

Alloy Reference Guide



IMR

INDIAN
METALLOY
RECYCLERS

STAINLESS STEEL SCRAP EXPERTS

MUMBAI - COIMBATORE



STAINLESS STEEL SCRAP EXPERTS

We are direct importers, stockists and suppliers of S.S. Scrap, High Nickel Alloy Scrap, Ferro Alloys and Virgin Metals.

We also deal in Manganese Steel plates and wear resistance plates as well as 904L sheet/plate and coils.

Address : **INDIAN METALLOY RECYCLERS PRIVATE LIMITED**
415, Prasad Chambers, 4th Floor, Tata Road No. 2, Opera House, Mumbai - 4.

Contact : **Dixit Mehta** - 9004422123 / **Rakesh Mehta** - 9892932599

Landline : 022-66102819 / 022 - 66595069

Email Id : dm@imrpvtltd.com / rm@imrpvtltd.com

Website : www.imrpvtltd.com

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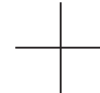


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STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
308 L Hi Si	9.50-11.00	20.00-22.00	—	—	0.03	2.00	0.03	0.03	1.00	Fe-Balance
309	12.00-15.00	22.00-24.00	—	—	0.20	2.00	0.045	0.03	1.00	Fe-Balance
309 Hi Si	13.00-14.00	23.00-25.00	—	—	0.08	2.00	0.03	0.03	2.00	Fe-Balance
309 Cb	12.00-15.00	22.00-24.00	—	—	0.20	2.00	—	—	1.00	Cb-Added, Fe-Balance
309 S	12.00-15.00	22.00-24.00	—	—	0.08	2.00	0.045	0.03	1.00	Fe-Balance
310	19.00-22.00	24.00-26.00	—	—	0.25	2.00	0.045	0.03	1.50	Fe-Balance
310 S	19.00-22.00	24.00-26.00	—	—	0.08	2.00	0.045	0.03	1.50	Fe-Balance
311	24.00-26.00	18.00-20.00	—	—	0.25	—	—	—	2.00-3.00	Fe-Balance
311 DQ	4.50	17.25	—	2.40	0.04	2.50	—	—	0.50	N-0.15, Fe-Balance
312	8.00-11.00	27.00-30.00	—	—	0.25	2.00	0.045	0.03	1.00	Fe-Balance
314	19.00-22.00	23.00-26.00	—	—	0.25	2.00	0.045	0.03	1.50-3.00	Fe-Balance
316	10.00-14.00	16.00-18.00	2.00-3.00	—	0.08	2.00	0.045	0.03	1.00	Fe-Balance
316 F	10.00-14.00	16.00-18.00	1.75-2.25	—	0.08	2.00	0.20	0.10 min	1.00	Fe-Balance
316 L	10.00-14.00	16.00-18.00	2.00-3.00	—	0.03	2.00	0.045	0.03	1.00	Fe-Balance



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
302 B	8.00-10.00	17.00-19.00	—	—	0.15	2.00	0.045	0.030	2.00-3.00	Zr-0.60 max, Fe-Balance
302 Cu	9.00	18.00	—	3.50	0.10	—	—	—	—	Fe-Balance
302 HQ	8.00-10.00	17.00-19.00	—	3.00	0.08	2.00	—	—	1.00	Fe-Balance
303	8.00-10.00	17.00-19.00	0.60	—	0.15	2.00	0.20	0.15	1.00	Fe-Balance
303 F	9.00	18.00	—	—	0.15	1.75	0.10	0.15	1.00	Fe-Balance, Cb-Added
303 MX	9.00	18.00	—	—	0.15	1.50	—	0.15 Min	—	Fe-Balance
303 S	8.00-11.00	17.00-19.00	—	—	0.15	2.00	0.02	0.15	1.00	Fe-Balance
303 Plus X	8.50	18.00	—	—	0.15	3.00	—	0.35	—	Fe-Balance
303 Se	8.00-10.00	17.00-19.00	—	—	0.15	2.00	0.20	0.06	1.00	Se-0.15 min, Fe-Balance
T 303 Pb	9.00	18.00	—	—	0.07	—	—	0.20	—	Pb-0.20, Fe-Balance
304	8.00-12.00	18.00-20.00	—	—	0.08	2.00	0.045	0.03	1.00	Fe-Balance
304 L	8.00-12.00	18.00-20.00	—	—	0.03	2.00	0.045	0.03	1.00	Fe-Balance
304 N	9.00	19.00	—	—	0.08	2.00	0.045	0.03	1.00	N-0.24 m, Fe-Balance
305	10.50-13.00	17.00-19.00	—	—	0.12	2.00	0.045	0.03	1.00	Fe-Balance
307	9.50	20.50	—	—	0.08	4.00	—	—	—	Fe-Balance
308	10.00-12.00	19.00-21.00	—	—	0.08	2.00	0.045	0.03	1.00	Fe-Balance
308 L	9.50-11.00	20.00-22.00	—	—	0.03	2.00	0.03	0.03	0.60	Fe-Balance



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
403	—	11.50-13.00	—	—	0.15	1.00	0.04	0.03	0.50	Fe-Balance
404	1.25-2.00	11.00-12.00	—	—	0.05	1.00	—	—	0.50	N-0.03m, Fe-Balance
405	—	11.50-14.50	—	—	0.08	1.00	0.04	0.03	1.00	Al-0.10-0.30, Fe-Balance
406	0.12	13.50	0.03	—	0.07	0.40m	—	—	0.48	Fe-Balance, Ti-0.32, Al-3.90m
409	—	11.00	—	—	0.00-0.045	0.55	0.045	0.045	0.50	Ti-6XC min-0.75 max, Al-0.50, Fe-Balance
410	—	11.50-13.50	—	—	0.15	1.00	0.04	0.03	1.00	Fe-Balance
410 Cb	—	12.00	—	—	0.13	0.20	—	—	0.20	Cb-0.15, Fe-Balance
410 S	0.60 max	11.50-13.50	—	—	0.08 max	1.00 max	0.040 max	0.030 max	1.00 max	Fe-Balance
414	1.25-2.50	11.50-13.50	—	—	0.15	1.00	0.04	0.03	1.00	Fe-Balance
416	—	12.00-14.00	0.60m	—	0.15	1.25	0.06	0.15 min	1.00	Fe-Balance
416 L	2.90m	12.80	—	—	0.035	—	—	—	—	Fe-Balance
416 MF	—	12.50	—	—	0.12	—	—	0.20	—	Fe-Balance
416 MH	—	12.50	—	—	0.12	—	—	0.27	—	Fe-Balance
416 MX	—	12.50	—	—	0.09	—	—	0.32	—	Fe-Balance
416 Se	—	12.00-14.00	—	—	0.15	1.25	0.06	0.06	1.00	Se-0.15, Fe-Balance
416 Plus X	—	13.00	—	—	0.15	2.00	—	0.35	—	Fe-Balance
418	—	12.50	—	—	0.20	1.00	—	—	0.50	W-3.00, Fe-Balance
419	0.50	11.50	0.50	—	0.25	1.00	—	—	0.30	W-2.50, V-0.40, Fe-Balance, N-0.10



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other	
4MX	—	13.25	—	—	0.07	—	—	0.42	—	Fe-Balance	
7-Mo Plus	4.00	26.00	2.00	—	—	2.00	—	—	—	Fe-Balance	
12 Mo V	0.50	12.00	1.00	—	0.25	0.50	—	—	0.50	V-0.30, Fe-Balance	
12 SR	—	12.00	—	—	—	—	—	—	0.50	Al-1.20, Cb-0.60, Ti-0.30, Fe-Balance	
13-8 Mo	7.50 – 8.50	12.25 – 13.25	2.00 – 2.50	—	—	0.05 Max	0.10 Max	0.01 Max	0.008 Max	0.10 Max	N-0.01, Al – 0.90 to 1.35
14-14-2	14.00	14.00	0.50	—	0.45	—	—	—	—	—	W-1.75- 3.00, Fe-Balance
15-5Ph	3.50-5.50	14.00-15.50	—	2.50-4.50	0.07m	1.00m	—	—	1.00m	—	Cb + Ta-0.15-0.45, Fe-Balance
15-7 Ph Mo	7.00	15.00	2.50	—	0.09	—	—	—	—	—	Al-1.00, Fe-Balance
15-15 N	15.00	16.00	1.55	—	0.15m	2.00m	—	—	0.75m	—	W-1.40, N-0.15m, Cb-1.05, Fe-Balance
16-15-6	15.00	16.00	6.00	—	0.07m	7.50	—	—	0.50	—	N-0.35, Fe-Balance
16-25-6	25.00	16.00	6.00	—	0.08m	1.35	—	—	0.70	—	Fe-Balance, N-0.15
17-4 Ph WRT	4.00	16.50	—	4.00	0.04	1.00m	—	—	1.00m	—	Fe-Balance, Cb + Ta-0.30
17-4 Ph CAST	3.00-5.00	15.00-17.00	—	2.30-3.00	0.04	1.00m	—	—	1.00m	—	Fe-Balance
17-7 Ph	7.10	17.00	—	—	0.09m	1.00m	—	—	1.00m	—	Al-1.00, Fe-Balance
17-10 P	10.20	16.70	—	—	0.125	0.76	0.27	0.025	0.55	—	Fe-Balance
17-14 Cu-Mo	14.10	15.90	2.50	3.00	0.12	0.75	—	—	0.50	—	Fe-Balance, Ti-0.25, Cb-0.45
17-14 Ph	14.00	16.00	2.50	3.00	0.12	—	—	—	—	—	Fe-Balance
17-22 A	—	1.25	0.50	—	0.45	0.55	—	—	0.65	—	Fe-Balance, V-0.25
17-22 AS	—	1.25	0.50	—	0.30	0.55	—	—	0.65	—	Fe-Balance, V-0.25
17-22 AV	—	1.25	0.50	—	0.28	0.75	—	—	0.65	—	Fe-Balance, V-0.85
18 SR	0.50	18.00	—	—	0.06	—	—	—	1.00	—	Al-2.00, Fe-Balance
18-8 LW	10.00	19.00	—	—	0.03	2.00	—	—	100	—	Fe-Balance, N-0.10
18-9 LW	9.00	18.00	—	3.50	0.10m	—	—	—	—	—	Fe-Balance
18-15	—	18.00	—	—	0.10	15.00	—	—	0.60	—	N-0.40, Fe-Balance



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Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
326	6.00-7.00	25.00-27.00	—	—	0.05	1.00	—	—	0.60	Fe-Balance
327	3.00-5.00	25.00-30.00	—	—	0.25	—	—	—	—	Fe-Balance
329	2.50-5.00	23.00-28.00	1.00-1.50	—	0.20	2.00	0.04	0.03	1.00	Fe-Balance
329 D	2.50-5.00	23.00-28.00	1.00-2.00	—	0.06	1.00	0.040	0.030	0.75	Fe-Balance
330	33.00-36.00	14.00-19.00	—	—	0.08	2.00	0.04	0.03	1.00	Fe-Balance
330 HC	35.00	19.00	—	—	0.40	1.50	—	—	1.25	Fe-Balance
331	9.00-12.00	17.00-19.00	—	—	0.08m	—	—	—	—	Cb-10XC, Fe-Balance
332	32.00	28.50	—	—	0.04	1.00	—	—	0.50	Fe-Balance
347	9.00-12.00	17.00-19.00	—	—	0.08	2.00	0.045	0.03	1.00	Cb+Ta-10XC min, Fe-Balance
348	9.00-13.00	17.00-19.00	—	—	0.08	2.00	0.045	0.03	1.00	Cb+Ta-10XC min, Co-0.20m, Ta-0.10m, Fe-Balance
353 MA	34.00-36.00	24.00-26.00	—	—	0.04-0.08	2.00 max	0.040 max	0.030 max	1.20-2.00	Ce-0.03-0.08, N-0.12-0.18, Fe-Balance
384	17.00-19.00	15.00-17.00	—	—	0.08	2.00	0.045	0.03	1.00	Fe-Balance
385	14.00-16.00	11.50-13.50	—	—	0.08	2.00	0.045	0.03	1.00	Fe-Balance
386	9.50	17.50	—	3.50	0.03	1.00	—	—	1.00	Fe-Balance
387	9.50	17.70	—	3.50	0.02	0.50	—	—	0.50	Fe-Balance
400	—	12.00-13.00	—	—	0.05	—	—	—	—	Al-0.50, Fe-Balance



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
316 L Hi Si	12.00-14.00	18.00-20.00	—	—	—	2.50	0.03	0.03	1.00	Fe-Balance
316 LN	10.00-14.00	16.00-18.00	2.00-3.00	—	0.030 max	2.00 max	0.045 max	0.030 max	1.00 max	N-0.10-0.16, Fe-Balance
316 N	10.00-14.00	16.00-18.00	2.00-3.00	—	0.08	2.00	0.045	0.03	1.00	Fe-Balance, N-0.10-0.16
317	11.00-15.00	18.00-20.00	3.00-4.00	—	0.08	2.00	0.045	0.03	1.00	Fe-Balance
317 L	11.00-15.00	18.00-20.00	3.00-4.00	—	0.03	2.00	0.045	0.03	1.00	Fe-Balance
317 LMN	13.50-17.50	17.00-20.00	4.00-5.00	0.75 max	0.03 max	2.00 max	0.045 max	0.030 max	0.75 max	N-0.10-0.20, Fe-Balance
318	10.00-14.00	17.00-19.00	2.00-3.00	—	0.08	—	—	—	—	Cb+Ta-10XC, Fe-Balance
319	11.00-15.00	17.50-19.50	2.50-3.00	—	0.07	2.00	0.045	0.03	1.00	Fe-Balance
319 L	13.35	18.00	2.50	—	0.02	—	—	—	—	Fe-Balance
321	9.00-12.00	17.00-19.00	—	—	0.08	2.00	0.045	0.03	1.00	Fe-Balance, Ti-5XC min
322	6.25-7.75	16.25-17.25	—	—	0.05-0.08	0.70	0.04	0.03	0.70	Ti-0.70-1.00, Fe-Balance, Al-0.20-0.30
323 (17-7PH)	6.50-7.75	16.00-18.00	—	—	0.09	1.00	—	—	1.00	Al-0.75-1.50, Fe-Balance
324 (17-4 PH)	3.00-5.00	15.50-17.50	—	3.00-5.00	0.07	1.00	—	—	1.00	Cb+Ta-0.25-0.45, Fe-Balance
325	19.00-23.00	17.00-20.00	—	1.00-1.50	0.50	2.00	—	—	1.60	Ti-0.25, Fe-Balance



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
18-15-5	5.50	17.50-18.50	—	—	0.10	15.10	—	—	0.70	N-0.38, Fe-Balance
18-18-2	18.00	18.00	—	—	0.06	1.50	—	—	2.00	Fe-Balance
19-9 DL	9.00	18.50	1.40	—	0.32	1.15	—	—	0.55	Fe-Balance, W-1.35, Ti-0.25, Cb-0.40
19-9 DX	9.00	18.50	1.60	—	0.32	1.00	—	—	0.55	Fe-Balance, W-1.35, Ti-0.55, Cb-1.30
19-9 W Mo	9.00	19.00	0.40	—	0.10	0.50	—	—	0.60	Fe-Balance, W-1.30, Ti-0.40, Cb-0.44
19-9 WX	8.50	20.50	0.50	—	0.11	—	—	—	—	Fe-Balance, Cb-1.30; Ti-0.20, W-1.55
21-6-9	6.50	20.25	—	—	0.80m	9.00	—	—	0.25	Fe-Balance, N-0.15-0.40
22-4-9	4.00	21.50	—	—	0.55	8.50	—	—	0.15	Fe-Balance, N-0.40
22-13-5	12.50	22.00	2.20	—	—	5.00	—	—	—	Cb-0.20, V-0.20, N-0.30, Fe-Balance
26-1 S	—	26.00	1.00	—	0.02	—	—	—	—	N-0.03, Fe-Balance, Ti-0.05
26-2	0.40	25.00	2.20	—	0.005	0.11	—	—	0.09	Fe-Balance, V-0.04
29-4	—	29.00	4.00	—	0.01	—	—	—	—	Fe-Balance
29-4-2	2.00	29.00	4.00	—	0.01	—	—	—	—	N-0.02, Fe-Balance
29-4-2C	2.00-4.50	28.00-30.00	3.60-4.20	—	0.030 max	1.00 max	0.040 max	0.030 max	1.00 max	N-0.045 max, Cb + Ti=0.20-1.00, 6(C+N) min Fe-Balance
29-9	9.50	29.00	—	—	—	—	—	—	—	Fe-Balance
153 MA	9.00-10.00	18.00-19.00	0.50 max	0.04-0.06	—	0.80 max	0.045 max	0.030 max	1.00-2.00	Ce-0.03-0.08, N-0.12-0.18, Fe-Balance
154 CM	—	14.50	4.00	—	1.15	0.50	—	—	0.30	V-1.25, Fe-Balance
201	3.50-5.50	16.00-18.00	—	—	0.15	5.50-7.50	0.06	0.03	1.00m	N-0.25 max, Fe-Balance



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
202	4.00-6.00	17.00-19.00	—	—	0.15	7.50-10.00	0.06	0.03	1.00	N-0.25 max, Fe-Balance
203 EZ	5.00-6.50	16.00-18.00	0.50	1.75-2.00	0.05	5.00-6.50	0.04	0.35	1.00	Fe-Balance
203 LZ	5.00-6.50	16.00-18.00	0.50m	1.75-2.25	0.08m	5.00-6.50	0.04	0.35m	1.00m	Fe-Balance
204	5.00	18.00	—	—	0.07	9.00	—	—	0.50	N-0.20, Fe-Balance
205	1.25-1.50	17.00-17.50	—	—	0.18	14.00-15.00	0.03	0.03	0.30-0.50	N-0.35, Fe-Balance
211	5.00-5.25	10.00-16.25	—	1.50-2.00	0.07	6.00-6.25	—	—	0.30-0.60	Fe-Balance
212 (Unitemp)	25.00	16.00	—	—	0.08	0.05	—	—	0.15	Ti-4.00, B-0.06, Fe-Balance, Al-0.15, Cb+Ta-0.50, Zr-0.05
216	5.00-7.00	17.50-22.00	—	—	0.10	7.50-9.00	0.03	0.03	0.50	Fe-Balance
223	0.60	15.50	0.50	—	0.10	12.00	—	—	0.50	N-0.25, Fe-Balance
253 MA	10.00-12.00	20.00-22.00	—	—	0.10 max	0.80 max	0.040 max	0.030 max	1.40-2.00	N-0.14-0.20, Ce-0.03-0.08, Fe-Balance
254 SMO	18.00	20.00	6.10	0.70	—	0.50	—	—	0.40	Fe-Balance
255	4.50-6.50	24.00-27.00	2.90-3.90	1.50-2.50	0.04	1.50	0.040	0.030	1.00	N-0.10-0.25, Fe-Balance
300 M	1.80	0.80	0.40	—	0.45	0.80	—	—	1.60	V-0.07, Fe-Balance
301	6.00-8.00	16.00-18.00	—	—	0.15	2.00	0.045	0.03	1.00	Fe-Balance
301 LW	6.00	17.00	—	2.00	—	—	—	—	—	Fe-Balance
302	8.00-10.00	17.00-19.00	—	—	0.15	2.00	0.045	0.03	1.00	Fe-Balance



