CRA GUIDE TO SELECTION OF STAINLESS STEELS

Alloy Family	Alloy Type	API Category	Trade Names	UNS Number	Chemical Composition (max. wt % or range, unless otherwise indicated)										PREN	API Grade	0.2% Yield Str. (ksi) long. at room temperature		Tensile Str. (ksi) long. at room temperature	Elong. (%) long. at room temperature	CVN Impact (ft-lbs) trans. at 14F	Hardness (HRC)	NACE MR0175/ISO 15156 H_2S Limits		Alloy Family
					C	CR	Ni	Mo	Cu	Ti	V	W	N				min.	max.	min.	min.	min.	max.	Tables	Sour Service Limits	
Martensitic Stainless Steel	**13 Chrome**	5CT 13Cr L80	13CR 420 Mod 13Cr L80	S42000	0.15 to 0.22	12.0 to 14.0	0.5	—	0.25	—	—	—	—		12 to 14	80	80	95	95	function of specimen size	function of wall thickness	23	A.19	H_2S≤1.5 psi, pH ≥3.5	Martensitic Stainless Steel
	Modified 13 Chrome	N/A	13CRM	N/A	0.03	11.0 to 14.0	4.0 to 6.0	0.2 to 1.2	—	—	—	—	—		12 to 18	80 95 110	80 95 100	95 110 140	90 105 115	function of specimen size and strength	29 29 29/30	27 28 32		not recommended for sour service	
			HP1	N/A	0.04	12.0 to 14.0	3.5 to 4.5	0.8 to 1.5	—	—	—	—	—		15 to 19										
	Super 13 Chrome	5CRA Group 1 13-5-2 PSL 1 & 2	13CRS CR13S	S41426	0.03	11.5 to 13.5	4.5 to 6.5	1.5 to 3.0	—	0.01 to 0.5	0.5	—	—		16 to 23	80 95 110	80 95 110	95 105 140	90 105 115	function of specimen size and strength	29 29 29/30	27 27 32	A.19	H_2S≤1.5 psi, pH ≥3.5 110 Gr. not recommended for sour service	
		5CRA Group 1 13-5-2 PSL 1	S13CR	S41425	0.05	12 to 15	4.0 to 7.0	1.5 to 2.0	0.03	—	—	—	0.06 to 0.12		17 to 22	80 95 110	80 95 110	95 105 140	90 105 115	function of specimen size and strength	29 29 29/30	27 28 32	A.18	H_2S≤1.5 psi, pH ≥3.5 110 Gr. not recommended for sour service	
			SCR13	S41427	0.03	11.5 to 13.5	4.5 to 6.0	1.5 to 2.5	—	0.01	0.1 to 0.5	—	—		16 to 22	80 95 110	80 95 110	95 105 140	90 105 115	function of specimen size and strength	29 29 29/30	27 29 32	A.21	1.5 psi H_2S, pH≥3.5, Cl≤6 g/l 110 Gr. not recommended for sour service	
			HP2	N/A	0.04	12.0 to 14.0	4.5 to 5.5	1.8 to 2.5	—	—	—	—	—		18 to 22	80 95 110	80 95 110	95 105 140	90 105 115	function of specimen size and strength	29 29 29/30	27 28 32		not recommended for sour service	
	15 Chrome	N/A	15 Cr	S42500	0.08 to 0.2	14.0 to 16.0	1.0 to 2.0	0.3 to 0.7	—	—	—	—	0.2		15 to 18	N/A	80	95	90			22	A.19	H_2S≤1.5 psi, pH≥3.5	
			UHP-15CR Super 15Cr	N/A	0.04	14.0 to 16.0	6.0 to 7.0	1.8 to 2.5	1.5	—	—	—	—		20 to 24	125	125	150	135	function of specimen size and strength		37		not recommended for sour service	
	17 Chrome	N/A	17CRS Super 17Cr	N/A	0.03	16.0 to 18.0	4.0 to 5.5	2.0 to 3.0	2.0 to 3.0	—	0.1	—	—		23 to 28	125	125	145	130	function of specimen size and strength		38		not recommended for sour service	

