



## CHEMICAL SPECIFICATION OF COMMONLY CAST HEAT RESISTANT ALLOYS

Sr.No.	Closest Equivalent Alloy	IS 4522	DIN 17465	ASTMA 297	C %	Ni %	Cr %	Mo %	Si %	Mn %	Others %
1	HRCS 9/19	Grade 5	1.4825	Gr HF	0.20-0.40	8.0- 12.0	18.0-23.0	0.5 max	2.0 max	2.0 max	-
2	HRCS 12/25	Grade 7	1.4837	Gr HH	0.20-0.50	11.0- 14.0	24.0-28.0	0.5 max	2.0 max	2.0 max	-
3	HRCS 12/25	-	-	Gr HH Type2	0.20-0.50	11.0- 15.0	22.0-24.0	0.5 max	1.75 max	2.5 max	-
4	Canalloy	-	-	SP	0.50-0.65	10.0- 14.0	22.0-26.0	-	1.75-2.25	1.5 max	-
5	High Cobalt Chromium Alloy (60Co30Cr)	-	-	-	0.90-1.40	3.0 max	28.0-32.0	1.5 max	2.0 max	2.0 max	3.0 max Fe 3.5 - 5.5 W Balance Co
6	HRCS 20/25	Grade 9	1.4848	Gr HK	0.20-0.60	18.0- 22.0	24.0-28.0	0.5 max	2.0 max	2.0 max	-
7	HRCS 20/25	-	1.4848	Gr HK40	0.35-0.45	19.0- 22.0	23.0-27.0	0.5 max	1.75 max	1.5 max	-
8	AISI 314	-	-	-	0.25 max	19.0- 22.0	23.0-26.0	-	1.5-3.0	2.0 max	-
9	HRCS 24/24 Nb	-	1.4855	IN519	0.25-0.35	23.0- 25.0	23.0-25.0	0.5 max	1.0 max	1.0 max	1.4 - 1.8 Nb
10	HRCS 25/20	Grade 11	-	Gr HN	0.20-0.50	23.0- 27.0	19.0-23.0	0.5 max	2.0 max	2.0 max	-
11	HRCS 32/20 Nb	(Incoalloy 800H)	1.4859	Castalloy 800H	0.10-0.15	30.0- 33.0	19.0-21.0	0.5 max	1.5 max	1.5 max	0.8 - 1.0 Nb
12	HRCS 35/25	-	-	Gr HP	0.35-0.75	33.0- 37.0	24.0-28.0	0.5 max	2.5max	2.0 max	-
13	HRCS 35/25 Nb	-	1.4852	Gr HP modified	0.35-0.45	33.0- 36.0	24.0-28.0	0.5 max	1.2 max	1.2 max	0.5 - 1.0 W 0.8 - 1.2 Nb
14	HRCS 35/15	Grade12	-	Gr HT	0.35-0.75	33.0- 37.0	15.0-19.0	0.5 max	2.5 max	2.0 max	-
15	HRCS 39/19	Grade 13	-	Gr HU	0.35-0.75	37.0-41.0	17.0-21.0	0.5 max	2.5 max	2.0 max	-
16	HRCS 48/28 W	-	2.4859	-	0.35-0.45	48.0- 52.0	27.0-29.0	-	1.5 max	1.5 max	4.0 - 6.0 W
17	HRCS 48/28 Wco	-	-	-	0.40-0.50	46.0- 50.0	27.0-29.0	-	2.0 max	1.5 max	4.0 - 6.0 W 2.0 - 4.0 Co
18	HRCS 50/50 Nb	-	2.4680	ASTM A560 Gr 50/50 Nb	0.10 max	Bala-nce	47.0-52.0	-	0.5 max	0.3 max	1.4 - 1.7 Nb 0.02 max P 0.02 max S 1.0 max Fe
19	HRCS 66/17	Grade 14	-	Gr HX	0.35 - 0.75	64.0- 68.0	15.0-19.0	0.5 max	2.5 max	2.0 max	-
20	CY-40 (70Ni15Cr)	-	-	ASTM A494 CY-40	0.35-0.45	Balance	14.0-17.0	-	3.0 max	1.5 max	11.0 max Fe