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
AM-350	4.25	16.50	2.75	—	0.10	1.00	—	—	0.40	N-0.10, Fe-Balance
AM-355 WRT	4.25	15.50	2.75	—	0.15	1.00	—	—	0.40	N-0.10, Fe-Balance
AM-355 Cast	4.20	15.00	2.30	—	0.10	0.80	—	—	0.60	N-0.09, Fe-Balance
AM-363	4.00	11.00	—	—	0.04	0.15	—	—	0.20	Ti-0.25, Cb-0.25, W-3.00, Fe-Balance
AM-736	10.00	10.00	2.00	—	0.02	—	—	—	—	Al-0.30, Fe-Balance, Ti-0.20
AMSCO-1	3.00	29.00	—	—	2.50	—	—	—	—	W-12.50, Fe-Balance
AMSCO-6	3.00	29.00	—	—	1.00	—	—	—	—	W-14.50, Fe-Balance
ARMCO 15-16WR	17.00	15.20	—	—	0.50	0.40	—	—	4.85	Fe-Balance
ARMCO 18-2Mn	1.60	18.00	—	—	0.10	12.00	—	—	0.50	N-0.34, Fe-Balance
ARMCO 21-6-9	6.75	20.50	—	—	0.40	9.00	—	—	0.25	N-0.27, Fe-Balance
ARMCO 22-4-9	3.50	20.50	—	—	0.55	8.50	—	—	0.15	N-0.40, Fe-Balance
ARMCO 22-13-5	11.50-13.50	20.50-23.50	1.50-3.00	—	0.06	4.00-6.00	—	—	1.00	N-0.20-0.40, Cb-0.10-0.30, V-0.10-0.30, Fe-Balance
ARMCO 311 DQ	4.50	17.25	—	2.40	0.04	2.50	—	—	—	Fe-Balance
ASP 11	5.30	23.50	1.45	—	0.04	—	—	—	—	Cb-0.30, Fe-Balance, B-0.001
BG42	—	14.50	4.00	—	1.15	0.50	—	—	—	V-1.20, Fe-Balance
Boron Stainless	13.50	19.00	—	—	0.08	—	—	—	—	B-2.00, Fe-Balance
Bower 315	3.00	1.50	5.00	—	0.10	—	—	—	—	Fe-Balance
CAF-404	1.00	11.00-13.00	—	1.50-2.00	0.12	1.00	—	—	2.00	Fe-Balance
Carpenter 1	—	11.50-13.00	—	—	0.15m	1.00m	—	—	0.50m	Fe-Balance
Carpenter 1J R	—	13.00	—	—	0.15	—	—	—	—	Al-3.90, Fe-Balance
Carpenter 2	—	12.00-14.00	—	—	0.15 Min	1.00m	—	—	1.00m	Fe-Balance
Carpenter 2 FH	—	12.00-14.00	0.60m	—	0.15 Min	—	—	—	—	Fe-Balance, S (or) Se-0.07 min



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
Carpenter 3	—	18.00-23.00	—	0.90-1.25	0.20m	—	—	—	—	Fe-Balance
Carpenter 4	8.00-10.00	17.00-19.00	—	—	0.15m	2.00m	—	—	1.00m	Fe-Balance
Carpenter 4-A	8.00-12.00	18.00-20.00	—	—	0.08m	2.00m	—	—	1.00m	Fe-Balance
Carpenter 4-LC	8.00-12.00	18.00-20.00	—	—	0.03m	2.00m	—	—	1.00m	Fe-Balance
Carpenter 5	—	12.00-14.00	—	—	0.15m	1.25m	—	0.15 min	1.00m	Fe-Balance
Carpenter 5-F	0.50	13.00-14.50	0.40-0.60	—	0.10	1.00	0.06	0.30	1.00	Fe-Balance
Carpenter 6	—	14.00-18.00	—	—	0.12m	1.00m	—	—	1.00m	Fe-Balance
Carpenter 6 FM	—	14.00-18.00	0.60m	—	0.12m	1.25m	—	—	1.00m	Fe-Balance, S (or) Se-0.15 min
Carpenter 7 Mo	4.75	27.50	1.50	—	0.15	—	—	—	—	Fe-Balance
Carpenter 10	18.00	16.25	—	—	0.08	2.00	—	—	1.00	Fe-Balance
Carpenter 18-18 Plus	—	18.00	1.00	1.00	0.10	18.00	—	—	—	N-0.50, Fe-Balance
Carpenter 345	—	5.00	1.50	—	0.35	0.30	—	—	1.00	Fe-Balance, V-0.40, W-1.25
Carpenter 404	1.25-2.00	11.00-12.50	—	—	0.05	1.00	0.03	0.03	0.50	Fe-Balance, N-0.03
Carpenter 434 HS	—	17.00	1.00	—	0.12	—	—	—	—	Fe-Balance
Carpenter 443	—	20.50	—	1.08	0.20	—	—	—	—	Fe-Balance
Carpenter 636	0.50-1.00	12.00-14.00	0.75-1.25	—	0.20-0.25	1.00m	—	—	1.00m	Fe-Balance, W-0.75-1.25



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
G 192	—	22.00	—	—	0.60	8.50	—	—	0.55	N-0.35, Fe-Balance
Ge 1541	—	15.00	—	—	—	—	—	—	—	Fe-Balance, Y-1.00, Al-4.00
Ge 2541	—	25.00	—	—	—	—	—	—	—	Fe-Balance, Y-1.00, Al-4.00
Greek Ascoloy	2.00	13.00	—	—	0.18	0.40	—	—	0.30	Fe-Balance, W-3.00
HA-46	0.60	11.50	0.65	—	0.16	0.60	—	—	0.40	Cb-0.25, V-0.30, Fe-Balance
Haynes 90	1.75 Max	25.00-29.00	—	—	2.75	1.00 max	—	—	1.00 Max	Fe-Balance
Haynes 92	1.65 Max	1.50 Max	10.00	—	3.75	1.00 max	—	—	1.00 Max	Fe-Balance
Haynes 506	10.00	15.00	4.00	—	0.55	15.00	—	—	0.75	Fe-Balance, W-2.00
Haynes 520	—	5.00	6.30	—	1.00	—	—	—	—	Co-2.70, Fe-Balance, W-7.50
Haynes 525	—	41.00	—	—	7.00	1.00	—	—	1.00	Fe-Balance, B-0.80
Haynes 589	—	15.50-18.50	14.50-17.50	—	2.90-3.40	0.50	—	—	0.50-1.50	Fe-Balance, T-2.00, V-1.65
Haynes Alloy 20	26.00	22.00	5.00	—	0.05	2.50	—	—	1.00	Ti-4XC, Fe-Balance
HB-100	3.00	20.00	—	—	1.00	—	—	—	—	Fe-Balance
Hoskins 750	—	15.00	—	—	0.10	—	—	—	0.50	Al-4.00, Fe-Balance
Hoskins 815	—	22.50	—	—	0.10	—	—	—	0.50	Al-4.60, Fe-Balance
Hoskins 875	—	22.50	—	—	0.10	—	—	—	0.50	Al-5.50, Fe-Balance
Hoskins 884	11.60	16.00	1.36	—	—	1.50	—	—	—	Fe-Balance
Hoskins 915	—	22.50	—	—	0.10	0.50	—	—	—	Al-5.10, Fe-Balance
HR-120	37.00	25.00	2.50m	—	—	—	—	—	—	W-2.50 max., Co-3.0 max, Cb -0.75
HTX	8.00	21.00	1.50	—	0.45	8.50	0.23	—	0.45	N-0.20, Fe-Balance
HWT	0.50M	18.00	—	—	0.07	0.50	0.30	0.30	0.20-0.60	N-0.50, Fe-Balance, Ti-0.85 Max
HY 130/150	5.00	0.50	0.50	—	0.10	0.75	—	—	0.25	V-0.07, Fe-Balance, Al-0.02
Illium P	8.00	28.00	2.00	3.50	0.25	0.75	—	—	0.75	Fe-Balance
Illium Pd	5.00	25.50	2.50	—	0.08	—	—	—	—	Co-6.00, Fe-Balance
In 744	6.00	26.00	—	—	0.02	0.40	—	—	0.60	Fe-Balance, Al-0.015, Ti-0.24



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
420	—	12.00-14.00	—	—	0.15-0.20	1.00	0.04	0.03	1.00	Fe-Balance
420 F	—	12.00-14.00	0.60m	—	0.15-0.20	1.25	0.06	0.15 Min	1.00	Fe-Balance
420 S	0.30	12.50	—	—	0.35	1.10	—	0.20	—	Fe-Balance
422	0.70	12.00	1.00	—	0.23	1.00	0.025	0.025	0.75	W-1.00, Fe-Balance, V-0.25
425	—	14.00	—	—	0.58	0.35	—	—	0.35	Fe-Balance
429	—	14.00-16.00	—	—	0.12	1.00	0.04	0.03	1.00	Fe-Balance
430	—	16.00-18.00	—	—	0.12	1.00	0.04	0.03	1.00	Fe-Balance
430 F	—	16.00-18.00	—	—	0.12	1.25	0.06	0.15 min	1.00	Fe-Balance
430 FSE	—	16.00-18.00	—	—	0.12	1.25	0.06	0.06	1.00	Fe-Balance, Se-0.15 min
430 Ti	—	17.50	—	—	0.08	—	—	—	—	Ti-0.40, Fe-Balance
431	1.25-2.50	15.00-17.00	—	—	0.20	1.00	0.40	0.03	1.00	Fe-Balance
431 Mod.	1.50-2.20	15.00-17.00	0.50	—	0.08-0.15	1.00	—	—	1.00	N-0.03-0.12, Fe-Balance
432	—	16.00	—	1.00	0.10	—	—	—	—	Fe-Balance
433	0.50	16.00	1.00	1.00	0.10	—	—	—	—	Fe-Balance
434	—	16.00-18.00	1.00	—	0.10	1.00	0.04	0.03	1.00	Fe-Balance
434 O	1.80	0.75	0.25	—	0.40	0.85	—	—	0.60	Fe-Balance
436	—	16.00-18.00	0.75-1.25	—	0.12	1.00	0.04	0.03	1.00	Cb+Ta=SXC min-0.70 max, Fe-Balance



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
Crucible E4	—	11.35	—	—	0.06	—	—	—	—	Ti-0.20, Fe-Balance
Crucible HNM	9.50	18.50	—	—	0.30	3.50	0.23	—	0.50	Fe-Balance
CSA	5.00	18.00	1.30	—	0.25	4.00 Max	—	—	0.40	W-1.30, Fe-Balance, Cb + Ta-1.00
Custom 182	—	18.50	2.00	—	0.08	—	—	0.15	—	Fe-Balance
Custom 450	5.50-7.00	14.50-16.50	0.50-1.00	1.25-1.75	0.05	0.50	—	—	0.50	Fe-Balance
Custom 455	8.50	11.75	0.50m	2.25	0.03	0.25	—	—	0.25	Ti-1.20, Fe-Balance, Cb-0.30
Custom 630 (17-4 Ph)	3.00-5.00	15.50-17.50	—	3.00-5.00	0.07m	1.00m	—	—	1.00m	Fe-Balance, Cb + Ta-0.15-0.45
Custom 631 (17-7)	7.10	17.00	—	—	0.09m	1.00m	—	—	1.00m	Fe-Balance, Ti-1.00
Cyclops 62	—	3.50	2.25	—	1.00	0.55	—	—	1.00	Fe-Balance, V-1.25
D6 AC	0.55	1.00	1.00	—	0.46	0.75	—	—	0.25	Fe-Balance, V-0.08
D11	0.55	1.05	2.00	—	0.46	0.75	—	—	0.35	Fe-Balance, V-0.50
DV-2	—	20.50	—	—	0.55	11.50	—	—	0.28-0.85	Fe-Balance, Cb-1.00, W-2.20, N-0.50
E-Bright 26-1	—	25.00-27.50	0.75-1.50	0.20	0.005	0.40	0.02	0.02	0.40	Cu + Ni-5.00, N-0.015, Fe-Balance
EF 450	0.50	10.50	0.75	—	0.08	0.90	—	—	0.60	V-0.15, Co-6.00, Cb-0.30, B-0.01, Fe-Balance
EF 503S	—	5.00	0.50	—	0.15	0.65	—	0.20	—	Fe-Balance
EME	12.00	19.00	—	—	0.10	0.05	—	—	0.70	Cb-1.20, W-3.20, N-0.15, Fe-Balance
ESCO 33G	3.80	12.75	0.60	—	0.06	—	—	—	—	Fe-Balance
F6NM (CA6NM-415)	3.50-5.50	11.50-14.00	0.50-1.00	—	0.05m	0.50-1.00	0.03m	0.03m	0.60m	Fe-Balance
Ferrallium 255	4.50-6.50	24.00-27.00	2.00-4.00	1.50-2.50	0.04	1.50	0.04	0.03	1.00	Fe-Balance



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
439	—	18.00	—	—	0.025	—	—	—	0.50	Ti-0.60 max, Fe-Balance
440	—	16.00-18.00	0.75 Max	—	1.20 Max	1.00	—	—	—	Fe-Balance
440 A	—	16.00-18.00	0.75 Max	—	0.60-0.75 Max	1.00	0.04	0.03	1.00	Fe-Balance
440 B	—	16.00-18.00	0.75 Max	—	0.75-0.95 Max	1.00	0.04	0.03	1.00	Fe-Balance
440 C	—	16.00-18.00	0.75 Max	—	0.95-1.20 Max	1.00	0.04	0.03	1.00	Fe-Balance
440 F	—	16.00-18.00	0.75 Max	—	0.95-1.20 Max	1.00	—	—	1.00	S or Se-0.07 min, Fe-Balance
440 F Se	0.75 Max	16.00-18.00	0.60 max	—	0.95-1.20 Max	1.25 Max	0.040 Max	0.030 Max	0.60 max	Fe-Balance, Se-0.15 min, N-0.08 max
441	—	17.50-18.50	—	—	0.03	1.00	0.04 Max	0.015 Max	1.00	0.45 Cb, 0.17 Ti Fe-Balance
442	—	18.00-23.00	—	—	0.20	1.00	0.04	0.03	1.00	Fe-Balance
443	—	21.00	—	0.90-1.25	0.10	1.00	0.04	0.03	1.00	Fe-Balance
444	1.0m	15.00	2.0	—	—	1.00	—	—	—	Fe -Balance
446	—	23.00-27.00	—	—	0.20	1.50	0.04	0.03	1.00	N-0.25, Fe-Balance
450	5.00-7.00	14.00-16.00	0.50-1.00	1.50	—	—	—	—	—	Cb-0.50, Fe-Balance
455	7.50-9.50	11.00-12.50	0.00-0.50	2.00	—	—	—	—	—	Cb-0.50, Fe-Balance, Ti-0.80-1.40
501	—	4.00-6.00	0.40-0.65	—	0.10 Min	1.00	0.04	0.03	1.00	Fe-Balance
502	—	4.00-6.00	0.40-0.65	—	0.10	1.00	0.04	0.03	1.00	Fe-Balance



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
Carpenter 709 #1	—	1.25	0.50	0.30	0.55	—	—	—	0.65	Fe-Balance, V-0.25
Carpenter 709 #2	—	1.00	0.55	0.45	0.55	—	—	—	0.25	Fe-balance, V-0.30
Carpenter 883	—	5.25	1.30	0.37	0.35	—	—	—	1.00	Fe-Balance, V-1.00
Carpenter H-46	0.45	12.00	0.75	0.17	0.65	—	—	—	0.40	V-0.30, Fe-Balance
Carpenter N-1	1.25-2.50	11.50-13.50	—	0.15m	1.00m	—	—	—	1.00m	Fe-Balance
Carpenter T-K	—	3.50	—	0.35	0.30	—	—	—	0.30	Fe-Balance, V-0.40, W-9.00
Carpenter VSM	—	3.00	5.25	0.70	0.50	—	—	—	1.10	Fe-Balance
CRM 6D	5.00	22.00	1.00	1.05	5.00	—	—	—	0.50	W-1.00, Fe-Balance, Cb-1.00
CRM 15D	5.00	20.00	2.00	1.00	5.00	—	—	—	0.50	W-2.00, Fe-Balance, Cb-1.00
CRM 17D	5.00	20.00	1.00	0.70	5.00	—	—	—	0.50	W-1.00, N-2.00, Cb-2.00, Fe-Balance
CRM 18D	5.00	23.00	1.00	0.75	5.00	—	—	—	0.50	Cb-2.00, N-0.20, Co-5.00, W-1.00, Fe-Balance
Croloy 16-1	1.25	15.00	—	0.035	1.00	0.03	0.03	0.03	0.75	Fe-Balance
Croloy 16-6 Ph	7.50	15.75	—	0.035	0.80	0.025	0.025	0.45	0.45	Ti-0.50, Fe-Balance, Al-0.40
Croloy 20-2A1	0.30	20.00-21.50	—	0.08	0.50	0.03	0.03	1.00-1.40	—	Al-2.00-2.50, Fe-Balance
Croloy 299	1.45	17.20	—	0.18	14.70	0.03	0.03	1.00	—	N-0.36, Fe-Balance
Croloy 329	3.70	25.50	1.50	0.20	—	—	—	—	—	Fe-Balance
Croloy 446	—	27.00	—	0.20	—	—	—	—	—	Fe-Balance
Crucible 16-16-1	1.00	16.00	—	0.10	16.00	—	—	—	—	N-0.18, Fe-Balance
Crucible 18-16	16.00	18.00	—	0.05	—	—	—	—	—	Fe-Balance
Crucible 25-25	25.00	25.00	—	0.05	—	—	—	—	—	Fe-Balance
Crucible Bright E3	0.50	12.00	—	0.08	—	—	—	—	—	Ti-5XC, Fe-Balance
Crucible E2	—	11.20	—	0.06	—	—	—	—	—	Ti-0.75 Max, Fe-Balance
Crucible E2 Mod	—	12.00	—	0.06	—	—	—	—	—	Ti-0.75 Max, Fe-Balance
Crucible E3 NT	—	13.00	—	0.05	—	—	—	—	—	Al-0.15, Fe-Balance



