570-720	450	19	30	20	3T

IS - 2002 - 62 STEEL PLATES FOR BOILERS

Designation			Chemical Composition			Tensile test			Elongation	
	C max	mn	si max	P max	S max	Tensile Strength Kf/mm²	Yield Strength Kf/mm²min		Test	% min piece
IS 2002-1	0.18	0.5 1.2	0.15-0.35	0.035	0.040	36.7-49	24	23	5.65/Sc	24
IS 2002-2	0.20	0.5 1.2	0.15-0.35	0.035	0.40	41.7-54	27	26	5.65/Sc	22
IS 2002-3	0.22	0.5 1.2	0.15-0.35	0.035	0.040	46.8-59	29.5	29	5.65/Sc	21

IS - 2062 -92 STEEL FOR GENERAL STRUCTURAL PURPOSE

Grade	Designation	%Chemical Composition						Supply Tensile	Tensile Strength (min) Kg/mm²	Yield Strength (min) kg/mm²			% El in gauge length 5.56/so	Bend Test	Std. Test Piece charpy V Notch Impact Energy joule min	Remark
		C max	Mn max	S max	P max	Si max	CE max			<20 mm	20-40 min	>40 min				
A	Fe 410 WA	0.23	1.5	0.050	0.050	-	0.42	As rolled	41.8	25.50	24.48	23.45	23	31	-	
B	FE410WB	0.22	1.5	0.045	0.045	0.40	0.41	As Rolled Plates above 12mm may be normalised if agreed to between manufacturer & purchaser	41.8	25.50	24.48	23.45	21 for t< 25 mm 3t for > 25 mm	23	27	min Charp impact energy to guarantee at 0-C agreed betn. mfgr purchaser
C	FE410WC	0.20	1.5	0.040	0.040	0.40	0.39	As Rolled Plates above 12mm shall be normalise	41.8	25.50	24.48	23.45	23	21	27	impact properties to be guarantee at any one two temp. 20c or 40 as specifie by purcha

ASTM A 537 - 35 PRESSURE VESSEL PLATES, HEAT TREATED, CARBON MANGANESES-SILICON STEEL

Designation	%Chemical Composition										Heat Treat-ment	Tensile Strength			Elongation % m	
	C Max		Min. thickness in mm		P max	S max	Cu max	Ni max	Cr max	Mo max		Thickness in mm	Tensile Strength Ksi (MPa)	Yield Strength Ksi (MPa) min	GL= 8 in or 200 mm	GL = 2 in or 50 mm
			t<1-1/2(38)	t>-1-1/2												
A 537 -1	0.24	0.15-0.50	0.70-1.35	1.0-1.60	0.035	0.040	0.035	0.25	0.25	0.08	Normalised	t<2-1 (64) 2-1/2<t <4 (100)	70-90 (485-620) 65-85 (450-585)	50 (345) 45 (310)	18	22
A 537 -2	0.24	0.15-0.50	0.70-1.35	1.0-1.60	0.035	0.040	0.035	0.25	0.25	0.08	Quenched & Tempered	T<2-1/2(64) 2-1/2<t (4(100)	80-100 (550-690) 75-95 (515-655)	60 (415) 55 (380)	-	22

ASTM A 285 - 80 PRESSURE VESSEL PLATES, CARBON STEEL LOW AND INTERMEDIATE TENSILE

Designation	Chemical Composition				Chemical Composition			
	C max	Mn max	P max	S max	Tensile Strength Ksi(MPa)	Yield Strength Ksi (Mpa)	Elongation % mm Gl + 8 in	Gl = 2 in
A 285	0.7	0.90	0.035	0.035	45-65 (310-450))	24-(165)	27	30
A 285 B	0.22	0.90	0.035	0.035	50-70 (385-485)	27(185)	25	28
A 285 C	0.28	0.90	0.035	0.035	55-75 (380-515)	30(205)	23	27

ASTM A515-78 PRESSURE VESSEL PLATES, CARBON STEEL, FOR INTERMEDIATE & HIGHER TEMP. SER

Designation	Chemical Composition, %						Tensile Test			
	Thickness in (mm)	C max	Si	Mn max	P max	S max	Tensile Strength Ksi (MPa)	Yield Strength Ksi (Mpa), min	Elongation,% min	
									Gl=8 in. *2	Gl=2 i
A 515-55	1<1(25) 1<t<2 (50) 2<t<4(100) 4<t<8 (200) t<1	0.20 0.22 0.24 0.26 0.28	0.15-0.30	0.90	0.035	0.04	55-75 (380-515)	30(205)	23	27
A 515-60	t<1 (25) 1<t<2 (50) 2<t<4 (100) 4<t<8 (200) t<8	0.24 0.27 0.29 0.31 0.31	0.15-0.30	0.90	0.035	0.04	60-80 (415-550)	32(220)	21	25
A 515-65	t<1 (25) 1<t<2 (50) 2<t<4 (100) 4<t<8(200) t<8	0.28 0.31 0.33 0.33 0.33	0.15-0.30	0.90	0.035	0.04	65-85 (450-585)	35(240)	19	23
A 515-70	t<1 (25) 1<t<2 (50) 2<t<4< (100) 4<t<8 (200) t<8	0.31 0.33 0.35 0.35 0.35	0.15-0.30	0.90	0.035	0.04	70-90 (485-620)	38(260)	17	21