Physical Specification of Commonly Cast Corrosion Resistant Alloys

Sr.No.	Closest Equivalent Alloy	UNS	DIN 17445	ASTM A351/A743/A890	Micro-Structure	Heat Treatment	Temp C	T.S. kg/mm <sup>2</sup> min.	Y.S. kg/mm <sup>2</sup> min.	Elong-ation min. %
1	AISI 410	J91150	1.4008	Gr CA-15	Martensite	Hardened & Tempered	955	63.24	45.90	18
2	AISI420	42000	1.4021	-	Martensite	Hardened & Tempered	980-1030 600-750	66.00	46.00	14
3	CA6NM	J91540	1.4313	Gr CA6NM	Martensite	Hardened & Tempered	1000-1050 580-620	77.00	56.00	15
4	17.4 PH	J92180	1.4542	ASTM A747 Gr CB7Cu-1	Martensite	Solution Annealed & Tempered	1100 580	105.80	81.10	15
5	AISI 304	J92600	1.4308	Gr CF8	Austenite	Solution Annealed	1040	49.47	21.09	35
6	AISI 304L	J92500	1.4311	Gr CF3	Austenite	Solution Annealed	1040	49.47	21.09	35
7	AISI 316	J92900	1.4408	Gr CF8M	Austenite	Solution Annealed	1040	49.47	21.09	30
8	AISI 316L	J92800	1.4404	Gr CF3M	Austenite	Solution Annealed	1040	49.47	21.09	30
9	AISI 317	J93000	1.4438	Gr CG8M	Austenite	Solution Annealed	1040	53.00	29.63	30
10	CD4MCu	J93370	1.4460	Gr CD4MCu	Ferrite + Austenite	Solution Annealed	1040	70.68	48.79	16
11	Duplex SS	J93345	-	Gr CE8MN	Ferrite + Austenite	Solution Annealed	Furnace cool from 1120 to 1045. Then quench.	66.81	45.90	25
12	CN7M (28Ni21Cr2.5Mo)	N08007	-	Gr CN7M	Austenite	Solution Annealed	1120	43.60	17.58	35
13	904L (25Ni20Cr4Mo)	-	-	-	Austenite	Solution Annealed	1120	43.60	17.58	35



14	R-55 (58Ni23Cr4Mo)	-	-	-	Austenite	Solution Annealed	1180	50.50	28.05	4
15	Super Duplex SS	J93380	-	ASTM A995 CD3MWCuN	Ferrite + Austenite	Solution Annealed	1110	690.00	450.00	25
16	M35 (65Ni30Cu)	N24135	-	ASTM A494 M35-1	-	-	-	45.90- 63.00	22.60- 28.00	25
17	CW12MW (53Ni17Cr17Mo4W)	N30002	-	ASTM A494 Gr CW12MW	Austenite	Solution Annealed	1180	50.63	28.12	4
18	N12MV (65Ni28Mo0.4Va)	N30012	-	ASTM A494 Gr N12MV	Austenite	Solution Annealed	1095	53.00	28.05	6
19	Cast Nickel (95Ni)	N02100	-	ASTM A494 CZ100	Austenite	As Cast	-	35.19	12.75	10
20	Ni-Resist AFG 1	-	-	ASTM A436 Type 1	Austenite	As Cast	-	17.34	-	-