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
654 SMO	21.00-23.00	24.00-25.00	7.00-8.00	0.30-0.60	0.020 max	2.00-4.00	0.030 max	0.005 max	0.50 max	N-0.45-0.55, Fe-Balance
734	9.75-11.25	10.50-12.50	—	—	0.03	0.10	0.01	—	—	Al-1.10-1.40, Ti-0.20-0.45, Fe-Balance
904 L	25.00	20.00	4.50	1.50	0.02	—	—	—	—	Fe-Balance
2205	4.50-6.50	21.00-23.00	2.50-3.50	—	0.030 max	2.00 Max	0.030 max	0.020 max	1.00 max	N-0.08-0.20, Fe-Balance
2304	3.00-5.50	21.50-24.50	0.05-0.60	0.05-0.60	0.030 max	2.50 Max	0.040 max	0.040 max	1.00 max	N-0.05-0.20, Fe-Balance
2507	6.00-8.00	24.00-26.00	3.00-5.00	—	0.030 max	1.20 Max	0.035 max	0.020 max	0.80 max	N-0.24-0.32, Fe-Balance
51440 F	—	17.00	0.50	—	1.05	—	—	—	—	Fe-Balance
52100	—	1.50	—	—	1.00	0.30	—	—	0.30	Fe-Balance
AC-254	1.00	12.00	2.50	—	0.24	1.00	—	—	0.40	B-0.22, V-0.25, W-1.00, Fe-Balance
AF 71	—	12.50	3.00	—	0.30	18.00	—	—	0.30	B-0.20, V-0.90, N-0.20, Fe-Balance
AF-183	—	12.00	3.00	—	0.30	18.00	—	—	0.30	V-0.75, Fe-Balance, N-0.20
AISI-A9	1.50	5.00	1.40	—	0.50	0.40	—	—	1.00	V-1.00, Fe-Balance
AL 326	6.50	26.00	—	0.05	—	—	—	—	—	Ti-0.25, Fe-Balance
AL 6XN	24.00	20.00	6.00	—	0.03	1.50	—	—	—	Fe-Balance
Alchrome-D	—	15.00	—	—	—	—	—	—	—	Al-5.50, Fe-Balance
Alferon	—	21.50	—	—	—	—	—	—	—	Al-4.50, Fe-Balance
Alkrothal-14	—	15.00	—	—	—	—	—	—	—	Al-4.00, Fe-Balance
Allegheny 216	6.00	19.80	—	0.05	8.30	—	—	—	0.30	N-0.35, Fe-Balance
Allegheny MF1	—	11.00	—	—	0.04	0.50	—	—	0.50	Ti-0.50, Fe-Balance
Allegheny OR-1	0.25	12.50	—	0.04	0.25	—	—	—	0.30	Ti-0.40, Fe-Balance, Al-3.20
Alloy 2205	5.60	22.1	3.10	—	0.02	—	—	—	—	N-0.18, S-0.001, Fe balance
Alloy 2507	7.00	25.00	4.00	—	0.02	—	—	—	—	N-0.27, S-0.001, Fe balance
Almar 362	6.50	14.50	—	—	0.30	0.30	—	—	0.20	Ti-0.80, Fe-Balance



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
Unitemp 14HV	—	1.00	0.55	—	0.45	—	—	—	—	Fe-Balance, V-0.30
Unitemp 14-14W	14.00	14.00	0.35	—	0.45	—	—	—	—	Fe-Balance, W-2.40
Unitemp 1409 Cb	—	12.75	—	—	0.16	—	—	—	—	Fe-Balance, Cb-0.42
Unitemp 1416 MV	—	12.25	1.00	—	0.16	—	—	—	—	Fe-Balance, V-0.25
Unitemp 1430 MV	0.25	11.80	2.80	—	0.30	1.05	—	—	0.30	Fe-Balance, V-0.25
UNS-S13800	7.50-8.50	12.25-13.25	2.00-2.50	—	0.05	0.10	0.01	0.008	0.01	Al-0.90-1.35, N-0.010, Fe-Balance
UNS-S15500	3.50-5.50	14.00-15.50	—	2.50-4.50	0.07	1.00	0.04	0.03	1.00	Cb + Ta=0.15-0.45, Fe-Balance
UNS-S17400	3.00-5.00	15.50-17.50	—	3.00-5.00	0.07	1.00	0.04	0.03	1.00	Cb + Ta= 0.15-0.45, Fe-Balance
UNS-S17700	6.50-7.75	16.00-18.00	—	—	0.09	1.00	0.04	0.04	1.00	Al-0.75-1.50, Fe-Balance
USAmet	7.80	17.20	0.40	—	0.10	1.50	—	—	1.00	Fe-Balance
USS 12 Mo-V	0.50	12.00	1.00	—	0.25	0.50	—	—	0.50	Fe-Balance, V-0.30
USS 100 (409SS)	—	11.00	—	—	0.07	0.40	—	—	0.50	Fe-Balance, Ti-0.65
USS Stainless W	6.75	16.50	—	—	0.05	—	—	—	—	Al-0.20, Fe-Balance, Ti-0.90
USS W-2	4.70	11.60	—	—	0.03	—	—	—	—	Al-0.80, Ti-0.40, Fe-Balance
W-545	26.00	13.50	1.50	—	0.08	1.50	—	—	0.40	Ti-2.85, B-0.05, Al-0.20, Fe-Balance
Waukesha 17Cr-Hi C	—	17.00	—	—	0.10	1.00	—	—	1.50	Fe-Balance
Zeron 100	6.00-8.00	24.00-26.00	3.00-4.00	0.50-1.00	0.03	1.00	0.03	0.01	1.00	N-0.20-0.30, Fe-Balance, W-0.50-1.00



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
Sandvik 5RA90	13.40	17.40	2.70	2.00	0.05	1.60	—	0.20	0.60	Ti-1.00, Fe-Balance
Sandvik 12R72	15.00	15.00	1.20	—	0.10	1.80	—	—	—	Ti-0.40, Fe-Balance, B-0.006
Sandvik 12R72 HV	15.00	15.00	1.20	—	0.10	1.80	0.02	0.015	0.40	Ti-0.40, Fe-Balance, B-0.0065
Sandvik HT9	0.50	12.00	1.00	—	0.20	0.55	—	—	0.30	Fe-Balance, V-0.30, W-0.50
TBS-600	—	1.45	0.30	—	1.00	0.70	—	—	1.00	Fe-Balance
TBS-1000	—	1.05	5.00	—	0.80	0.50	—	—	0.50	Fe-Balance, V-1.05
Tenelon	0.30	18.00	—	—	0.10	15.50	—	—	0.60	Fe-Balance, N-0.45
Tenton	—	1.50	—	—	1.00	—	—	—	—	Fe-Balance
Thermalloy A1	1.00	31.00	2.00	—	2.25	—	—	—	—	W-13.00, Fe-Balance
TPA	14.00	14.00	0.40	—	—	—	—	—	—	W-2.40, Fe-Balance
UCX-2	—	0.80-1.10	0.15-0.25	—	0.35-0.40	0.70-0.90	—	—	1.00	Fe-Balance, V-0.15, Co-1.00
UHB 34L	13.50	17.00	4.30	—	0.03	—	—	—	—	Fe-Balance
UHB 44L	5.00	26.00	1.50	—	0.03	—	—	—	—	Fe-Balance
UHB 119	5.00	16.00	1.00	—	0.04	—	—	—	—	Fe-Balance
UHB 725LN	22.00	25.00	2.10	—	0.02	1.70	—	—	—	N-0.12, Fe-Balance
Unilec 1409L	—	13.00	—	—	0.12	—	—	—	—	Al-4.00, Fe-Balance
Uniloy 332	32.50	20.50	—	—	0.05	1.00	—	—	—	Fe-Balance
Uniloy 888	7.50	7.50	—	—	0.50	9.00	—	—	0.50	Fe-Balance, V-1.45
Uniloy 1409 T13	0.40	12.25	0.30	—	0.12	0.50	—	—	0.40	Fe-Balance
Uniloy 1420 WM	0.75	12.75	1.00	—	0.20	1.00m	—	—	1.00m	Fe-Balance, V-0.23
Uniloy 15100 Mo	—	14.00	4.00	—	1.10	0.50	—	—	0.30	Fe-Balance
Unimar CR-1	10.25	11.50	—	—	0.02	—	—	—	—	Ti-0.30, Fe-Balance, Al-1.20
Unimar CR-2	10.25	11.50	—	—	0.02	—	—	—	—	Ti-0.30, Fe-Balance, Al-0.70
Unimar SX-1	10.50	11.20	—	—	0.01	0.01	—	—	0.01	Fe-Balance, Al-1.22, Ti-0.37
Uniseal 18	0.20	18.75	—	—	0.06	—	—	—	—	Ti-0.45, Fe-Balance



TOOL STEELS

Designation	W	Mo	Co	Cr	V	C	Other
M-1	1.50	8.50	—	4.00	1.00	0.85	Fe-Balance
M-2	6.00	5.00	—	4.00	2.00	0.85-1.00	Fe-Balance
M-3-1	6.00	5.00	—	4.00	2.40	1.05	Fe-Balance
M-3-2	6.00	5.00	—	4.00	3.00	1.20	Fe-Balance
M-4	5.50	4.50	—	4.00	4.00	1.30	Fe-Balance
M-6	4.00	5.00	12.00	4.00	1.50	0.80	Fe-Balance
M-7	1.75	8.75	—	4.00	2.00	1.00	Fe-Balance
M-8	5.00	5.00	—	4.00	1.50	0.80	Cb-1.25, Fe-Balance
M-10	—	8.00	—	4.00	2.00	0.85-1.00	Fe-Balance
M-11	1.00	8.50	1.50	8.00	1.25	0.90	Fe-Balance
M-15	6.50	3.50	5.00	4.00	5.00	1.50	Fe-Balance
M-30	2.00	8.00	5.00	4.00	1.25	0.80	Fe-Balance
M-33	1.50	9.50	8.00	4.00	1.15	0.90	Fe-Balance
M-34	2.00	8.00	8.00	4.00	2.00	0.90	Fe-Balance
M-35	6.00	5.00	5.00	4.00	2.00	0.80	Fe-Balance
M-36	6.00	5.00	8.00	4.00	2.00	0.80	Fe-Balance
M-41	6.75	3.75	5.00	4.25	2.00	1.10	Fe-Balance
M-42	1.50	9.50	8.00	3.75	1.15	1.10	Fe-Balance
M-43	2.75	8.00	8.25	3.75	1.60	1.20	Fe-Balance
M-44	5.25	6.25	12.00	4.25	2.00	1.15	Fe-Balance
M-45	8.00	5.00	5.50	4.25	1.60	1.25	Fe-Balance
M-46	2.00	8.25	8.25	4.00	3.20	1.25	Fe-Balance
M-47	1.50	9.50	5.00	3.75	1.25	1.10	Fe-Balance
M-48	10.00	5.25	9.00	3.75	3.10	1.50	Fe-Balance
M-50	—	4.25	—	4.00	1.00	0.80	Mn-0.25, Si-0.30, Fe-Balance



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
In 833	7.00	11.50	—	—	0.03	0.50m	—	—	1.00m	Al-0.10, Ti-0.10, Fe-Balance
Inco 956	—	20.00	—	—	—	—	—	—	—	Al-4.50, Ti-0.50, Fe-74.00, Y ₂ O ₃ -0.50
J&L Type 444	—	18.50	2.00	—	0.02	—	—	—	—	Fe-Balance
Jalhead 12-15	14.00-16.00	13.00	—	—	0.08	—	—	—	—	Fe-Balance
Jalhead 16-18	17.00-19.00	17.00	—	—	0.08	—	—	—	—	Fe-Balance
Jethete M152	2.90	11.25	1.60	—	0.14	0.70	—	—	0.15	V-0.30, Fe-Balance, N-0.35
JS 777	25.00	21.00	4.50	2.00	0.03	1.70	—	—	—	Cb-0.30, Fe-Balance
Kanthal A	—	22.00	—	—	—	—	—	—	—	Fe-Balance, Al-5.00, Co-0.50
Kanthal A-1	—	22.00	—	—	—	—	—	—	—	Fe-Balance, Al-5.50, Co-0.50
Kanthal AF	—	22.00	—	—	—	—	—	—	—	Al-5.00, Fe-Balance
Kanthal C	—	25.00	—	—	—	—	—	—	—	Fe-Balance, Ti-3.50
Kanthal D	—	22.00	—	—	—	—	—	—	—	Fe-Balance, Al-4.50, Co-0.50
Kanthal DS	—	22.00	—	—	—	—	—	—	—	Fe-Balance, Al-4.50, Co-0.50, Ta-1.00
Lapelloy	0.50m	12.00	2.75	—	0.30	1.00	—	—	0.25	V-0.25, Fe-Balance
Lapelloy C	0.50m	11.50	2.75	2.00	0.22	0.80	—	—	0.25	N-0.08, Fe-Balance
Lescalloy 736	10.00	10.00	2.00	—	0.02	—	—	—	—	Fe-Balance
Lescalloy 5616	2.00	13.00	—	—	0.18	0.35	—	—	0.35	W-3.00, Fe-Balance
Lescalloy BG-42	—	14.50	4.00	—	1.15	0.50	—	—	0.30	V-1.20, Fe-Balance
Maniflex	11.50	25.00	—	—	—	—	—	—	1.50	Fe-Balance
MF-2	0.50	12.00	—	—	0.08	—	—	—	—	Ti-0.60, Fe-Balance, Al-1.00
Moly Ascoloy	2.60	11.50	1.70	—	0.12	0.80	—	—	0.20	Fe-Balance, N-0.03, V-0.30
Ni-Hard	4.50	2.00	—	—	3.00	0.50	—	—	0.50	Fe-Balance
Ni-Hard Type 4	6.00	9.00	—	—	3.00	1.30	—	—	—	Fe-Balance
Nimoloy	2.50	2.00	7.50	—	—	—	—	—	—	Fe-Balance



TOOL STEELS

Designation	W	Mo	Co	Cr	V	C	Other
H-12	1.50	1.50	—	5.00	0.40	0.35	Fe-Balance
H-13	—	1.50	—	5.00	1.00	0.35	Fe-Balance
H-14	5.00	—	—	5.00	—	0.40	Fe-Balance
H-15	—	5.00	—	5.00	—	0.40	Fe-Balance
H-16	7.00	—	—	7.00	—	0.55	Fe-Balance
H-19	4.25	—	4.25	4.25	2.00	0.40	Fe-Balance
H-20	9.00	—	—	2.00	—	0.35	Fe-Balance
H-21	9.00	—	—	3.50	—	0.35	Fe-Balance
H-22	11.00	—	—	2.00	—	0.35	Fe-Balance
H-23	12.00	—	—	12.00	—	0.30	Fe-Balance
H-24	15.00	—	—	3.00	—	0.45	Fe-Balance
H-25	15.00	—	—	4.00	—	0.25	Fe-Balance
H-26	18.00	—	—	4.00	1.00	0.50	Fe-Balance
H-41	1.50	8.00	—	4.00	1.00	0.65	Fe-Balance
H-42	6.00	5.00	—	4.00	2.00	0.60	Fe-Balance
H-43	—	8.00	—	4.00	2.00	0.55	Fe-Balance
H-46	—	0.75	—	11.50	0.30	0.15	Fe-Balance, Cb-0.40, N-0.07, Mn-0.57, Ni-0.45
HW-7	3.75	1.00	0.50	5.00	0.50	0.45	Fe-Balance, Mn-0.75, Si-1.00
L-1	—	—	—	1.25	—	1.00	Fe-Balance
L-2	—	—	—	1.00	0.20	0.50-1.10	Fe-Balance
L-3	—	—	—	1.50	0.20	1.00	Fe-Balance
L-4	—	—	—	1.50	0.25	1.00	Mn-0.60, Fe-Balance
L-5	—	0.25	—	1.00	—	1.00	Mn-1.00, Fe-Balance
L-6	—	0.25	—	0.75	—	0.70	Ni-1.50, Fe-Balance
L-7	—	0.40	—	1.40	—	1.00	Mn-0.35, Fe-Balance



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
Nitronic 20	7.00-9.00	22.00-24.00	—	—	0.28-0.38 max	1.50-3.50	—	—	—	N-0.28-0.40, Fe-Balance
Nitronic 30	1.5-3.0	15-17	—	1.0 Max.	0.03 Max.	7-9	0.04 Max.	0.03 Max.	1.00 Max.	N 0.15 - 0.3
Nitronic 32	0.50-2.50	16.50-19.00	—	—	0.15 Max.	11.00-14.00	—	—	—	N-0.20-0.45, Fe-Balance
Nitronic 33	2.25-3.75	17.00-19.00	—	—	0.08 Max.	11.50-14.50	—	—	—	N-0.20-0.40, Fe-Balance
Nitronic 40	5.50-7.50	19.00-21.50	—	—	0.08 Max.	8.00-10.00	—	—	—	N-0.15-0.40, Fe-Balance
Nitronic 50	11.50-13.50	20.50-23.50	1.50-3.00	—	0.06 Max.	4.00-6.00	—	—	—	N-0.20-0.40, Fe-Balance
Nitronic 60	8.00-9.00	16.00-18.00	—	—	0.10 Max.	7.00-9.00	—	—	3.50-4.50	N-0.08-0.18, Fe-Balance
Nomag	10.00	—	—	—	2.00	5.00	—	—	—	Fe-Balance
OR-1	0.50	12.50	—	—	0.08	—	—	—	—	Ti-0.60, Fe-Balance, Al-3.00
Ph 13-8 Mo	7.50-8.50	12.25-13.25	2.00-2.50	—	0.05m	0.10m	—	—	0.10m	Fe-Balance, N-0.01m, Al-0.90-1.35
Ph 14-4 Mo	—	13.00-16.00	3.75-4.25	—	0.95-1.20	1.00m	—	—	1.00m	Fe-Balance, V-0.15m
Ph 14-8 Mo	7.50-8.75	13.75-15.00	2.00-3.00	—	0.05m	1.00m	—	—	0.10m	Fe-Balance, Al-0.75-1.50
Ph 55A	9.00	20.00	4.00	—	0.05m	1.00m	—	—	3.50	Fe-Balance
Ph 55B	9.00	20.00	5.00	3.50	0.05m	1.00m	—	—	1.50	Fe-Balance
Potomac 2V	—	6.50	1.40	—	0.60	0.65	—	—	1.00	Fe-Balance, V-2.15
Potomac 4V	—	5.25	1.30	—	1.10	0.35	—	—	1.00	Fe-Balance, V-4.00
Project 70-182 FM	—	18.50	2.00	—	0.08	2.00	—	0.30	—	Fe-Balance
Pyrista	1.80	29.00	—	—	0.10	1.30	—	—	1.20	Fe-Balance
Pyromet 538	6.50	20.25	—	—	0.03	9.00	—	—	1.00m	Fe-Balance, N-0.15-0.40



TOOL STEELS

Designation	W	Mo	Co	Cr	V	C	Other
A-2	—	1.00	—	5.00	—	1.00	Fe-Balance
A-3	—	1.00	—	5.00	1.00	1.25	Fe-Balance
A-4	—	1.00	—	1.00	—	1.00	Mn-2.00, Fe-Balance
A-5	—	1.00	—	1.00	—	1.00	Mn-3.00, Fe-Balance
A-6	—	1.25	—	1.00	—	0.70	Mn-2.00, Fe-Balance
A-7	1.00	1.00	—	5.25	4.75	2.25	Fe-Balance
A-8	1.25	1.25	—	5.00	—	0.55	Fe-Balance
A-9	—	1.40	—	5.00	1.00	0.50	Ni-1.50, Fe-Balance
A-10	—	1.50	—	—	—	1.35	Mn-1.80, Si-1.25, Ni-1.80, Fe-Balance
CPM 10V	—	1.30	—	5.25	9.75	2.45	Mn 0.5, Si 0.9, S 0.07, Fe balance
CPM 3V	—	1.30	—	7.50	2.75	0.80	Fe balance
D-1	—	1.00	—	12.00	1.00	1.00	Fe-Balance
D-2	—	1.00	—	12.00	1.00	1.50	Fe-Balance
D-3	—	—	—	12.00	0.00-1.00	2.25	Fe-Balance
D-4	—	1.00	—	12.00	0.00-1.00	2.25	Fe-Balance
D-5	—	1.00	3.00	12.00	0.00-1.00	1.50	Fe-Balance
D-7	—	1.00	—	12.00	4.00	2.35	Fe-Balance
F-1	1.25	—	—	—	—	1.00	Fe-Balance
F-2	3.50	—	—	—	—	1.25	Fe-Balance
F-3	3.50	—	—	0.75	—	1.25	Fe-Balance
H-10	—	2.50	—	3.25	0.40	0.40	Fe-Balance
H-11	—	1.50	—	5.00	0.40	0.35	Fe-Balance
H-11 MOD	—	1.30	—	5.00	0.50	0.40	Fe-Balance, Si-0.90