ASTM A515-78 PRESSURE VESSEL PLATES, CARBON STEEL, FOR INTERMEDIATE AND LOWER TEMP. SER

Designation	Chemical Composition, %						Tensile Test			
	Thickness in (mm)	C max	Si	Mn max	P max	S max	Tensile Strength Ksi (MPa)	Yield Strength Ksi (MPa), min or 200 mm	Elongation,% min	
									Gl=8 in. *2 or 50 mm	Gl=2
A 516-55	T<1/2 (13)	0.18	0.15~0.30	0.60~0.90	0.035	0.04	55-75 (380-515)	30(205)	23	27
	1<t<2(50) 2<t<4(100) 4<t<8 (200) t>8	0.20 0.22 0.24 0.26	0.15-0.30	0.60~1.20	0.035	0.04				
A 516-60	T<1/2 (13)	0.21	0.15~0.30	0.60~0.90	0.035	0.04	60-80 (415-550)	32(220)	21	25
	1<t<2 (50) 2<t<4 (100) 4<t<8 (200) t<8	0.23 0.25 0.27 0.27	0.15-0.30	0.85~1.20	0.035	0.04				
A 516-65	t<1/2(13) 1<t<2 (50) 2<t<4 (100) 4<t<8(200) t<8	0.24 0.26 0.28 0.29 0.29	0.15-0.30	0.85~1.20	0.035	0.04	65-85 (450-585)	35(240)	19	23
A 516-70	t<1/2 (13) 1<t<2 (50) 2<t<4< (100) 4<t8 (200) t>8	0.27 0.28 0.30 0.31 0.31	0.15-0.30	0.85~1.20	0.035	0.04	70-90 (485-620)	38(260)	17	21

ASTM A387-78 PRESSURE VESSEL PLATES, ALLOY STEEL, CHROMIUM - MOLYBDENUM **Tensile Test**

Designation	Specification	CHEMICAL COMPOSITION, % C max	Si	Mn	P max	S max	Cr	Mo	Class 1*5 Tensile Strength Ksi (MPa)	Yield Strength (0.2% offset) Ksi (MPa) min	Elongation %min GL=8 in.*2 or 200 mm	Elongation %min GL= 2in. or 50 m	Reduction of area % min.	Class 2*6 Tensile Strength Ksi(MPa)	Yield Strength (0.02%Offset) Ksi(MPa)	Elongation %, min GL=8 in. *2 or 200mm	Elongation %, min GL=2 in. or 50 mm	Reduction of Area %, min	Heat Treatment Tempering Tempreature
A 387	Grade 2	0.05 0.21	0.15-0.40	0.55-0.80	0.035	0.035	0.50-0.80	0.45-0.60	55-80 (380-550)	33 (230)	18	22	--	70-90 (485-620)	45 (310)	18	22	--	1,150°F(620°C)and over
	Grade 12	0.05 0.17	0.15-0.40	0.40-0.65	0.035	0.035	0.80-1.15	0.45-0.60	55-80 (380-550)	33 (230)	18	22	--	65-85 (450-585)	40 (275)	19	22	--	
	Grade 11	0.05 0.17	0.50-0.80	0.40-0.65	0.035	0.035	1.00-1.50	0.45-0.65	60-85 (415-585)	35 (240)	19	22	--	75-100 (515-690)	45 (310)	18	22	--	
	Grade 22	0.05 0.15*1	0.50 max	0.30-0.60	0.035	0.035	2.00-2.50	0.90-1.10	60-85 (415-585)	30 (205)	--	18	45*3 40*4	75-100 (515-690)	45 (310)		18	45*3 40*4	1,250°F(675°C) and over
	Grade 21	0.05 0.15*1	0.50 max	0.30-0.60	0.035	0.035	2.75-3.25	0.90-1.10	60-85 (415-585)	30 (205)	--	18	45*3 40*4	75-100 (515-690)	45 (310)		18	45*3 40*4	
	Grade 5	0.15	0.50 max	0.30-0.60	0.040	0.030	4.00-6.00	0.45-0.65	60-85 (415-585)	30 (205)	--	18	45*3 40*4	75-100 (515-690)	45 (310)	--	18	45*3 40.4	1,300°F(705°C) and over
	Grade 9	0.15	1.00 max	0.30-0.60	0.030	0.030	8.00-10.00	0.85-1.10	60-85 (415-585)	30 (205)	--	18	45*3 40*4	75-100 (515-690)	45 (310)	--	18	45*3 40.4	1,250°F(675°C) and over

1). The carbon content for plates over 5 inch (127 mm) in thickness is 0.17% max. on product analysis.

*2). a) For plates under 0.312 inch (7.92 mm) in thickness, a deduction of 1.25% from the specified percentage of elongation shall be made for each decrease of 0.031 inch (0.79 mm) of the specified thickness under 0.312 inch.

b) For plates over 3.5 inch (88.9 mm) in thickness, a deduction of 0.5% from the specified percentage of elongation in 2 inch (50 mm) shall be made for each increase of 0.05 inch of the specified thickness over 3.5 in this deduction shall not exceed 3%

c) For plates upto the including 3/4 inch thickness, if the percentage of elongation of an 8 inch or 200 mm gauge length test specimen falls not more than 3 % below tyhe amount prescribed, the elongation shall be considered satisfactory provided the percentage of elongation in 2 inch (50 mm) across the break is not less than 25 %.

*3). Measured on round test specimen.

*4). Measured on flat test specimen

*5). Applicable to annealed and normalised-tempered materials

*6). Not applicable to annealed material