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1	AISI 410	J91150	1.4008	Gr CA-15	0.15 max	1.0 max	11.5-14.0	0.5 max	1.5 max	1.0 max	-
2	AISI420	42000	1.4021	-	0.15-0.23	1.0 max	12.0-14.0	-	1.0 max	1.0 max	-
3	CA6NM	J91540	1.4313	Gr CA6NM	0.06 max	3.5-4.5	11.5-14.0	0.4-1.0	1.0 max	1.0 max	-
4	17.4 PH	J92180	1.4542	ASTM A747 Gr CB7Cu-1	0.07 max	3.6-4.6	15.5-17.7	-	1.0 max	0.7 max	2.50 - 3.20 Cu
5	AISI 304	J92600	1.4308	Gr CF8	0.08 max	8.0-11.0	18.0-21.0	0.5 max	2.0 max	1.5 max	-
6	AISI 304L	J92500	1.4311	Gr CF3	0.03 max	8.0-12.0	17.0-21.0	0.5 max	2.0 max	1.5 max	-
7	AISI 316	J92900	1.4408	Gr CF8M	0.08 max	9.0-12.0	18.0-21.0	2.0-3.0	1.5 max	1.5 max	-
8	AISI 316L	J92800	1.4404	Gr CF3M	0.03 max	9.0-13.0	17.0-21.0	2.0-3.0	1.5 max	1.5 max	-
9	AISI 317	J93000	1.4438	Gr CG8M	0.08 max	9.0-13.0	18.0-21.0	3.0-4.0	1.5 max	1.5 max	-
10	CD4MCu	J93370	1.4460	Gr CD4MCu	0.04 max	4.75-6.00	24.5-26.5	1.75-2.25	1.0 max	1.0 max	2.75 - 3.25 Cu
11	Duplex SS	J93345	-	Gr CE8MN	0.08 max	8.0-11.0	22.5-25.5	3.0-4.5	1.5 max	1.0 max	0.1 - 0.3 N
12	CN7M (28Ni21Cr2.5Mo)	N08007	-	Gr CN7M	0.07 max	27.5-30.5	19.0-22.0	2.0-3.0	1.5 max	1.5 max	3.00 - 4.00 Cu
13	904L 25Ni20Cr4Mo	-	-	-	0.025 max	24.0-26.0	19.0-21.0	4.0-5.0	1.00 max	2.00 max	1.00 - 2.00 Cu
14	R-55 (58Ni23Cr4Mo)	-	-	-	0.15 max	55.0-60.0	22.0-24.0	4.0-5.0	3.0-4.0	1.5 max	4.00 - 5.00 Cu
15	Super Duplex SS	J93380	-	ASTM A995 CD3MWCuN	0.03 max	6.5-8.5	24.0-26.0	3.0-4.0	0.25 max	1.0 max	0.50 - 1.00 W 0.20 - 0.30 N
16	M35 (65Ni30Cu)	N24135	-	ASTM A494 M35-1	0.35 max	62.0- 68.0	-	-	2.0 max	1.5 max	26.0 - 33.0 Cu 2.5 max Fe
17	CW12MW (53Ni17Cr17Mo4W)	N30002	-	ASTM A494 Gr CW12MW	0.12 max	50.0-55.0	15.5-17.5	16.0-18.0	1.0 max	1.0 max	3.75 - 5.25 W
18	Ni2MV (65Ni28Mo0.4Va)	N30012	-	ASTM A494 Gr N12MV	0.12 max	61.0-69.0	1.0 max	26.0-30.0	1.0 max	1.0 max	0.20 - 0.60 Va
19	Cast Nickel (95 Ni)	N02100	-	ASTM A494 CZ100	1.00 max	95.00 min	-	-	2.00 max	1.5 max	3.00 max Fe 1.25 max Cu
20	Ni-Resist AFG 1	-	-	ASTM A436 Type 1	3.00 max	13.5-17.5	1.5-2.5	-	1.0-2.8	0.5-1.5	5.50 - 7.50 Cu



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Sr. No.	Closest Equivalent Alloy	IS 4522	DIN 17465	ASTMA 297	Micro-Structure	Heat Treatment	Temp C	T.S. kg/mm <sup>2</sup> min.	Y.S. kg/mm <sup>2</sup> min.	Elong-ation min. %
1	HRCS 9/19	Grade 5	1.4825	Gr HF	Austenite	As Cast	-	58.50	24.00	25
2	HRCS 12/25	Grade 7	1.4837	Gr HH	Austenite	As Cast	-	51.50	24.00	10
3	HRCS 12/25	-	-	Gr HH Type2	Fully Austenite	As Cast	-	51.50	-	4
4	Canalloy	-	-	SP	Austenite	-	-	210.00-200.00	-	-
5	High Cobalt Chromium Alloy (60Co30Cr)	-	-	-	-	As Cast Hardness 38 HRC.	220	HB	-	-
6	HRCS 20/25	Grade 9	1.4848	Gr HK	Austenite	As Cast	-	45.90	24.00	10
7	HRCS 20/25	-	1.4848	Gr HK40	Austenite	As Cast	-	45.90	24.00	10
8	AISI 314	-	-	-	Austenite	Solution Annealed	1010-1120	-	-	-
9	HRCS 24/24 Nb	-	1.4855	IN519	Austenite	As Cast	-	45.00	23.00	10
10	HRCS 25/20	Grade 11	-	Gr HN	Austenite	As Cast	-	43.50	-	8
11	HRCS 32/20 Nb	(Incoalloy 800H)	1.4859	Castalloy 800H	Austenite	As Cast	-	45.00	18.00	30
12	HRCS 35/25	-	-	Gr HP	Austenite	As Cast	-	45.00	23.00	8
13	HRCS 35/25 Nb	-	1.4852	Gr HP modified	Austenite	As Cast	-	45.00	23.00	8
14	HRCS 35/15	Grade12	-	Gr HT	Austenite	As Cast	-	45.90	-	4



15	HRCS 39/19	Grade 13	-	Gr HU	Austenite	As Cast	-	45.90	-	4
16	HRCS 48/28 W	-	2.4859	-	Austenite	As Cast	-	45.00	24.00	4
17	HRCS 48/28 Wco	-	-	-	Austenite	As Cast	-	45.00	24.00	4
18	HRCS 50/50 Nb	-	2.4680	ASTM A560 Gr 50/50 Nb	Austenite	As Cast	-	56.00	35.00	5
19	HRCS 66/17	Grade 14	-	Gr HX	Austenite	As Cast	-	41.50	-	-
20	CY-40 (70Ni15Cr)	-	-	ASTM A494 CY-40	Austenite	As Cast	-	49.50	20.00	30