STAINLESS STEEL

Designation	Ni	Cr	Mo	Cu	C	Mn	P	S	Si	Other
RA-253	11.00	21.00	—	—	—	—	—	—	1.70	Fe-Balance
RA-330	35.00	19.00	—	0.50	0.06	1.50	—	—	1.25	Fe-43.00
Republic 12-5	5.00	12.00	—	—	0.05	—	—	—	—	Ti-0.50, Fe-Balance
Republic 14-6 Ti	6.50	14.50	—	—	0.05	—	—	—	—	Ti-0.75, Fe-Balance
Republic 444L	—	18.50	2.00	—	0.03	—	—	—	—	Cb-0.60, Fe-Balance
Republic 444 Multicut	—	18.50	2.00	—	0.03	—	—	0.30	—	Fe-Balance
Rex 448	0.75	11.50	0.45	—	0.15	1.00	—	—	—	Fe-Balance, Cb-0.50
Rex 535	0.75	11.50	0.70	—	0.15	1.00	—	—	0.40	Fe-Balance, Cb-0.45, Co-6.00, V-0.25
S31200 (F50)	5.50-6.50	24.00-26.00	1.20-2.00	—	0.030	2.00	0.045	0.030	1.00	N-0.14-0.20, Fe-Balance
S31260	5.50-7.50	24.00-26.00	2.50-3.50	0.20-0.80	0.03	1.00	0.030	0.030	0.75	N-0.10-0.20, W-0.10-0.20, Fe-Balance
S31803	4.50-6.50	21.00-23.00	2.50-3.50	—	0.030	2.00	0.030	0.020	1.00	N-0.08-0.20, Fe-Balance
S32001	1.00-3.00	19.50-21.50	0.60	1.00	0.030	4.00-6.00	0.040	0.030	1.00	N-0.05-0.17, Fe-Balance
S32520	5.50-8.00	24.00-26.00	3.00-4.00	0.50-2.00	0.030	1.50	0.035	0.020	0.80	N-0.20-0.35, Fe-Balance
S32950 (F52)	—	—	—	—	0.03	2.00	0.035	—	—	Fe-Balance
Sandvik 2RE 10	20.30	24.40	—	—	0.02	1.75	—	—	0.30	Fe-Balance
Sandvik 2RE69	22.00	25.00	2.10	—	0.02	1.70	—	—	—	N-0.12, Fe-Balance
Sandvik 2RK65	25.00	19.50	4.50	1.50	0.02	1.80	—	—	—	Fe-Balance
Sandvik 2RN65	24.00	17.50	4.70	—	0.02	1.80	—	—	—	Fe-Balance
Sandvik 3R19	10.30	18.50	—	—	0.03	1.25	—	—	—	Fe-Balance
Sandvik 3R69	12.80	17.40	2.80	—	0.03	1.70	—	—	—	Fe-Balance
Sandvik 3RE60	4.70	18.50	2.70	—	0.03	1.50	—	—	1.65	Fe-Balance



LOW ALLOY STEELS

Designation	Ni	Cr	Mo	C	Si	Mn	Other
1020 Carbon Steel	—	—	—	0.15-0.20	—	0.70-1.00	P-0.030 max, S-0.050 max, Fe-Balance
1030 Carbon Steel	—	—	—	0.28-0.34	—	0.60-0.90	P-0.030 max, S-0.050 max, Fe-Balance
1040 Carbon Steel	—	—	—	0.37-0.44	—	0.60-0.90	P-0.030 max, S-0.050 max, Fe-Balance
1050 Carbon Steel	—	—	—	0.48-0.55	—	0.60-0.90	P-0.030 max, S-0.050 max, Fe-Balance
4130 Alloy Steel	—	0.80-1.10	0.15-0.25	0.28-0.33	0.15-0.35	0.40-0.60	P-0.035 max, S-0.040 max, Fe-Balance
4140 Alloy Steel	—	0.80-1.10	0.15-0.25	0.38-0.43	0.15-0.35	0.75-1.00	P-0.035 max, S-0.040 max, Fe-Balance
4320 Alloy Steel	1.65-2.00	0.40-0.60	0.20-0.30	0.17-0.22	0.15-0.35	0.45-0.65	P-0.035 max, S-0.040 max, Fe-Balance
4340 Alloy Steel	1.65-2.00	0.70-0.90	0.20-0.30	0.38-0.43	0.15-0.30	0.60-0.80	P-0.035 max, S-0.040 max, Fe-Balance



SPECIAL (NONSTANDARD) TOOL STEELS¹

Type of Steel And Trade Name COLD WORK	Composition, %									
	C	Mn	Si	Cr	Ni	Mo	V	W	Fe	Other
A-HT	1.00	—	—	3.00	—	1.10	0.25	1.05	Bal	Ti-1.00
Columbia 16	0.98	0.35	1.38	4.25	—	2.50	1.10	0.40	Bal	—
Cyclops SCK	0.70	0.35	1.00	8.50	1.50	1.40	1.00	—	Bal	—
Deep- Hardening Berkshire	1.23	1.00	0.40	0.50	—	—	0.20	—	Bal	—
Header Die DX	1.35	0.30	1.00	6.25	—	1.00	6.00	—	Bal	—
Hi-Shock 60	0.68	0.50	0.30	1.00	0.50	1.10	0.15	—	Bal	—
Oildie Smoothcut	1.05	0.80	—	1.60	—	—	—	0.50	Bal	Free-machining Additives

Type of Steel And Trade Name HOT WORK	Composition, %									
	C	Mn	Si	Cr	Ni	Mo	V	W	Fe	Other
Carpenter VSM	0.70	0.50	1.10	3.15	—	5.25	—	—	Bal	—
Cromo-N	0.25	0.95	1.00	11.00	0.95	1.00	0.50	0.90	Bal	N-0.10
Cyclops 2570	0.47	0.30	1.00	8.50	—	1.15	—	1.15	Bal	—
Firedie 9	0.38	0.30	0.90	3.60	—	3.00	0.65	—	Bal	Co-2.00
MCH	0.50	0.30	0.50	3.75	—	6.25	0.75	1.00	Bal	—
MCL	0.33	0.30	0.50	3.75	—	6.25	0.75	1.00	Bal	—
Pyrovan	0.75	—	1.00	5.25	—	1.10	2.50	—	Bal	—
Thermold 75	0.35	0.30	1.00	3.50	—	2.50	0.75	—	Bal	Co-2.00



HIGH ALLOY CASTINGS

Designation	Ni	Cr	Mo	C	Si	Mn	Other
Accoloy NC-9 MO	46.00	22.00	2.00-7.00	0.35-0.75	—	—	Fe-Bal.
Accoloy NC 10	35.00	25.00	—	0.35-0.75	—	—	Fe-Bal.
Accoloy NC-11 (NA22H)	46.00	26.30	—	0.44	—	1.40	W-5.30, Si-1.00, Fe-Bal.
CA-6N	7.00	12.00	—	0.06	—	—	Fe-Bal.
CA-6NM	4.00	12.00	0.40-1.00	0.06	—	—	Fe-Bal.
CA-15 (410 SS)	1.00	11.50-14.00	0.50+	0.15	1.50	1.00	P-0.04, S-0.04, Fe-Bal.
CA-15M	1.00 max	12.00	0.60	0.15	—	—	Fe-Bal.
CA-40 (420 SS)	1.00	11.50-14.00	0.50+	0.20-0.40	1.50	1.00	P-0.04, S-0.04, Fe-Bal.
CB-7CU-1 (17-4 PH)	3.60-4.60	15.50-17.00	—	0.07	1.00	1.00	P-0.04, S-0.04, Cu-2.30-3.30, Cb & Ta-0.30, Fe-Bal.
CB-7CU-2 (15-5 PH)	5.00	15.00	—	0.07	—	—	Cb & Ta-0.30, Cu-2.30-3.30, Fe-Bal
CB-30 (431 SS)	2.00	18.00-22.00	—	0.30	1.00	1.00	P-0.04, S-0.04, Fe-Bal.
CC-50 (446 SS)	4.00 max	26.00-30.00	—	0.50	1.00	1.00	P-0.04, S-0.04, Fe-Bal.
CD-4MCU	4.75-6.00	25.00-27.00	1.75-2.25	0.040	1.00	1.00	P-0.04, S-0.04, Fe-Bal., Cu-2.75-3.25
CE-30 (312 SS)	8.00-11.00	26.00-30.00	—	0.30	2.00	1.50	P-0.04, S-0.04, Fe-Bal.
CF-3 (304L SS)	8.00-2.00	18.00-21.00	—	0.03	2.00	1.50	P-0.04, S-0.04, Fe-Bal.
CF-8 (304 SS)	8.00-11.00	18.00-21.00	—	0.08	2.00	1.50	P-0.04, S-0.04, Fe-Bal.



TOOL STEELS

Designation	W	Mo	Co	Cr	V	C	Other
M-52	1.25	4.00	—	4.00	0.20	0.90	Fe-Balance
ASP-60	6.50	7.00	10.00	4.00	6.00	—	Fe-Balance
M-61	12.50	6.50	—	4.00	5.00	1.80	Fe-Balance
M-62	6.25	10.50	—	3.75	2.00	1.70	Fe-Balance
WR-95	—	3.00	2.00	3.60	0.05	0.36	Mn-0.30, Si-0.90, Fe-Balance
P-1	—	—	—	—	—	0.10	Fe-Balance
P-2	—	0.20	—	2.00	—	0.07	Ni-0.50, Fe-Balance
P-3	—	—	—	0.60	—	0.10	Ni-1.25, Fe-Balance
P-4	—	0.75	—	5.00	—	0.07	Fe-Balance
P-5	—	—	—	2.25	—	0.10	Fe-Balance
P-6	—	—	—	1.50	—	0.10	Ni-3.50, Fe-Balance
P-20	—	0.40	—	1.25	—	0.35	Fe-Balance
P-21	—	—	—	—	—	0.20	Ni-4.00, Al-1.20, Fe-Balance
Pyromet 882	—	1.50	—	5.00	0.40	0.04	Mn-0.30, Si-1.00, Fe-Balance
S-1	2.50	—	—	1.50	—	0.50	Fe-Balance
S-2	—	0.50	—	—	—	0.50	Si-1.00, Fe-Balance
S-3	1.00	—	—	0.74	—	0.50	Fe-Balance
S-4	—	—	—	—	—	0.55	Mn-0.80, Si-2.00, Fe-Balance
S-5	—	0.40	—	—	—	0.55	Mn-0.80, Si-2.00, Fe-Balance
S-6	—	0.40	—	1.50	—	0.45	Mn-1.40, Si-2.25, Fe-Balance
S-7	—	1.40	—	3.25	—	0.50	Fe-Balance
T-1	18.00	0.95 max	—	4.00	1.00	0.70	Fe-Balance
T-2	18.00	0.95 max	—	4.00	2.00	0.80	Fe-Balance
T-3	18.00	—	—	4.00	3.00	1.05	Fe-Balance
T-4	18.00	0.95 max	5.00	4.00	1.00	0.75	Fe-Balance
T-5	18.00	0.95 max	8.00	4.00	2.00	0.80	Fe-Balance



HIGH ALLOY CASTINGS

Designation	Ni	Cr	Mo	C	Si	Mn	Other
Accoloy CN-1	3.00	28.00	—	0.50 Max.	—	—	Fe-Bal.
Accoloy CN-2	10.00	28.00	—	0.40	—	—	Fe-Bal.
Accoloy CN-3	20.00	25.00	—	0.40	—	—	Fe-Bal.
Accoloy CN-4	12.00	25.00	—	0.30	—	—	Fe-Bal.
Accoloy CN-6	20.00	30.00	—	0.20- 0.60	—	—	Fe-Bal.
Accoloy CN-7	8.00	18.00	—	0.20 Max.	—	—	Fe-Bal.
Accoloy CN-8	8.00	18.00	—	0.08 Max.	—	—	Fe-Bal.
Accoloy CN-10	9.00	18.00	2.00- 3.00	0.08 Max.	—	—	Fe-Bal.
Accoloy NC-1	68.00	18.00	—	0.35- 0.75	—	—	Fe-Bal.
Accoloy NC-2	60.00	12.00	—	0.35- 0.75	—	—	Fe-Bal.
Accoloy NC-3	38.00	18.00	—	0.35- 0.75	—	—	Fe-Bal.
Accoloy NC-4	35.00	15.00	—	0.35- 0.75	—	—	Fe-Bal.
Accoloy NC-6	25.00	20.00	—	0.20- 0.50	—	—	Fe-Bal.
Accoloy NC-7	9.00	21.00	—	0.20- 0.40	—	—	Fe-Bal.
Accoloy NC-9	46.00	22.00	—	0.35- 0.75	—	—	Fe-Bal.



TOOL STEELS

Designation	W	Mo	Co	Cr	V	C	Other
T-6	20.00	0.95 max	12.00	4.50	1.50	0.80	Fe-Balance
T-7	14.00	0.95 max	—	4.00	2.00	0.75	Fe-Balance
T-8	14.00	0.95 max	5.00	4.00	2.00	0.75	Fe-Balance
T-9	18.00	0.95 max	—	4.00	4.00	1.20	Fe-Balance
T-15	12.00	—	5.00	4.00	5.00	1.50	Fe-Balance
Vasco-Jet 1000	—	1.30	—	5.00	0.50	0.50	Si-0.90, Mn-0.30, Fe-Balance
Vasco X-2	1.35	1.35	—	5.00	0.20	0.22	Si-1.00, Mn-0.35, Fe-Balance
Vasco X-8	—	1.35	—	7.75	1.40	0.47	Si-0.90, Mn-0.30, Fe-Balance
Vasco X-21	9.75	—	—	3.50	0.45	0.33	Si-0.30, Mn-0.20, Fe-Balance
Vasco Y-9	—	1.45	—	3.25	0.25	0.48	Si-0.90, Mn-0.30, Fe-Balance
VLM LoC	—	8.25	—	4.00	1.90	0.60	Si-0.30, Mn-0.30, Fe-Balance
VSM	—	5.25	—	3.00	—	0.70	Si-1.10, Mn-0.50, Fe-Balance
W-1	—	—	—	—	—	0.60- 1.40	Fe-Balance
W-2	—	—	—	—	0.25	0.60- 1.40	Fe-Balance
W-3	—	—	—	—	0.50	1.00	Fe-Balance
W-4	—	—	—	0.25	—	0.60- 1.40	Fe-Balance
W-5	—	—	—	0.50	—	1.10	Fe-Balance
W-6	—	—	—	0.25	0.25	1.00	Fe-Balance
W-7	—	—	—	0.50	0.20	1.00	Fe-Balance



LOW ALLOY STEELS

Designation	Ni	Cr	Mo	C	Si	Mn	Other
52100 Alloy Steel	—	1.30-1.60	—	0.98-1.10	0.15-0.35	0.25-0.45	P-0.025 max, S-0.025 max, Fe-Balance
6150 Alloy Steel	—	0.80-1.10	—	0.48-0.53	0.15-0.35	0.70-0.90	P-0.035 max, S-0.040 max, V-0.15 min, Fe-Balance
8620 Alloy Steel	0.40-0.70	0.40-0.60	0.15-0.25	0.18-0.23	0.15-0.35	0.70-0.90	P-0.035 max, S-0.040 max, Fe-Balance
8630 Alloy Steel	0.40-0.70	0.40-0.60	0.15-0.25	0.28-0.33	0.15-0.35	0.70-0.90	P-0.035 max, S-0.040 max, Fe-Balance
9310 Alloy Steel	3.25	1.20	—	—	—	0.10	—
COR-TEN A	0.65 max	0.50-1.25	—	0.12 max	0.25-0.75	0.20-0.50	P-0.07-0.15, S-0.05 max, Cu-0.25-0.55, Al-0.020-0.060, Fe-Balance
COR-TEN A-F	0.65 max	0.50-1.25	—	0.12 max	0.25-0.75	0.20-0.50	P-0.07-0.15, S-0.05 max, Cu-0.25-0.55, Al-0.020-0.060, Fe-Balance
P5	—	4.00-6.00	0.44-0.65	0.15m	—	0.30-0.60	Fe-Balance
P9	—	8.00-10.00	0.90-1.10	0.15m	—	0.30-0.60	Fe-Balance
P11	—	1.00-1.50	0.44-0.65	0.10-0.20	—	0.30-0.60	Fe-Balance
P22	—	2.00-2.50	0.87-1.13	0.05-0.15	—	0.30-0.60	Fe-Balance
P91	—	8.00-10.00	0.85-1.05	0.07-0.12	—	0.30-0.60	Cb-0.06-0.10, V-0.18-0.25, Al-0.04m, N-0.03-0.07, Fe-Balance
P550	—	18.00-20.00	0.40-0.60	—	—	18.00- 20.00	Fe-Balance
WCB Carbon Steel	—	—	—	0.30 max	0.60 max	1.00 max	P-0.04 max, S-0.045 max, Fe-Balance



SPECIAL (NONSTANDARD) TOOL STEELS¹

Type of Steel And Trade Name	Composition, %									
	C	Mn	Si	Cr	Ni	Mo	V	W	Fe	Other
WATER-HARDENING										
Hedervan	1.40	0.40	0.35	0.15 max	—	0.10 max	3.50	—	Bal	—
V-35 Double Header	1.40	0.35	0.35	—	—	—	3.50	—	Bal	—
V-Kut	0.71	0.25	0.28	0.80	—	—	0.20	—	Bal	—

Type of Steel And Trade Name	Composition, %									
	C	Mn	Si	Cr	Ni	Mo	V	W	Fe	Other
SHOCK-RESISTING										
Atlas 93	0.55	0.55	0.20	0.70	—	0.35	—	—	Bal	—
Beaver	0.68	0.60	1.00	8.25	1.50	1.40	1.00	—	Bal	—
CEC Impact	0.58	0.85	1.95	0.30	—	—	0.25	—	Bal	—
Hi-Carbon Solar	0.73	0.50	1.20	—	—	0.50	0.20	—	Bal	—
Shoe-Die	0.58	0.55	0.33	0.70	—	0.43	—	—	Bal	—
Staminal	0.55	0.90	1.00	0.40	2.70	0.45	0.13	—	Bal	—
Ultimo 6	0.55	0.55	0.80	1.00	1.60	0.75	—	—	Bal	—
Venango Special	0.65	0.50	1.10	—	—	0.50	0.20	—	Bal	—

Type of Steel And Trade Name	Composition, %									
	C	Mn	Si	Cr	Ni	Mo	V	W	Fe	Other
HIGH SPEED										
Carpenter Intermediate Band Saw Steel	0.96	0.25	0.25	4.15	—	2.65	2.35	2.90	Bal	—
HTB-Z	0.80	0.25	0.15	4.00	—	4.25	1.00	—	Bal	—
Silvanite	1.30	—	—	4.00	—	—	0.50	8.00	Bal	—