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					C	CR	Ni	Mo	Cu	Ti	V	W	N			min.	max.	min.	min.	min.	max.	Tables	Sour Service Limits	
Duplex Stainless Steel	**22 Chrome Duplex**	5CRA Group 2 22-5-3 PSL 1 & 2	22Cr 2205	S31803	0.03	21.0 to 23.0	4.5 to 6.5	2.5 to 3.5	—	—	—	—	0.08 to 0.20	35 to 40	65 75 110 125 140	65 75 110 125 140	90 100 140 150 160	90 90 125 130 145	25% 25% 12% 10% 9%	function of strength and wall thickness	26 26 36 36 38	A.24 (annealed)	H_2S≤1.5 psi, Temps≤450F	Duplex Stainless Steel
	25 Chrome Duplex	5CRA Group 2 25-7-3 PSL 1 & 2	25Cr 2507	S31260	0.03	24.0 to 26.0	5.5 to 7.5	2.5 to 3.5	0.2 to 0.8	—	—	0.10 to 0.50	0.10 to 0.30	37 to 40								A.25 (cold worked)	H_2S≤0.3 psi 140 Gr. not recommended for sour service	
	Super Duplex	5CRA Group 2 25-7-4 PSL 1 & 2	SAF 2507	S32750	0.03	24.0 to 26.0	6.0 to 8.0	3.0 to 4.0	—	—	—	—	0.24 to 0.32	40 to 45	80 90 110 125 140	80 90 110 125 140	105 105 140 150 160	110 115 125 130 145	20% 20% 12% 10% 9%	function of strength and wall thickness	28 30 36 38	A.24 (annealed)	H_2S≤3.0 psi, Temps≤450F	
			25CRS Z 100	S32760	0.03	24.0 to 26.0	6.0 to 8.0	3.0 to 4.0	0.5 to 1.0	—	—	0.50 to 1.0	0.20 to 0.30	40 to 45								A.25 (cold worked)	H_2S≤3.0 psi, Cl≤120g/l 140 Gr. not recommended for sour service	
			25CRW	S39274	0.03	24.0 to 26.0	6.0 to 8.0	2.5 to 3.5	0.2 to 0.8	—	—	1.5 to 2.5	0.24 to 0.32	40 to 45										

CRA GUIDE TO SELECTION OF NICKEL ALLOYS

Alloy Family	Alloy Type	API Category	Trade Names	UNS Number	Chemical Composition (max. wt % or range, unless otherwise indicated)										PREN	API Grade	0.2% Yield Str. (ksi) long. at room temperature		Tensile Str. (ksi) long. at room temperature	Elong. (%) long. at room temperature	CVN Impact (ft-lbs) trans. at 14F	Hardness (HRC)	NACE MR0175/ISO 15156 H_2S Limits		Alloy Family
					Cr	Ni	Fe	Mo	Co	Cu	Ti	Nb+Ta	W	AL			min.	max.	min.	min.	min.	max.	Tables	Sour Service Limits	
Solid Solution Nickel Base Alloys	**28 Chrome**	5CRA Group 3 27-31-4 PSL 1 & 2	28 Chrome Alloy 28	N08028	26.0 to 28.0	29.5 to 32.5	bal.	3.0 to 4.0	—	0.6 to 1.4	—	—	—	—	36 to 41	110 125 140	110 125 140	140 150 160	115 130 145	11% 10% 9%	function of strength & wall thickness	33 35 38	A.14	no limit ≤270F, refer to table for temperatures up to 450F 140 Gr. not recommended for sour service	Solid Solution Nickel Base Alloys
	2535	5CRA Group 3 25-32-3 PSL 1 & 2	2535	N08535	24.0 to 27.0	29.0 to 36.5	bal.	2.5 to 4.0	—	1.5	—	—	—	—	32 to 40										
	2035	5CRA Group 3 22-35-4 PSL 1 & 2	2035	N08135	20.5 to 23.5	33.0 to 38.0	bal.	4.0 to 5.0	—	0.7	—	—	0.2 to 0.8	—	34 to 41										
	825	5CRA Group 4 21-42-3 PSL 1 & 2	825 2242	N08825	19.5 to 23.5	38.0 to 46.0	bal.	2.5 to 3.5	—	1.5 to 3.0	0.6 to 1.2	—	—	0.2	28 to 35										
	G3	5CRA Group 4 22-50-7 PSL 1 & 2	G3	N06985	21.0 to 23.5	bal.	18.0 to 21.0	6.0 to 8.0	5.0	1.5 to 2.5	—	0.50	1.5	—	41 to 50	110 125 140	110 125 140	140 150 160	115 130 145	11% 10% 9%	function of strength & wall thickness	35 37 38	A.14	no limit ≤300F, refer to table for temperatures up to 450F 140 Gr. not recommended for sour service	
	G2	5CRA Group 4 25-50-6 PSL 1 & 2	G2	N06975	23.0 to 26.0	47.0 to 52.0	bal.	5.0 to 7.0	—	0.7 to 1.2	0.7 to 1.5	—	—	—	40 to 49										
	2550		2550 CRA 2550E	N06255	23.0 to 26.0	47.0 to 52.0	bal.	6.0 to 9.0	—	1.2	0.69	—	3.0	—	43 to 56										
	G50	5CRA Group 4 20-54-9 PSL 1 & 2	G50 Alloy 050	N06950	19.0 to 21.0	50.0 min	15.0 to 20.0	8.0 to 10.0	2.5	0.5	—	0.50	1.0	—	45 to 54										
	C276	5CRA Group 4 15-60-16 PSL 1 & 2	C276	N10276	14.5 to 16.5	bal.	4.0 to 7.0	15.0 to 17.0	2.5	—	—	—	3.0 to 4.5	—	69 to 80	110 125 140	110 125 140	140 150 160	115 130 145	11% 10% 9%	function of strength & wall thickness	35 37 38	A.14	no limit ≤400F, refer to table for temperatures up to 450F	
	C22	N/A	Alloy 22	N06022	20.0 to 22.5	bal.	2.0 to 6.0	12.5 to 14.5	2.5	—	—	—	2.5 to 3.5	—	65 to 76										