HIGH ALLOY CASTINGS

Designation	Ni	Cr	Mo	C	Si	Mn	Other
HR-1	0.10	48.50	—	0.30	1.50	0.20	Fe-Bal.
HR-3	49.00	49.00	—	0.05	0.20	0.10	Fe-Bal.
HR-4	52.00	17.50	—	0.60	1.50	1.20	W-Added, Fe-Bal.
HR-5	37.00	17.50	—	0.50	1.30	1.00	Fe-Bal.
HR-6	20.00	25.00	—	0.40	1.10	1.00	Fe-Bal.
HR-7	12.00	25.00	—	0.40	1.10	1.00	Fe-Bal.
HR-8	37.00	17.50	—	0.20	1.30	1.00	Nb-2.00, Fe-Bal.
HR-9	96.90	—	—	0.80	1.50	0.80	—
HR-10	32.00	20.00	—	0.10	1.20	1.00	Fe-Bal., Nb- added
HR-11	9.00	28.00	—	0.35	1.20	1.00	Fe-Bal.
HR-14 L	—	28.00	—	0.40	1.20	1.00	Fe-Bal.
HR-14 L/M	—	28.00	—	0.70	1.20	1.00	Fe-Bal.
HR-M	—	28.00	—	1.00	1.20	1.00	Fe-Bal.
HR-14 H	—	28.00	—	2.00	1.20	1.00	Fe-Bal.
HR-15	8.00	18.00	—	0.30	1.00	1.00	Fe-Bal.
HR-17	35.00	15.00	—	0.50	1.30	1.00	Fe-Bal.
HR-18	25.00	20.00	—	0.40	1.10	1.00	Fe-Bal.
HR-19	5.00	26.00	—	0.40	1.00	1.00	Fe-Bal.
HR-23	47.50	27.00	—	0.45	1.20	0.70	Fe-Bal., W-5.00
HR-27	Bal.	20.00	—	0.10	0.70	0.70	Fe-Bal., Ti-Added
HR-29	66.00	18.00	—	0.60	1.50	1.20	Fe-Bal.
HR-30	37.00	20.00	—	0.60	2.00	0.80	W-2.00, Fe-Bal
HR-31	37.00	17.50	—	0.35	1.30	1.00	Fe-Bal
HR-32	37.00	17.50	—	0.50	1.30	1.00	Nb-1.00, Fe-Bal
HR-33	35.00	26.00	—	0.50	1.30	1.00	Fe-Bal
IN862	24.00	21.00	5.00	0.07	—	—	Fe-Bal
N-12M	62.00	—	28.00	0.12	—	—	Fe-6.00-8.00, V-1.00-3.00



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
Carpenter 20Cb3	30.00-38.00	19.00-21.00	2.00-3.00	0.07	3.00-4.00	—	—	Bal	2.00	—	Si- 1.00 Cb+ Ta = 8XC min or 1.00 max Si-0.25
Carpenter 42	41.50	—	—	0.10	—	—	—	Bal	0.50	—	—
Carpenter 49	48.50	—	—	—	—	—	—	Bal	—	—	—
Carpenter 52	51.00	—	—	—	—	—	—	Bal	0.50	—	Si-0.25
CG 27	38.00	13.00	5.75	0.05	—	2.50	1.60	Bal	—	0.60	Co-0.70 B-0.1
Type Chace 1200 Bi Metal	30.50	—	—	—	—	—	—	67.50	2.00	—	—
1700 Bi Metal	33.50	—	—	—	—	—	—	64.50	2.00	—	—
2100 Bi Metal	27.00	5.50	—	—	—	—	—	67.50	—	—	—
Type Chace 2300 Bi Metal	30.10	5.50	—	—	—	—	—	64.40	—	—	—
2400 Bi Metal	29.00	1.50	—	—	—	—	—	69.50	—	—	—
2500 Bi Metal	37.70	4.20	—	—	—	—	—	58.10	—	—	—
2600 Bi Metal	30.50	4.20	—	—	—	—	—	65.30	—	—	—
2800 Bi Metal	33.60	4.20	—	—	—	—	—	62.20	—	—	—
3300 Bi Metal	69.50	—	—	—	—	—	—	30.50	—	—	—
3500 Bi Metal	35.10	4.20	—	—	—	—	—	60.70	—	—	—
3600 Bi Metal	32.00	1.50	—	—	—	—	—	66.50	—	—	—
3650 Bi Metal	30.50	1.00	—	—	—	—	—	68.50	—	—	—
3700 Bi Metal	31.00	1.50	—	—	—	—	—	67.50	—	—	—
3900 Bi Metal	30.50	1.50	—	—	—	—	—	68.00	—	—	—
3950 Bi Metal	29.00	1.00	—	—	—	—	—	70.00	—	—	—
4000 Bi Metal	9.30	20.20	—	—	—	—	—	70.50	—	—	—
4700 Bi Metal	28.50	7.30	—	—	—	—	—	64.20	—	—	—
Type Chace 4800 Bi Metal	63.30	1.40	—	—	—	—	—	35.30	—	—	—
5200 Bi Metal	18.40	8.30	—	—	—	—	2.00	71.30	—	—	—
6100 Bi Metal	64.20	0.80	—	—	—	—	—	35.00	—	—	—



HIGH ALLOY CASTINGS

Designation	Ni	Cr	Mo	C	Si	Mn	Other
HC (466 SS)	4.00 max.	26.00-30.00	0.50 max.	0.50	2.00	1.00	P-0.04, S-0.04, Fe-Bal
HD (327 SS)	4.00-7.00	26.00-30.00	0.50 max.	0.50	2.00	1.50	P-0.04, S-0.04, Fe-Bal
HE	8.00-11.00	26.00-30.00	0.50 max.	0.20-0.50	2.00	2.00	P-0.04, S-0.04, Fe-Bal
HF- (302B SS)	9.00-12.00	19.00-23.00	0.50 max.	0.20-0.40	2.00	2.00	P-0.04, S-0.04, Fe-Bal
HH (309 SS)	11.00-14.00	24.00-28.00	0.50 max.	0.20-0.50	2.00	2.00	N-0.20 max. P-0.04, S-0.04, Fe-Bal
HI	14.00-18.00	26.00-30.00	0.50 max.	0.20-0.50	2.00	2.00	P-0.04, S-0.04, Fe-Bal
HK (310 SS)	18.00-22.00	24.00-28.00	0.50 max.	0.20-0.60	2.00	2.00	P-0.04, S-0.04, Fe-Bal
HL	18.00-22.00	28.00-32.00	0.50 max.	0.20-0.60	2.00	2.00	P-0.04, S-0.04, Fe-Bal
HN	23.00-27.00	19.00-23.00	0.50 max.	0.20-0.50	2.00	2.00	P-0.04, S-0.04, Fe-Bal
HP	33.00-37.00	24.00-28.00	0.50 max.	0.35-0.75	2.00	2.00	P-0.04, S-0.04, Fe-Bal
HT (330 SS)	33.00-37.00	13.00-17.00	0.50 max.	0.35-0.75	2.50	2.00	P-0.04, S-0.04, Fe-Bal
HU	37.00-41.00	17.00-21.00	0.50 max.	0.35-0.75	2.50	2.00	P-0.04, S-0.04, Fe-Bal
HW	58.00-62.00	10.00-14.00	0.50 max.	0.35-0.75	2.50	2.00	P-0.04, S-0.04, Fe-Bal
HX	64.00-68.00	15.00-19.00	0.50 Max.	0.35-0.75	2.50	2.00	P-0.04, S-0.04, Fe-Bal.



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
6125 Bi Metal	54.10	1.00	—	—	—	—	—	44.90	—	—	—
6150 Bi Metal	49.20	1.10	—	—	—	—	—	49.70	—	—	—
6175 Bi Metal	45.80	1.20	—	—	—	—	—	53.00	—	—	—
6200 Bi Metal	42.10	1.20	—	—	—	—	—	56.70	—	—	—
6250 Bi Metal	37.40	1.30	—	—	—	—	—	61.30	—	—	—
6300 Bi Metal	34.50	1.40	—	—	—	—	—	64.10	—	—	—
6350 Bi Metal	32.40	1.40	—	—	—	—	—	66.20	—	—	—
6400 Bi Metal	30.90	1.50	—	—	—	—	—	67.60	—	—	—
6560 Bi Metal	25.30	4.60	—	—	—	—	2.40	67.70	—	—	—
E- 105 Bi Metal	65.20	0.80	—	—	—	—	—	34.00	—	—	—
E-116 Bi Metal	63.80	0.80	—	—	—	—	—	35.40	—	—	—
S-561 Bi Metal	75.90	—	—	—	—	—	—	24.10	—	—	—
S- 676 Bi Metal	71.40	—	—	—	—	—	—	28.60	—	—	—
Type Chace S-885 Bi Metal	4.10	17.50	—	—	—	—	—	78.40	—	—	—
S-994 Bi Metal	29.00	1.50	—	—	—	—	—	69.50	—	—	—
Chromel A	80.00	20.00	—	—	—	—	—	—	—	—	—
Chromel AA	70.00	20.00	—	—	—	—	—	10.00	—	—	—
Chromel C	59.00	16.00	—	—	—	—	—	23.00	—	—	Si- 1.30
Chromel D	36.00	18.50	—	—	—	—	—	44.00	—	—	Si- 1.50
Chromel P	90.00	10.00	—	—	—	—	—	—	—	—	—
Chromel R	74.00	Bal	—	—	—	—	—	—	—	—	—
Chromax	35.00	15.00	—	—	—	—	—	50.00	—	—	—
Cinidur	24.00	19.00	2.00	0.25	—	2.25	1.00	Bal	—	—	W- 1.00
Cosmoloy -F	70.31	15.00	3.80	0.04	—	3.40	4.70	0.20	0.10	—	W-2.20 Zr-0.07 Si-0.10 B-0.08



HIGH ALLOY CASTINGS

Designation	Ni	Cr	Mo	C	Si	Mn	Other
CF-20 (302 SS)	8.00-11.00	18.00-21.00	—	0.20	2.00	1.50	P-0.04, S-0.04, Fe-Bal.
CF-3M (316L SS)	9.00-12.00	18.00-21.00	2.00-3.00	0.03	1.50	1.50	P-0.04, S-0.04, Fe-Bal.
CF-8M (316 SS)	9.00-12.00	18.00-21.00	2.00-3.00	0.08	1.50	1.50	P-0.04, S-0.04, Fe-Bal.
CF-12M	9.00-12.00	18.00-21.00	2.00-3.00	0.12	1.50	1.50	P-0.04, S-0.04, Fe-Bal.
CF-8C (347 SS)	9.00-12.00	18.00-21.00	—	0.08	2.00	1.50	P-0.04, S-0.04, Fe-Bal., Cb-8xc min-1.00 max or Cb&Ta-10xc min-1.35 max
CF-16F (303 SS)	9.00-12.00	18.00-21.00	1.50 max	0.16	2.00	1.50	P-0.17, S-0.04, Fe-Bal.
CG-8M (317 SS)	8.00-11.00	18.00-21.00	3.00 min	0.08	1.50	1.50	P-0.04, S-0.04, Fe-Bal
CG-12	12.00	22.00	—	0.12	—	—	Fe-Bal.
CH-20 (309 SS)	12.00-15.00	22.00-26.00	—	0.20	2.00	1.50	P-0.04, S-0.04, Fe-Bal
CK-20 (310 SS)	19.00-22.00	23.00-27.00	—	0.20	2.00	1.50	P-0.04, S-0.04, Fe-Bal
CN-7M	27.00-31.00	18.00-22.00	Various amounts	0.07	Various amounts	1.50	P-0.04, S-0.04, Cu-Various amounts, Fe-Bal
CW-12M	40.00	18.00	18.00	0.12	—	—	Fe-Bal
CY-40 (Inconel)	67.07-70.07	14.00-17.00	—	0.40 max	3.00	1.50	P-0.015, S-0.015, Fe-11.00
CZ-100	95.00 min.	—	—	1.00 max	2.00	1.50	P-0.015, S-0.015, Fe-1.50 max
HA	—	8.00 - 10.00	0.90-1.20	0.20	1.00	0.35-0.65	P-0.04, S-0.04, Fe-Bal



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
D-979	45.00	15.00	4.00	0.05	—	3.00	1.00	Bal	0.75	—	Si-0.75 W-4.00 B-0.01
DCM	61.00	15.00	5.30	0.05	—	3.45	4.50	5.00	0.10	—	Si-0.15 B-0.08
DH 242	79.00	20.00	—	—	—	—	—	—	—	1.00	—
Discaloy	26.00	13.50	2.70	0.04	—	1.70	0.10	Bal	0.90	—	Si-0.80 B-0.005
Discaloy 24	25.50	13.10	2.83	0.03	—	1.83	0.16	Bal	0.64	—	Si-0.92
DS Nickel	97.90	—	—	—	—	—	—	—	—	—	Th O ₂ = 2.10
Dumet	46.00	—	—	—	—	—	—	Bal	—	—	Cu Sheath
Duraloy HOM-3 (RA 333)	45.00	26.00	3.00	0.45	—	—	—	Bal	1.00	—	Si-1.20 Co-3.00 W-3.00
Duraloy HOM-5	48.00	28.00	—	0.50	—	—	—	Bal	1.00	—	Si-1.30 W-5.00
Duraloy MO-RE1	35.00-38.00	25.00-28.00	0.50 max.	0.4-.0.5	—	—	—	Bal	1.25 max	—	W-1.25 - 2.00, Si - 1.5 max.
Duraloy MO-RE2	48.00-52.00	32.00-34.00	—	0.15 - 0.25	—	—	0.75 - 1.25	—	0.30 max	—	W - 15.00-17.00, Si - 0.3 max
Dura-Nickel (301)	94.00	—	—	0.15	—	0.50	4.50	—	0.25	—	Si-0.55 Co-0.05
Elinvar Extra	42.00	5.00	—	—	—	2.50	0.50	Bal	—	—	—
EPD-16	74.74	6.00	2.00	0.12	—	—	6.00	—	—	—	W-11.00 B-0.020 Zr-0.12
F-342	68.75	15.00	5.00	0.15	—	—	5.00	5.00	0.40	—	Si-0.40 B-0.30
Fahrte N-5	59.00-62.00	10.00-14.00	—	—	—	—	—	Bal	—	—	—
Fahrte N-6	65.00-68.00	15.00-19.00	—	—	—	—	—	Bal	—	—	—
FM-62	73.00	15.50	—	—	—	—	—	8.00	—	Cb + Ta 2.20	—
G-157	59.54	27.00	1.50	0.06	—	2.00	0.75	6.00	1.25	—	Si-0.40 W-1.50
Gamma Cb	24.60	15.20	4.10	0.40	—	—	—	Bal	0.54	2.20	Si-0.62



HIGH ALLOY CASTINGS

Designation	Ni	Cr	Mo	C	Si	Mn	Other
NA-1	10.00	28.00	—	0.10 - 0.50	—	—	Fe-Bal
NA-2	35.00	15.00	—	0.35 - 0.70	—	—	Fe-Bal
NA-2T	36.00 - 39.00	16.00 - 19.00	—	0.40 - 0.60	1.50	1.20	Fe-Bal
NA-3	23.00 - 27.00	21.00 - 25.00	—	0.20 - 0.50	2.00 max	2.00 max	Fe-Bal
NA-4	8.00 - 10.00	18.00 - 20.00	—	0.20 - 0.50	—	—	Fe-Bal
NA-4M	8.00	18.00	3.00	0.20 - 0.50	—	—	Fe-Bal
NA-6	11.00 - 14.00	24.00 - 28.00	—	0.20 - 0.50	2.00 max	2.00 max	Fe-Bal
NA-7	18.00 - 22.00	24.00 - 28.00	—	0.20 - 0.60	2.00 max	2.00 max	Fe-Bal
NA-18	—	17.00	—	0.30 max	—	—	Fe-Bal
NA-19	3.00	26.00 - 29.00	—	0.50 - 0.70	—	—	Fe-Bal
NA-20	4.00-7.00	26.00-30.00	0.50 max	0.50 max	—	—	Fe-Bal
NA-22H	46.00	26.30	—	0.44	1.00	1.40	Fe-Bal, W-5.30
NA-34	8.00 - 10.00	18.00 - 20.00	2.00 - 4.00	0.10 max	—	—	Fe-Bal
NA-60	58.00 - 62.00	10.00 - 14.00	—	0.20	—	—	Fe-Bal
NA-65	65.00 - 70.00	18.00 - 20.00	—	0.30 max	—	—	Fe-Bal



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
20Mo4	35.00-40.00	22.50-25.00	3.50-5.00	0.03m	1.00	—	—	Bal	1.00m	0.25	P-0.035m, S-0.035m, Si-0.50
35Ni 20Cr	34.00-37.00	18.00-20.00	—	0.15	—	—	—	Bal	1.00	—	Si-1.00-3.00 S-0.01
35Ni 30Cr	35.50	30.00	—	0.05	—	—	—	Bal	—	—	Si- 1.50
60Ni 16Cr	57.00	14.00-18.00	—	0.15	—	—	—	Bal	1.00	—	Si-0.75-1.50 S-0.01
70Ni 30 Cr	68.55	30.00	—	0.05	—	—	—	—	—	—	Si- 1.40
78Ni 20Cr 1 Cb	77.77	20.00	—	0.03	—	—	—	—	—	1.00	Si- 1.20
80Ni 20Cr	73.84-76.59	19.00-21.00	—	0.15	—	—	—	1.00	2.50	—	Si-0.75-1.50 S-0.01
A-286	26.00	15.00	1.25	0.05	—	2.15	0.20	Bal	1.40	—	Si- 0.40 B- 0.003 V-0.30
A-286 Mod	30.00	15.00	1.20	0.01-0.03	—	2.20	0.25	—	—	—	B- 0.001 V-0.30
Allegheny 47-50	47.00	—	—	—	—	—	—	53.00	—	—	—
AL 6XN	24.00	20.00	6.00	—	0.75	—	—	Bal	2.00	—	Si- 1.00
AL 904L	25.00	20.00	4.50	0.015	1.50	—	—	Bal	2.00	—	Co- 0.50 Si- 1.00
ALNICO III	25.00	—	—	—	3.00	—	12.00	Bal	—	—	—
Alumel	95.00	—	—	—	—	—	1.00	—	3.00	—	Si- 1.00
AKMCO 20-45-5	45.00	20.00	2.25	0.05	—	—	—	Bal	5.00	0.15	Si-0.40
ATV-3	27.40	14.90	—	0.35	—	—	—	Bal	1.36	—	Si-1.17 W-4.00
Balco	70.00	—	—	—	—	—	—	30.00	—	—	—
Bendel 65-35	65.00	35.00	—	—	—	—	—	—	—	—	3 Al ₂ O ₃ Mg ₀
Carpenter 10	18.00	16.00	—	0.08	—	—	—	Bal	—	—	—
Carpenter 20	27.00	20.00	2.50	—	3.50	—	—	Bal	—	—	—



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
Inconel X 550	73.00	15.00	—	0.03	—	2.50	1.10	7.00	—	0.60	—
Inconel 600	76.00	15.50	—	0.04	—	—	—	8.00	0.20	—	Si-0.20
Inconel 601	60.50	23.00	—	0.05	0.50	—	1.35	14.10	0.50	—	Si-0.25 S-0.007
Inconel 604	74.00	15.80	—	0.04	—	—	—	7.20	0.20	2.80	Si-0.20
Inconel 610	71.00	15.50	—	0.20	0.50	—	—	9.00	0.90	1.00	Si-2.00 S-0.008
Inconel 611	70.50	15.50	—	0.20	0.50	—	—	9.00	0.90	2.00	Si-1.60 S-0.008
Inconel 625	61.00	22.50	9.00	0.05	—	0.20	0.20	3.00	0.15	Cb+Ta 3.65	Si-0.30
Inconel 671	51.60	48.00	—	0.05	—	0.35	—	—	—	—	—
Inconel 686	49.50- 57.00	19.00- 23.00	15.00- 17.00	0.01m	—	0.20- 0.80	—	5.00m	0.75m	—	P-0.04m, S-0.02m, Si-0.08m, W3.0-4.4
Inconel 702	79.50	15.50	—	0.04	—	0.65	3.25	0.35	0.05	—	Si-0.20
Inconel 705	69.65	11.00	3.00	0.10	—	2.75	3.50	4.00	2.00	—	Si-1.00 Co-3.00
Inconel 706	40.00	16.00	—	0.02	—	1.70	0.30	Bal	0.05	2.75	Si-0.05, B-0.004
Inconel 709	72.65	7.50	3.00	0.10	—	3.00	3.75	4.00	2.00	—	Si-1.00 Co-3.00
Inconel 713C	73.41	12.50	4.20	0.12	—	0.80	6.10	—	0.25	2.00	Si-0.50 B-0.012 Zr-0.10
Inconel 713LC	74.00	12.00	4.50	0.05	—	0.60	5.90	—	0.25	2.00	Si-0.50 B-0.10 Zr-0.10
Inconel 718	52.50	19.00	3.05	0.04	—	0.90	0.50	18.50	0.20	Cb+Ta 5.30	Si-0.30 B-0.005
Inconel 721	71.00	16.00	—	0.04	—	3.05	—	7.70	2.25	—	Si-0.12
Inconel 722	75.00	15.00	—	0.04	—	2.40	0.70	6.50	0.55	—	Si-0.20



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
Illium B	50.70	28.00	8.50	0.05	5.50	—	—	2.00	1.25	—	Si-4.00
Illium G	56.00	22.50	6.40	0.20	6.50	—	—	6.50	1.25	—	Si-0.65
Illium R	64.00	22.00	4.00- 5.00	0.07	2.00- 3.00	—	—	6.00	1.00	—	Si-0.30
Illium W	55.57	15.50	16.00	0.08	2.50	—	—	5.00	—	—	W-4.00 Si-1.00 V-0.35
Immac 5	20.00	23.50	—	0.12	—	—	—	Bal	0.80	—	Si-1.30
In-102	66.93	15.00	2.90	0.06	—	0.50	0.50	7.00	0.75	2.90	Si-0.40 W-3.00 B-0.005 Zr-0.03 Mg-0.02
In-162	73.58	10.00	4.00	0.12	—	1.00	6.50	0.50	1.00	—	Zr-0.10 V-1.00 W-2.00 Si-0.20
In-625	65.20	21.6	8.70	0.20	—	0.20	0.20	—	—	3.90	—
In-657	44.89- 49.19	48.00- 52.00	—	0.10	—	—	0.15	1.00	—	1.40- 1.70	Si-0.16
In-713 C	73.00	13.50	4.50	0.10	—	0.80	6.00	—	—	2.00	B-0.010 Zr-0.06
In-713 LC	75.00	12.00	4.30	0.06	—	0.70	5.80	—	—	2.00	B-0.007 Zr-0.06
In-718	52.50	19.00	3.00	0.05	—	0.90	0.55	Bal	—	5.00	B-0.005
In-733	10.50	11.50	—	0.03	—	0.30	0.70	Bal	1.00	—	Si-0.10
In-734	10.50	11.50	—	0.03	—	0.30	1.20	Bal	0.10	—	Si-0.10
In-736	10.00	10.00	2.00	0.03	—	0.20	0.30	Bal	0.15	—	Si-0.15
In-748	27.00	20.00	9.00	0.03	—	—	—	—	0.25	0.50	Si-0.20
In-853	74.69	19.70	—	0.06	—	2.30	0.88	—	—	—	Zr-0.07 Al ₂ O ₃ - 1.12 Y ₂ O ₃ -1.18
Inconel 13	Bal	—	—	—	—	—	5.00	Bal	—	—	—
Inco G	44.00	22.00	6.50	0.10	2.00	—	—	Bal	—	2.00	—
Inco G-3	44.00	22.00	7.00	0.10	2.00	—	—	Bal	—	2.00	—
Inco 425	25.50	5.50	—	0.04	—	2.40	0.65	Bal	1.30	—	Si-0.75
Inco 690	60.00	30.00	—	0.10	—	—	—	Bal	—	—	—



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
M-600	55.50	19.00	7.00	0.08	—	2.30	1.10	13.00	—	—	—
M-813	35.00	18.00	4.00	0.08	—	2.25	1.40	Bal	—	—	—
MA 754	77.00	20.00	—	0.06	—	1.00	0.60	—	—	—	Y ₂ O ₃ -1.30
Mar M 004	72.20	12.00	4.50	0.05	—	0.60	5.90	1.30	—	2.00	B-0.015 Zr-0.05 HF-1.30
MC-102	65.00	20.00	6.00	0.04	—	—	—	—	0.30	Cb+Ta 6.60	Si-0.25 W-2.20
MM-004	73.55	12.00	4.50	0.05	—	0.60	5.90	—	—	2.00	Zr-0.10 HF-1.30
MU-Metal	75.00	0.00- 2.00	—	0.50	5.00	—	—	17.00- 20.00	—	—	—
MO-RE 1 Wrt	33.00	22.00	—	0.10	—	—	—	Bal	2.50	—	Si-0.75 W-14.00
MO-RE 1 Cast	33.00	22.00	—	0.45	—	—	—	Bal	—	—	W-14.00
MO-RE 2 Wrt	51.00	31.00	—	0.05	—	—	—	Bal	—	—	W-17.00
MO-RE 2 Cast	51.00	31.00	—	0.45	—	—	—	Bal	—	—	W-17.00
NA 2	34.00	17.50	—	0.45	—	—	—	Bal	1.00	—	Si-1.75
NA 6	12.00	27.00	—	0.30	—	—	—	Bal	1.00	—	Si-1.25
NA 7	20.00	26.00	—	0.40	—	—	—	Bal	1.00	—	Si-1.00
NA 22H	48.00	27.00	—	0.50	—	—	—	Bal	1.30	—	Si-1.00 W-6.00
NA Super 22H	48.00	28.00	—	0.40	—	—	—	—	1.25	—	Co-3.00 W- 5.00 Si-1.25
NA 64	40.00m	60.00m	—	0.50	—	—	—	—	0.05	—	Si-1.00



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
Gannaloy	25.00	5.00	—	0.03	—	2.25	0.50	Bal	1.40	—	—
GE-B-129	66.64	5.00	15.00	0.06	—	—	6.00	4.00	0.40	2.00	Si-0.40 B-0.50
GMR 235	63.58	15.50	5.30	0.15	—	2.00	3.00	10.00	0.10	—	Si-0.30 B-0.07
GMR-235 AM	63.88	15.29	5.16	0.11	—	2.13	2.54	10.16	0.18	—	Si-0.50 B-0.042
GMR-235D	68.00	15.50	5.30	0.15	—	2.50	3.70	4.30	0.10	—	Si-0.30 B-0.075
GMR-236	49.00	15.50	5.00	0.15	—	2.25	3.25	Bal	—	—	B-0.06
Guy Alloy	66.65	13.50	5.50	0.10	—	—	6.25	4.50	0.50	2.00	Si-0.50 B-0.50
Hastelloy A	59.00	—	20.00	0.10	—	—	—	20.00	2.00	—	Si-0.70 Co-2.50
Hastelloy B	62.00	0.60	28.00	0.10	—	—	—	5.00	0.80	—	Si-0.70 V-0.20-0.60 Co-2.50
Hastelloy B-2	61.94 - 67.94	1.00	26.00-32.00	0.02	—	—	—	2.00	1.00	—	Si-1.00 Co-1.00 P-0.04
Hastelloy B-282	63.40	0.60	28.00	0.02	—	—	—	5.00	0.60	—	Si-0.35 V-2.00
Hastelloy C	53.50	16.00	17.00	0.07	—	—	—	5.00	0.80	—	Si-0.70 Co-2.50 V-0.40 W-4.00
Hastelloy C 2000	52.90 - 57.50	22.00 - 24.00	15.00-17.00	0.010	1.30- 1.90	—	0.50	3.00	0.50	—	Si-0.08 P-0.025 S-0.010
Hastelloy C22	55.00	22.00	12.50-14.50	0.02	—	—	—	3.00 Max.	—	—	W-2.50-3.50 Co 2.5 Max. V 0.35 Max.



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
Incoloy 925	42.00	21.00	3.00	0.03	2.00	2.00	0.15	Bal	—	—	—
Incoloy DS	37.00	18.00	—	0.08	—	—	—	43.00	—	—	Si-2.00
Invar	36.00	—	—	—	—	—	—	Bal	—	—	—
Jessop700	25.00	21.00	4.50	0.03	—	—	—	Bal	1.70	10XC	Si-0.50
Kinsaloy	70.00	—	22.00	—	—	—	8.00	—	—	—	—
Kromarc 55	20.00	16.00	2.25	0.04	—	—	—	Bal	9.50	—	Si-0.30
Kromarc 58	20.00	15.00	0.00-2.00	0.03	—	—	—	Bal	10.00	—	Zr-0.01 N-0.17 V-0.25-1.25 Si-0.10 B-0.010
Langalloy 4R	65.00	—	30.00	—	—	—	—	5.00	—	—	—
Langalloy 5R	57.00	16.00	17.00	—	—	—	—	5.00	—	—	W-5.00
Langalloy 7R	54.00	23.00	6.00	0.08	6.00	—	—	5.00	0.75	—	Si-3.00 W-2.00
M-21	73.50	5.70	2.00	0.13	—	—	6.00	—	—	1.50	B-0.02 W-11.00 Zr-0.12
M-22	71.27	5.70	2.00	0.13	—	—	6.30	—	—	—	Ta-3.00 W-11.00 Zr-0.60
M-308	33.00	14.00	4.00	0.08	—	2.00	0.25	Bal	0.03	—	W-6.50 Zr-0.25 Si-0.70 B-0.005
M-313	62.38	30.00	—	0.06	—	1.70	0.90	2.00	0.50	—	B-0.003 Zr-0.05 Si-0.40 Co-2.00



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
Hastelloy C-276	55.36	15.50	16.00	.02	—	—	—	5.50	1.00	—	W-3.75 V-0.35 Si-0.02 Co-2.50
Hastelloy C-4	58.16-65.16	14.00-18.00	14.00-17.00	0.015	—	0.70	—	3.00	1.00	—	Co-2.00 Si-0.08 P-0.04
Hastelloy D	82.38	1.00	—	0.12	3.00	—	—	1.00	1.00	—	Si-9.00 Co-2.50
Hastelloy F	47.380	22.00	6.50	0.05	—	—	—	Bal	1.50	Cb+Ta 2.1m	Si-1.00 Co-2.50 W-1.00
Hastelloy G	45.70	22.00	6.50	0.03	2.00	—	—	19.50	1.30	Cb+Ta 2.1m	Si-0.35 Co-2.50 max W-0.50
Hastelloy G-3	45.00	22.00	7.00	—	1.75	—	—	Bal	—	—	Co-5.0 W-1.75
Hastelloy G-30	43.00	29.00	5.00	—	1.75	—	—	Bal	—	—	Co-5.0 W-1.50
Hastelloy N	69.90	7.00	16.50	0.06	—	—	—	5.00	0.80	—	Si-0.50 Co-0.20 B-0.01
Hastelloy R	65.00	15.50	5.00	0.10	—	2.50	2.25	Bal	—	—	Co-1.50
Hastelloy R-235	60.85	15.50	5.50	0.15	—	2.50	2.00	10.00	0.50	—	Si-0.50 Co-2.50
Hastelloy S	68.70	14.50-17.00	14.50-15.50	0.02	—	—	0.10-0.50	1.00-3.00	0.30-1.00	—	Co-2.00 Si-2.75
Hastelloy T	64.56	12.00	9.00	0.02	—	—	0.20	—	0.20	—	W-14.00 La-0.02
Hastelloy W	59.78	5.00	24.50	0.12	—	—	—	5.50	1.00	—	Si-1.00 Co-2.50 V-0.60
Hastelloy X	45.00	22.00	9.00	0.10	—	—	—	18.50	0.50	—	Si-0.50 Co-1.50 W-0.60
Hastelloy X-280	50.00	22.00	8.84	0.12	—	—	—	17.43	0.45	—	Si-0.44 Co-0.28 W-0.30
Haynes 40	73.00	14.00	—	0.75	—	—	—	4.00	—	—	Si-4.00
Haynes 41	76.00	12.00	—	0.45	—	—	—	3.00	—	—	Si-3.50
Haynes 43	76.25	17.00	—	0.85	—	—	—	2.00	—	—	Si-3.90
Haynes 44	83.75	9.00	—	0.45	—	—	—	3.80	—	—	Si-3.00
Haynes 45	95.90	0.50	—	0.10	—	—	—	1.00	—	—	Si-2.50



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
Inconel 725	55.00-59.00	19.00-22.50	7.00-9.50	0.03	—	1.00-1.70	0.35	Bal	0.35	2.75-4.00	Si-0.20 P-0.015 S-0.010
Inconel 739	77.70	15.50	—	0.07	—	1.70	2.70	0.50	0.50	—	Si-0.50
Inconel MA-6000	69.00	15.00	2.00	0.05	—	2.50	4.50	—	—	—	Ta-2.00 Zr-0.15 Y ₂ O ₃ -1.10 B-0.01
Inconel X750	73.00	15.50	—	0.04	—	2.50	0.70	7.00	0.70	Cb+Ta 0.95	Si-0.30
Inconel X751	72.21	15.00	—	0.04	—	2.50	1.20	7.00	0.70	Cb+Ta 0.95	Si-0.30 Zr-0.10
Inconel 754	78.00	20.00	—	0.05	—	0.50	0.30	1.00	—	—	Y ₂ O ₃ -0.60
Inconel W	75.00	15.00	—	0.55	0.10	2.40	0.60	6.50	—	—	—
Incoloy 800	32.00	20.50	—	0.04	0.30	0.40	0.40	46.00	0.75	—	Si-0.35
Incoloy 801	32.00	20.50	—	0.04	0.15	1.12	—	44.50	0.75	—	Si-0.35
Incoloy 802	32.50	21.00	—	0.35	—	0.75	0.57	46.00	0.80	—	Si-0.30
Incoloy 804	41.00	29.50	—	0.06	0.40	0.40	0.25	25.40	0.85	—	Si-0.50
Incoloy 810	31.00-33.00	20.00-22.00	—	0.25	0.50	—	—	45.50	0.90	—	S-0.008 Si-0.80
Incoloy 825	42.00	21.50	3.00	0.03	2.25	0.90	0.15	30.00	0.65	—	Si-0.35
Incoloy 840	21.00	19.00	—	—	—	—	—	Bal	—	—	—
Incoloy 864	30.00-38.00	20.00-25.00	4.00-4.80	0.08 max	0.75 max	0.40-1.00	—	—	1.00 max	—	P-0.045, S-0.015 max, Si-0.60-1.00
Incoloy 901	42.70	13.50	6.10	0.05	—	2.50	0.25	34.00	0.45	—	Si-0.40 B-0.01-0.02
Incoloy 905	50.00	—	—	—	—	1.50	—	Bal	—	5.00	—



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
Haynes 46	92.90	0.50	2.50	0.10	—	—	—	1.00	—	—	Si-3.00
Haynes 48	57.00	16.00	17.00	0.40	—	—	—	3.00	—	—	Si-4.00 Co-2.50
Haynes 88	15.00	12.50	2.00	0.07	—	0.60	—	Bal	1.50	—	Si-0.50 B-0.15 W-0.60
Haynes 214	Bal	16.00	—	0.10	—	—	4.50	3.00	—	—	Y- Present
Haynes 230	57.69	22.00	2.00	0.10	—	—	0.30	3.00	0.50	—	Si-0.40, B-0.005, W-14.00
Haynes 242	59.31-63.31	7.00-9.00	24.00-26.00	0.03m	0.50	—	0.50m	2.00	0.80	—	Si-0.80 P-0.30 B-0.006m Co-1.00m S-0.015
Haynes 273	57.08	16.00	17.00	0.12	—	—	—	5.30	—	—	W-4.50
Haynes 294	73.00	15.00	5.00	0.02	—	6.70	—	—	—	—	B-0.07 Zr-0.10
HDA-8294	73.50	15.00	5.00	0.01	—	—	6.70	—	0.10	—	Si-0.10
HM-30	54.50	38.50	4.50	0.05	—	0.10	2.00	—	0.01	—	Si-0.04 B-0.015
HR 120	37	25	2.5 Max.	0.05	—	—	0.1	33	0.7	0.7	Co 3.0 Max. W 2.5 Max. Si 0.6 N 0.2 B 0.004
Hypemik	50.00	—	—	—	—	—	—	Bal	—	—	—
Hy-80	1.90-3.30	0.80-1.90	—	0.13-0.63	0.22m	—	—	Bal	—	—	—
Hy-Mu-80	80.00	—	4.00	—	—	—	—	Bal	—	—	—
Hy-100	2.25-3.50	1.00-1.80	—	0.20-0.60	0.20	0.02	—	—	0.10-0.40	—	Cu-0.25, P-0.015, S-0.008, Si-0.15-0.35, V-0.03
I-1360	72.10	10.00	5.00	0.10	—	—	6.00	4.50	—	2.00	Zr-0.30
Illium 98	54.51	29.00	8.80	0.07	5.50	0.17	—	—	1.25	—	Si-0.70



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
Pyromet 680	41.30-51.70	20.50-23.00	8.00-10.00	0.05-0.15	—	—	—	17.00-20.00	1.00	—	Si-1.00 W-0.20-1.00 Co-0.50-2.50
Pyromet 860	40.00-45.00	12.00-16.00	5.00-7.00	0.05	—	2.50-3.50	0.75-1.50	Bal	1.00	—	Si-1.00 Co-3.50-4.50
Pyrotool 7	50.00-55.00	17.00-21.00	2.80-3.30	0.10	—	0.65-1.15	0.35-0.85	Bal	0.35	Cb+Ta 4.75-5.50	B-0.001-0.006 Si-0.35 Co-1.00
Pyrotool A	24.00-27.00	13.50-16.00	1.00-1.75	0.08	—	1.90-2.30	0.35	Bal	1.00-2.00	—	V-0.10-0.50 Si-1.00 B-0.003-0.010
Pyrotool V	25.50-28.50	13.50-16.00	1.00-1.50	0.08	—	2.70-3.20	0.10-0.35	—	0.35	—	B-0.005-0.012 Si-0.50 V-0.50
R-55 (Labour)	50.00	23.00	4.00	0.30	6.00	—	—	8.00	—	—	Si-4.00 W-2.00
R-63	95.00	—	—	—	—	—	—	—	4.00	—	Si-1.00
RA 309	14.00	23.00	—	0.05	—	—	—	60.00	1.50	—	Si-0.80
RA 310	20.00	25.00	—	0.05	—	—	—	52.00	1.50	—	Si-0.50
RA 330	36.00	19.00	—	0.05	—	—	—	Bal	1.50	—	Si-1.25
RA 330 HC	35.00	19.00	—	0.40	—	—	—	Bal	2.00	—	Si-1.25
RA 333	45.00	25.00	3.00	0.05	—	—	—	18.00	1.50	—	Si-1.25 W-3.00 Co-3.00
RA 634	72.00	4.00	—	0.05	—	—	—	Bal	1.50	—	Si-3.00
Refractalloy B	30.00	25.00	8.00	0.07	—	—	—	Bal	—	—	—
Rene 62	47.60	15.00	9.00	0.05	—	2.50	1.25	22.00	0.25	2.25	B-0.01
Rene Y	40.00-48.30	20.00-23.00	8.00-10.00	0.15	—	—	—	17.00-20.00	1.00	—	Si-1.00 Co-2.50 W-2.00 La-0.05-0.30



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
NX 188	73.90	—	18.00	0.04	—	—	8.00	—	—	—	—
Ohiooly 2300	45.00	25.00	—	0.50	—	—	—	Bal	1.50	—	Si-1.50
PD 16	70.00	6.00	2.00	0.13	—	0.50	6.00	0.50	0.50	—	Si-0.50 W-11.00 S-1.50
PDRL-102	68.00	15.00	3.00	0.06	—	0.50	0.40	7.00	0.02	3.00	B-0.005 W-3.00 Zr-0.03 Mg-0.02
PDRL-162	72.40	10.00	4.00	0.12	—	1.00	6.50	0.50	0.10	1.00	Si-0.20 B-0.020 W-2.00 Zr-0.10 Ta- 2.00
PDRL-163	69.20	17.00	1.50	0.05	—	0.25	6.25	0.30	0.10	1.00	Si-0.20 B-0.02 W-2.00 Zr-0.10 Ta- 2.00
PE 7	37.00	18.00	5.00	—	—	1.20	1.20	35.00	—	—	Co-2.00
PE 10	64.00	20.00	6.00	—	—	—	—	—	—	6.50	W-2.50
PE 13	48.00	22.00	9.00	—	—	—	—	18.50	—	—	Co-1.50 W-0.60
PE 16	44.00	16.50	3.50	—	—	1.20	1.20	33.00	—	—	—
Permalloy 78 (Std)	78.50	—	—	—	—	—	—	—	21.50	—	—
Permalloy 4-79MO	79.00	—	4.00	—	—	—	—	16.70	0.30	—	—
Permalloy B	46.00	—	—	—	—	—	—	Bal	—	—	—
Permalloy C	78.00	—	4.00	—	5.00	—	—	13.00	—	—	—
Permalloy D (Invar)	36.00	—	—	—	—	—	—	Bal	—	—	—
Permalloy F	65.00	—	—	—	—	—	—	35.00	—	—	—
Permanickel	98.60	—	—	0.25	—	—	0.50	0.167	—	—	Mg-0.35



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
W-545	26.00	13.50	1.50	0.05	—	2.85	0.20	Bal	1.50	—	Si-0.40 B-0.08
Waukesha B	54.70-61.10	1.00	26.60-33.00	0.12	—	—	—	6.00	1.00	—	V-0.60 Si-1.00 Co-2.50
Waukesha C	—	15.00-20.00	16.00-20.00	0.12	—	—	—	7.50	1.00	—	Si-1.50 V-0.40 Co-2.50 W-5.25
Waukesha 23	78.00-82.00	—	—	0.05-0.20	—	—	—	—	—	—	Pb-3.50-4.50 Sn-7.00-9.00 Zn-6.00-9.00
Waukesha 23C	74.80-82.40	—	—	0.05-0.20	—	—	—	—	1.50-2.50	—	Pb-3.00-4.50 Sn-7.00-9.00 Zn-6.00-9.00
Waukesha 54C	75.80	—	—	0.20	—	—	—	—	2.00	—	Sn-8.00 Zn-8.00 Ag-6.00
Waukesha 88	70.90-78.40	11.00-14.00	2.50-3.50	0.05	—	—	—	2.00m	—	—	Sn-3.00-5.00 Bi-3.00-4.50
WAZ-16	72.20	—	2.00	0.20	—	—	7.00	—	—	2.10	W-16.00 Zr-0.50
WAZ-20	73.60	—	—	0.15	—	—	6.20	—	—	—	W-18.50 Zr-1.50
WAZ-D	69.30	—	—	0.06	—	—	7.00	4.30	—	—	W-16.50 Zr-0.80 Y ₂ O ₃ -2.00
WBD Weld 55	55.00	—	—	—	—	—	—	Bal	—	—	—
WBD Weld 61	96.00	—	—	—	—	3.00	—	—	—	—	—
WBD Weld 62	74.00	16.00	—	—	—	—	—	7.50	—	2.00	—
WBD Weld 82	72.00	20.00	—	—	—	—	—	—	3.00	2.50	—
WBD Weld 92	71.00	16.00	—	—	—	3.00	—	7.00	—	—	—
Westralloy 600	91.89	—	—	—	0.10	—	—	8.00	—	—	S-0.0007
Worthite	22.00-25.00	18.00-20.00	2.50-3.00	0.70	1.50-2.00	—	—	—	—	—	Si-3.00 P-0.04 S-0.03
Zeron 100	6.50	25.00	3.50	—	0.90	—	—	Bal	—	—	—



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
NA 65	65.00-70.00	18.00-20.00	—	0.30	—	—	—	Bal	—	—	—
NASA Alloy	78.87	6.00	8.00	0.125	—	—	6.00	—	—	—	Zr-1.00
NIAL II	97.00	—	—	—	—	—	—	—	—	—	Si-2.00
Nichrome	60.00	15.00	—	0.04	—	—	—	Bal	—	—	Si-1.40
Nichrome V	79.00	20.00	—	0.04	—	—	—	—	—	—	Si-1.40
Nichrome V 242	78.00	20.00	—	0.04	—	—	—	—	—	1.00	Si-1.00
Nichrome V 245	75.00	20.00	—	0.04	—	—	4.00	—	—	—	Si-1.00
Nickel 200(A)	99.50	—	—	0.06	0.05	—	—	0.15	—	—	S-0.005 Mn-0.25
Nickel 201	99.50	—	—	0.01	0.05	—	—	0.50	—	—	S-0.005 Si-0.05
Nickel 202	95.50	—	—	0.03	0.02	—	—	0.05	—	—	W-3.80
Nickel 204	95.20	—	—	0.06	0.02	—	—	0.05	0.20	—	Co-4.50, Si-0.02, S-0.005
Nickel 205	99.50	—	—	0.06	—	—	—	0.10	0.20	—	Si-0.05
Nickel 210	95.60	—	—	0.80	0.50	—	—	0.50	—	—	Si-1.60
Nickel 211(D)	95.00	—	—	0.10	0.03	—	—	0.05	4.50	—	—
Nickel 213(G)	95.00	—	—	1.50	0.50	—	—	0.50	—	—	Si-1.60
Nickel 220	99.50	—	—	0.06	—	0.03	—	0.05	0.12	—	Si-0.03 Mg-0.04



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
Timken 16-25-6	25.00	16.00	6.00	—	—	—	—	Bal	1.35	—	—
TKSN	95.00	—	—	—	—	—	—	—	—	—	Si-2.50
Tinidur	26.10	14.70	—	0.04	—	2.26	0.15	Bal	1.00	—	Si-0.73
Tophel	90.00	10.00	—	—	—	—	—	—	—	—	—
Tophel II	90.00	9.00	—	—	—	—	—	—	—	—	—
Tophel 30	70.00	30.00	—	—	—	—	—	—	—	—	—
Tophet A	80.00	20.00	—	—	—	—	—	—	—	—	—
Tophet B	70.00	20.00	—	—	—	—	—	Bal	—	—	—
Tophet C	61.00	15.00	—	—	—	—	3.00	Bal	—	—	—
Tophet F	36.00-38.00	20.00	—	—	—	—	3.00	Bal	—	—	Si-2.00
Tophet G	95.00	5.00	—	—	—	—	—	—	—	—	—
Tophet M	65.00	30.00	5.00	—	—	—	—	—	—	—	—
Tophet P	90.00	10.00	—	—	—	—	—	—	—	—	—
TRW 1800	69.60	13.00	—	0.09	—	0.60	6.00	—	—	1.50	Zr-0.07 B-0.07 W-9.00
Turboly 13	23.60	17.80	2.50	0.13	—	1.40	1.40	Bal	1.70	—	Si-0.75 W-1.00
Udimet 630	49.40	17.00	3.00	0.04	—	1.00	0.60	18.00	0.20	6.50	Si-0.20 Co-1.00 B-0.005 W-3.00
Udimet A	25.00	—	—	0.03	—	1.65	0.30	Bal	—	—	—
Uniloy 50Cr 50 Ni	49.00	50.00	—	0.06	—	1.00	—	—	—	—	—
Unitemp 212	25.00	16.00	—	0.08	—	4.00	0.15	Bal	0.05	Cb+Ta 0.50	Si-0.15 B-0.06 Zr-0.05
V-57	25.50	14.75	1.25	0.08	—	3.00	0.25	Bal	0.25	—	Si-0.55 V-0.30 B-0.0075
Vasco Max T-200	18.50	—	3.00	0.03	—	0.70	0.10	—	0.10	—	Si-0.10 S-0.01 P-0.01
Vasco Max T-250	18.50	—	3.00	0.03	—	1.40	0.10	—	0.10	—	Si-0.10 S-0.01 P-0.01
Vasco Max T-300	18.50	—	4.00	0.03	—	1.85	0.10	—	0.10	—	Si-0.10 S-0.01 P-0.01
Vibrallloy	41.00	—	9.00	—	—	—	—	Bal	—	—	—



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
Nickel 230	99.50	—	—	0.09	—	0.003	—	0.05	0.10	—	Si-0.031 Mg-0.06
Nickel 233	99.50	—	—	0.09	0.03	0.003	—	0.05	0.18	—	Si-0.03 Mg-0.07 S-0.005
Nickel 240	95.00	1.70	—	—	—	0.30	—	—	2.00	—	Si-0.45
Nickel 270	99.98	—	—	0.01	—	—	—	—	—	—	—
Nickel 305(s)	91.50	—	—	0.80	0.50	—	—	0.50	—	—	Si-6.00
F-Nickel	92.00	—	—	0.50	0.20	—	—	1.65	—	—	Si-5.50, S-0.06
Z-Nickel	94.00	—	—	0.15	0.05	0.50	4.50	0.15	—	—	—
NICRFE	67.65-76.94	14.00-19.00	—	0.06-0.10	0.50	—	—	6.00-10.00	0.50-0.75	2.00	—
NI CR MO	59.50-61.50	16.50-19.50	17.50-19.50	0.70	—	—	—	2.50-5.00	—	—	Si-0.75-1.50
Nickel Vac W	70.00 min	14.00-17.00	—	0.08	—	2.75	1.00	9.00	1.00	—	Si-0.70
Nicrothal 4	35.00	20.00	—	—	—	—	—	Bal	—	—	—
NILVAR (Invar)	36.00	—	—	—	—	—	—	Bal	—	—	—
NIMARK II	20.00	—	—	0.03	—	1.40	0.25	Bal	0.10	0.40-0.60	Zr-0.05 Ca-0.05 Si-0.10 B-0.003
Nimocast 75	70.60	20.00	—	0.10	—	0.40	0.20	5.00	0.40	—	Si-0.30 Co-3.00
Nimocast 80	67.65	20.00	—	0.05	—	2.40	1.20	5.00	0.40	—	Si-0.30 Co-3.00



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
RL-35-100	35.00	28.00	8.00	0.85	—	—	—	Bal	1.50	—	Si-0.50 B-0.150
S-495	20.00	14.00	4.00	0.45	—	—	—	Bal	0.55	4.00	Si-0.60 W-4.00
S-588	20.00	18.50	4.00	0.46	—	—	—	Bal	1.20	4.00	Si-0.80 W-4.00
Sealmet	42.00	5.00	—	—	—	—	—	Bal	—	—	—
SM 2550	47.0-54.0	23.0-26.0	6.00-9.00	0.03	1.20 Max	0.69 Max	—	—	1.00 Max	—	Si 1.00 Max. W 3.00
TAZ-8	68.37	6.00	4.00	0.125	—	—	6.00	—	—	—	W-4.00 Ta-8.00 Zr-1.00 V-2.50
TAZ-8A	68.37	6.00	4.00	0.125	—	—	6.00	—	—	2.50	B-0.004 W-4.00 Zr-1.00 Ta-8.00
TD Nickel	98.00	—	—	0.02	—	—	—	—	—	—	ThO ₂ -2.00
TD Ni-Cr	77.90	20.00	—	0.05	—	—	—	—	—	—	ThO ₂ -2.00
TD Ni-Mo	76.60	—	20.00	0.05	—	—	—	—	—	—	ThO ₂ -3.00 Zr-0.30
Thermalloy 40A2	15.00	26.00	—	0.50	—	—	—	Bal	1.00	1.00	Si-1.00 N-0.13
Thermalloy 40E	12.00	26.00	—	0.90	—	—	—	Bal	1.00	—	Si-1.20
Thermalloy 47	20.00	26.00	—	0.40	—	—	—	Bal	1.00	—	Si-1.20 N-0.10
Thermalloy 47D	20.00	28.00	—	0.50	—	—	—	Bal	1.00	—	Si-1.50 N-0.10
Thermalloy 50C0	35.00	15.00	—	0.50	—	—	—	Bal	1.00	1.00	Si-1.70
Thermalloy 52	24.00	22.00	—	0.40	—	—	—	Bal	—	0.80	Co-2.00 W-1.20
Thermalloy 63	35.00	26.00	—	0.50	—	—	—	Bal	0.30	—	Si-1.50
Thermalloy T-30	10.50	20.00	—	0.30	—	—	—	Bal	—	—	Si-2.00
Thermalloy T-45	25.00	20.00	—	0.40	—	—	—	Bal	—	—	Si-2.00
Thermalloy T-46	21.00	25.00	—	0.40	—	—	—	Bal	—	—	Si-2.00
Thermalloy T-47	20.00	25.00	—	0.40	—	—	—	Bal	—	—	Si-2.00
Thermalloy T-50	35.00	18.00	—	0.50	—	—	—	Bal	—	—	Si-2.00
Thermalloy T-85	66.00	17.00	—	0.50	—	—	—	Bal	—	—	Si-2.00
Thermenol	80.60	—	3.30	0.05	—	—	16.00	—	—	—	—
Timken 16-15-6	15.00	16.00	6.00	—	—	—	—	Bal	7.50	—	—



NICKEL ALLOYS

Designation	Ni	Cr	Mo	C	Cu	Ti	Al	Fe	Mn	Cb	Other
Nimocast-PE 10	63.00	20.00	6.00	0.02	—	—	—	0.25	0.25	6.50	Si-0.50 Co-1.00 W-2.50
Nimonic 75	77.60	20.50	—	0.10	—	0.35	0.20	0.50	0.45	—	Si-0.45
Nimonic 80	74.50	18.00-21.00	—	0.10	—	1.80-2.70	0.50-1.80	5.00	1.00	—	Si-1.00 Co-2.00
Nimonic 80A	65.00-70.00	18.00-21.00	—	0.10	—	1.80-2.70	0.50-1.80	5.00	1.00	—	Si-1.00 Zr-present Co-2.00 B-0.008
Nimonic 81	67.00	30.00	—	—	—	1.80	0.90	—	—	—	—
Nimonic 86	64.50	25.00	10.00	—	—	—	—	—	0.15	—	—
Nimonic 942	49.50	12.50	5.50	0.03	—	3.70	0.60	25.00	—	—	Co-1.00m B-0.015
Nimonic DS	37.50	18.00	—	0.15	—	—	—	Bal	—	—	Si-2.25
Nimonic- PE 16	43.50	16.50	3.30	0.05	—	1.20	1.20	Bal	0.10	—	Si-0.15 Zr-0.05 Co-2.00 B-0.005
Ni-O-Nel 825	41.80	21.50	3.00	0.03	1.80	0.90	0.15	30.00	—	—	—
Ni-O-Nel 826	51.50	30.00	—	0.04	1.70	—	—	Bal	—	—	—
Ni Resist #1	15.50	2.20	—	3.00	6.00	—	—	Bal	—	—	Si-2.00
Ni Resist #2	20.00	3.00	—	2.60	—	—	—	Bal	—	—	Si-2.00
Ni Resist #3	30.00	3.00	—	2.60	—	—	—	Bal	—	—	Si-1.50
Ni Resist #4	30.50	5.00	—	2.60	—	—	—	Bal	—	—	Si-5.50
Ni Resist #5	35.00	3.00	—	2.40	—	—	—	Bal	—	—	Si-1.50
Nirus	25.00	—	—	—	—	—	—	Bal	—	—	—
Ni-Span-C	42.00	5.40	—	0.02	0.05	2.40	0.65	Bal	—	—	—
Ni-Span-C Alloy 902	41.00-43.50	5.00	—	0.06	—	2.00	0.30-0.80	Bal	0.80	—	Si-1.00



NICKEL ALLOYS WITH COBALT

Table with 12 columns: Designation, Ni, Cr, Co, Mo, C, Ti, Al, Fe, Mn, Cb, Other. Rows include Inco 617, Inco 718 plus, Inco 783, Inco 903, Inco 907, Inco 909, Inconel 700, Inconel 703, Inconel 707, Inconel 708, Inconel 710, Inconel 711, Inconel 717C, Inconel 783, J-500 (M-252), J-1530 (Waspalloy), J-1600 (U-500), K2, K-42-B, Kovar (Rodar), M-252, M3608, Maraging 200.



NICKEL ALLOYS WITH COBALT

Table with 12 columns: Designation, Ni, Cr, Co, Mo, C, Ti, Al, Fe, Mn, Cb, Other. Rows include GTD 222, Haynes 56, Haynes 96, Haynes 99, Haynes 282, Haynes 556, Haynes 561, Haynes Stellite 27, HP 9-4-20, HP 9-4-30, HR-120, HR-160, Hy-180, Ilium PD, IN 100, IN 587, IN 597, IN 643, IN 728, IN 731, IN 738, IN 738 LC, IN 792, IN 792 +Hf, IN 939.



NICKEL ALLOYS WITH COBALT

Table with 12 columns: Designation, Ni, Cr, Co, Mo, C, Ti, Al, Fe, Mn, Cb, Other. Rows include Nimonic 118, Nimonic C263, Nimonic PK31, Nimonic PK33, Oerstit 120k, Oerstit 190k, PDRL, PK24, PK25, PWA 1426, PWA 1480, PWA 1484, PWA 1487, Pyromet 90, Pyromet 95, Pyromet 860, Pyromet 925, Pyrotool EX.



NICKEL ALLOYS WITH COBALT

Table with 12 columns: Designation, Ni, Cr, Co, Mo, C, Ti, Al, Fe, Mn, Cb, Other. Rows include 9Ni-4Co-0.20C, 9Ni-4Co-0.25C, 9Ni-4Co-0.30C, 9Ni-4Co-0.45C, 15 Ni Maraging, 17 Ni Maraging, 18 Ni 200, 18 Ni 250, 18 Ni 300, 18 Ni 350, AF-2-1D, AF-2-1DA, AF 1410, AF 1753, Alnico I, Alnico II, AM 1.



NICKEL ALLOYS WITH COBALT

Designation	Ni	Cr	Co	Mo	C	Ti	Al	Fe	Mn	Cb	Other
N115	57.20	15.00	15.00	3.50	0.15	4.00	5.00	—	—	—	B-0.018, Zr-0.045
N153	15.00	17.00	12.00	3.00	0.32	—	—	Bal	1.50	1.00	Si-0.50, W-2.00
N154	24.00	17.00	21.00	3.00	0.32	—	—	Bal	1.50	1.00	Si-0.50, W-2.00
N155 (Multimet)	20.00	21.00	20.00	3.00	0.15	—	—	Bal	1.50	—	Si-0.50 Cb+Ta-1.00, W-2.50
N156	33.00	17.00	24.00	3.00	0.33	—	—	Bal	1.50	1.00	Si-0.50, W-2.00
N556	20.00	22.00	20.00	3.00	0.20	—	0.30	Bal	1.50	—	W-2.50, Ta-0.90
Nickel 204	95.20	—	4.50	—	0.06	—	—	0.05	0.20	—	Cu-0.02, Si-0.02, S-0.005
Nicrotung	61.00	11.00-13.00	9.00-11.00	—	0.10	4.00	4.00	—	—	—	W-8.00, Zr-0.05
Nimark 1	18.50	—	7.50	4.85	0.03m	0.40	0.10	Bal	0.10m	—	Si-0.10m, Zr-0.03m, B-0.003m, Ca-0.05m
Nimark 200	18.00	—	8.50	3.25	0.02m	0.20	0.10	Bal	0.05m	—	Si-0.05m, Zr-0.02, B-0.003, Ca-0.05m
Nimark 300	18.50	—	8.75	4.90	0.03m	0.65	0.10	Bal	0.10m	—	Si-0.10m, Zr-0.05m, B-0.003m, Ca-0.05m
Nimocast 90	54.60	20.00	16.00	—	0.10	2.40	1.20	5.00m	0.40	—	Si-0.30
Nimocast 242	57.60	20.00	10.00	10.00	0.30	0.30m	0.20m	1.00m	0.30	—	Si-0.30
Nimocast 257	55.70	20.00	16.00	—	0.08	1.60	0.90	5.00m	0.40	—	Si-0.30
Nimocast 258	58.70	10.00	20.00	—	0.22	3.70	4.80	2.00m	0.25	—	Si-0.25
Nimonic 90	58.00	19.50	15.00-21.00	—	0.06	2.40	1.40	5.00m	0.50	—	Si-0.75
Nimonic 91	48.00	28.50	20.00	—	—	2.30	1.20	—	—	—	—
Nimonic 95	50.00	20.00	15.00-21.00	—	0.15m	3.00	2.00	5.00m	1.00m	—	Si-1.50m, B-added, Zr-added
Nimonic 100	50.00	10.00-12.00	20.00	5.00	0.30m	1.50	4.00-6.00	2.00m	1.00m	—	Si-0.50m, B-added, Zr-added
Nimonic 105/108	46.00	13.00-16.00	15.00	5.00	0.15	1.45	4.50	2.00m	1.00m	—	Si-0.50m, B-added, Zr-added
Nimonic 115	51.00	15.00	20.00	5.00	0.20	1.45	4.50	1.00m	1.00m	—	Si-0.20m



NICKEL ALLOYS WITH COBALT

Designation	Ni	Cr	Co	Mo	C	Ti	Al	Fe	Mn	Cb	Other
AM 3	67.00	8.00	6.00	2.00	—	2.00	6.00	—	—	—	W-5.00, Ta-4.00
Aermet 100	11.00	3.00	13.50	1.20	—	—	—	Bal	—	—	—
Astroloy	57.00	15.00	15.00	5.25	0.06	3.50	4.40	—	—	—	B-0.03, Zr-0.06m
B-B	45.00	15.00	30.00	5.00	0.08	2.50	3.00	—	—	—	B-0.50
B-1900	64.00	8.00	10.00	6.00	0.10	1.00	6.00	0.35m	0.20m	0.10	Si-0.25m, B-0.015, Zr-0.08, Ta-4.30, W-0.10m
B-1900 Mod. (B-1900+Hf)	63.00	8.00	10.00	6.00	0.10	1.00	6.00	—	—	—	B-0.015, Hf-1.10, Ta-4.25, Zr-0.10
B-1910	62.50	10.00	10.00	3.25	0.09	1.00	6.00	—	—	—	B-0.10, Ta-7.00, Zr-0.10
B-1914	Bal	10.00	10.00	3.00	—	5.30	5.50	—	—	—	B-0.010, C, Zr Low As Possible
B-1925	Bal	12.00	8.50	1.80	—	4.00	3.50	—	—	—	W-4.50, Ta-4.00, B-0.10, C, Zr Low As Possible
B-1964	60.20	8.80	10.00	1.00	0.02	5.30	3.50	—	—	—	W-8.50, Ta-2.50, B-0.11 Zr-0.02
B-1981	Bal	16.00	8.50	1.80	—	3.40	3.40	—	—	0.90	W-2.60 Ta-1.80 B-0.10 C, Zr Low As Possible
C-101	66.00	12.70	8.90	1.85	0.08	4.05	3.42	0.45	0.10	—	W-12.10, Cu-0.01, B-0.015, Hf-1.00
C-263	51.00	20.00	20.00	5.90	0.06	2.15	0.45	—	—	—	B-0.001
C-1023	58.60	15.50	10.00	8.50	0.16	3.60	4.20	—	—	—	B-0.006
Chace Bi-metal 4600	32.00	—	8.00	1.00	—	—	—	Bal	—	—	—
Chace Bi-metal 7100	33.50	4.00	4.00	—	—	—	—	Bal	—	—	—



NICKEL ALLOYS WITH COBALT

Designation	Ni	Cr	Co	Mo	C	Ti	Al	Fe	Mn	Cb	Other
Maraging 250	17.00-19.00	—	7.00-8.50	4.60-5.10	0.03	0.30-0.50	0.10	Bal	0.10m	—	Si-0.10m
Maraging 300	18.00-19.00	—	8.00-9.50	4.60-5.20	0.03	0.50-0.80	0.10	Bal	0.10m	—	Si-0.10m
Maraging 350	17.50	—	12.50	3.75	0.01 max	1.80	0.15	Bal	0.10 max	—	Si-0.10 max
Mar M002	59.00	10.00	10.00	—	—	1.50	5.00	1.00	—	—	W-10.00, Hf-1.50 Ta-2.50
MarM200+Hf	59.00	9.00	10.00	—	0.14	2.00	5.00	—	—	1.00	W-12.00, B-0.015, Hf-0.80-1.90
Mar M246	60.00	9.00	10.00	2.50	0.15	1.50	5.50	—	—	—	W-10.00, Ta-1.50, B-0.015, Zr-0.05
Mar M247	60.00	8.20	10.00	0.60	0.16	1.00	5.50	—	—	—	Ta-3.00, B-0.015 Zr-0.05, Hf-1.5 W-10.00
Mar M432	47.50-50.90	15.30-15.80	19.50-20.50	—	0.12-0.18	4.20-4.50	2.70-3.00	0.50 max	0.10 max	1.80-2.20	W-2.90-3.30, Zr-0.03-0.07, Si-0.10 max, B-0.01-0.02, Ta-1.80-2.20
Melni 19	58.40	19.70	9.40	—	0.14	1.95	4.08	—	—	—	B-0.24, W-5.75, Zr-0.14, La-0.17
Melni 22	61.40	18.80	7.85	2.20	0.14	2.84	4.12	—	—	—	B-0.21, W-2.05, Zr-0.16, La-0.16
MM-002	67.70-71.70	8.00-10.00	9.00-11.00	—	0.15	1.50	5.50	—	—	—	B-0.015, Ta-2.50, Zr-0.05, Hf-1.50
MM-007	59.00-67.00	7.00-9.00	9.00-11.00	5.00-7.00	0.10	1.00	5.00-7.00	—	—	0.10	W-0.10, Zr-0.075, Ta-4.25, B-0.015, Hf-1.30
MM-008	56.00-57.50	14.00-15.00	15.00-15.50	4.40	0.07	3.35	4.30	—	—	—	Zr-0.03, B-0.015, Hf-1.30
MP35N Multiphase	35.00	20.00	35.00	10.00	—	—	—	—	—	—	—



NICKEL ALLOYS WITH COBALT

Designation	Ni	Cr	Co	Mo	C	Ti	Al	Fe	Mn	Cb	Other
CM 186 LC	62.60	6.00	9.00	0.50	0.07	0.70	5.70	—	—	—	W-8.00 Ta-3.00 B-0.015 Zr-0.005 Hf-1.40 Re-3.00
CM 247 LC	61.50	8.00	9.00	0.50	0.07	0.70	5.60	—	—	—	W-10.00, Ta-3.20, B-0.015, Zr-0.01, Hf-1.40
CM 681	60.40	5.50	9.00	—	0.10	0.15	—	5.75	—	—	W-8.50, Ta-6.00, Zr-0.01, Hf-1.50, Re-3.00
CMSX-2	65.80	8.00	5.00	0.60	—	1.00	5.60	—	—	—	W-8.00, Ta-6.00
CMSX-3	62.70	8.00	5.00	0.60	—	1.00	5.60	—	—	—	W-8.00, Ta-6.00, Hf-0.10, Re-3.00
CMSX-4	61.70	6.50	9.00	0.60	—	1.00	5.60	—	—	—	W-6.00, Ta-6.50, Hf-0.10, Re-3.00
CMSX-4 [ULS][La+Y]	61.60	6.50	9.00	0.60	—	1.00	5.60	—	—	—	W-6.00, Ta-6.50, Hf-0.10, Re-3.00, La+Y-0.002
CMSX-4 (B/C)[MK4]	61.50	6.50	9.00	0.60	0.04	1.00	5.60	—	—	—	W-6.00, Ta-6.50, B-0.006, Hf-0.20, Re-3.00
CMSX-6	70.40	10.00	5.00	3.00	—	4.70	4.80	—	—	—	Ta-2.00, Hf-0.10
CMSX-10K	69.50	2.00	3.00	0.40	—	0.20	5.70	—	—	0.10	W-5.00, Ta-8.00, Hf-0.03, Re-6.00
CMSX-10N	69.10	1.50	3.00	0.40	—	0.10	5.80	—	—	0.05	W-5.00, Ta-8.00, Hf-0.03, Re-7.00
CMSX 486	61.30	5.00	9.00	0.70	0.07	0.70	5.70	—	—	—	W-9.00, Ta-4.50, B-0.015, Zr-0.005, Hf-1.00, Re-3.00
Consumet 41	46.40-52.50	18.00-20.00	10.00-12.00	9.00-10.50	0.06-0.12	3.00-3.30	1.40-1.60	5.00m	0.50m	—	Si-0.50m, B-0.003-0.010
'Cosint' 1000	47.40	16.00	20.00	2.50	0.30	2.50	5.50	—	—	—	B-0.10, W-5.50 Zr-0.20
CRM 18D	5.00	23.00	5.00	1.00	0.75	—	—	Bal	5.00	2.00	Si-0.50, W-1.00, B-0.003, N-0.25
EPK-36	65.70	10.00	10.00	4.00	0.10	5.00	5.00	—	—	—	B-0.015, Zr-0.12
Ford 406	60.00	6.00	10.00	1.00	—	2.00	4.50	—	—	2.00	W-8.50, Ta-6.00
G-18B	13.00	13.00	10.00	2.00	0.04	—	—	Bal	0.80	3.00	Si-1.00, W-2.50
G-19	13.00	19.00	10.00	1.80	0.40	—	—	Bal	0.80	3.00	Si-1.00, W-2.50
GTD 111	60.26	14.00	9.50	1.60	0.10	4.90	3.00	—	—	—	W-3.80, Ta-2.80, B-0.012, Zr-0.02
GTD 111 M	60.28	14.00	9.50	1.60	0.10	4.90	3.00	—	—	—	W-3.80, Ta-2.80, B-0.012



COBALT ALLOYS

Designation	Co	Cr	Ni	W	Mo	C	Ti	Al	Fe	Cb	Other
25 Ni- Co	42.50	19.00	24.50	10.00	—	0.17	—	—	1.00	1.50	—
AF 94	56.00	15.00	10.00	10.00	5.50	0.12	—	—	2.00	1.00	1.20-Mn
AFC 77	13.50	14.50	—	—	5.00	0.15	—	—	Bal	—	0.50 -V
AFC 260	13.00	15.50	1.80	—	4.50	0.07	—	—	Bal	0.15	—
AiResist 13	56.20-57.70	21.00	1.00-2.50	11.00	—	0.45	—	3.50	2.50	2.00	0.50-Mn, 0.10-Y, 0.25m-Si
AiResist 213	64.57	19.00	0.50m	4.70	—	0.18	—	3.50	0.50m	—	6.50-Ta, 0.15-Zr, 0.10-Y, 0.10-Mn, 0.20m-Si
AiResist 215	62.60	19.00	0.50m	4.50	—	0.35	—	4.30	0.50m	—	7.50-Ta, 0.13-Zr, 0.17-Y, 0.20m-Mn, 0.25m-Si
Alcomax III	24.00	—	13.50	—	—	—	—	8.00	Bal	0.80	3.00-Cu
Alcomax IV	24.00	—	13.50	—	—	—	—	8.00	Bal	2.50	3.00-Cu
Alnico V	24.00	—	14.00	—	—	—	—	8.00	51.00	—	3.00-Cu
Alnico VI	24.00	—	15.00	—	—	—	1.25	8.00	Bal	—	3.00-Cu
Alnico VII	23.00-25.00	—	17.00-19.00	—	—	—	5.00	8.50	Bal	—	3.00 Cu
Alnico VIII	34.00-36.00	—	14.00-15.00	—	—	—	5.00	7.00	Bal	—	4.50 Cu
AM 367	15.50	14.00	3.50	—	2.00	0.03m	0.50	—	Bal	—	0.15m-Mn
B-100	9.50	17.50	5.50	10.50	0.50	1.25	6.30	6.50	Bal	—	0.01-B, 0.75-V
B-400	9.50	17.50	1.00m	10.50	0.50m	1.25	0.10m	—	Bal	—	0.10-Mn, 0.10-Si, 0.008-B, 0.75-V
C-50	13.00	15.40	1.30	—	4.40	0.07	—	—	Bal	0.14	0.30-Mn
CF-43	55.00	25.00	10.00	7.50	—	0.50	—	—	1.50	—	—
Cromo-Co	10.00	11.00	0.75	0.45	1.15	0.27	—	—	Bal	—	0.60-Mn, 1.25-Si, 0.06-N, 0.95-V
ECY 768	55.70	23.00	10.00	7.00	—	0.60	0.20	—	—	—	3.50-Ta
Elgiloy	40.00	20.00	15.00	—	7.00	0.05	—	—	Bal	—	2.00-Mn, 0.04 Be



COBALT ALLOYS

Designation	Co	Cr	Ni	W	Mo	C	Ti	Al	Fe	Cb	Other
HS-1016	45.50	32.00	2.50	17.00	—	—	—	—	3.00	—	—
HS- 8117	33.70-47.50	27.50-31.50	2.50	15.00-18.50	—	2.50-3.80	—	—	2.00-5.00	—	1.00-3.00-Mn, 1.00-Si, 1.00-B
HWM	11.00	5.00	2.00	—	7.80	0.05	—	—	Bal	—	—
Hycamax II	28.00	—	Bal	—	—	—	4.00	Bal	Bal	—	Bal Cu
I-336	50.00	19.50	15.50	12.00	—	0.19	—	—	1.30	0.90	—
Illium D	65.00	27.00	—	1.00	4.50	0.20	—	—	1.00	—	0.90-Mn, 0.40-Si
Illium X	52.00	28.50	1.00	15.00	—	0.85	—	—	2.00	—	0.25-Mn, 0.40-Si
Jetalloy	37.00-38.00	20.00	29.00	7.00	—	0.20	4.20	—	—	—	—
Jetalloy 209	50.00	20.00	10.00	15.00	—	0.03 m	2.00	—	2.00 m	—	0.50-Mn, 0.50-Si
Jetalloy 249	55.00	25.00	10.00	7.50	—	0.03 m	—	—	2.00 m	—	0.50-Mn, 0.50-Si
Jetalloy 1570	37.50	20.00	29.00	7.00	—	0.20	2.50-4.00	0.20	2.00 m	—	—
Jetalloy 1650	35.98	19.00	27.00	12.00	—	0.20	3.80	—	—	—	0.02-B, 2.00-Ta
Koerflex 30	30.00	15.00	—	—	—	—	—	—	Bal	—	—
Koerflex 300	52.00	4.00	—	—	—	—	—	—	Bal	—	8.00-V
Kromar	12.00	12.00	4.50	—	4.50	0.03	0.30	0.10	Bal	—	Si-0.10, S-0.020, P-0.020
Lodex	35.00	—	—	—	—	—	—	—	65.00	—	—
M-203	36.50	19.50	24.50	12.00	—	0.07	2.15	0.75	1.60	1.50	—
M-204	40.50	18.50	24.50	12.00	—	0.07	—	—	1.60	1.20	0.22-B
M-205	37.50	18.50	24.50	12.00	—	0.07	—	2.75	1.60	1.20	0.22-B
MAR-M 302	57.00	21.50	—	10.00	—	0.85	—	—	—	—	0.10-Mn, 0.30-Si, 0.005-B, 9.00-Ta, 0.20-Zr
MAR-M 322	61.05	21.50	—	9.00	—	1.00	0.75	—	—	—	0.10-Mn, 0.10-Si, 4.50-Ta, 2.00-Zr



NICKEL ALLOYS WITH COBALT

Designation	Ni	Cr	Co	Mo	C	Ti	Al	Fe	Mn	Cb	Other
Unitemp C-300	57.36	8.70	9.00	2.00	0.12	0.70	3.40	—	—	—	W-7.60 HF-1.00 Ta-10.00 Zr-0.10 B-0.02
Waspaloy	55.00	19.00	13.50	4.00	0.07	3.00	1.20	2.00	0.10 max	—	Si-0.15 max, Zr-0.09
Waspaloy A	54.04 - 56.04	19.00-20.00	13.00 - 14.00	4.30	0.07	3.00	1.40	2.00	0.50	—	Cu-0.10 Zr-0.09, Si-0.50
Waspaloy B	53.54 - 55.54	19.00-20.00	13.00 - 14.00	4.30	0.07	3.00	1.40	2.00	0.75	—	Cu-0.10 S-0.02 Si-0.75 Zr-0.07
Waspaloy Mod.	56.00	18.00-20.00	12.00 - 15.00	3.50-5.00	0.05-0.70	2.75-3.25	1.20-1.60	2.00	0.10	—	Si-0.15 Zr-0.08



NICKEL ALLOYS WITH COBALT

Designation	Ni	Cr	Co	Mo	C	Ti	Al	Fe	Mn	Cb	Other
Pyrotol M	48.10-54.80	18.00-20.00	9.00-11.00	9.00-10.50	0.10-0.20	2.25-2.75	0.75-1.25	5.00m	0.50m	—	Si-0.50m, Zr-0.02-0.15, B-0.001-0.01
Pyrotol W	50.70-59.50	18.00-21.00	12.00 - 15.00	3.50-5.00	0.03-0.10	2.60-3.25	1.00-1.50	2.00m	0.50m	—	Si-0.75m, Zr-0.02-0.12, B-0.003-0.008
Refractaloy B	29.00-31.00	24.00-26.00	8.00-9.00	—	0.07	—	—	Bal	—	—	—
Refractaloy 26	36.00-38.00	17.00-19.00	19.00 - 21.00	3.20	0.03	2.70	0.50	Bal	0.80	—	Si-1.00, B-0.015
Rene 41	52.00	19.00	11.00	10.00	0.09	3.10	1.50	5.00	0.10	—	Si-0.50, B-0.01m
Rene 63	55.50	14.00	15.00	6.00	0.10	2.50	3.80	—	—	—	B-0.015, W-3.00
Rene 77	57.00	14.00-15.25	14.25 - 15.75	3.90-4.50	0.05-0.09	3.00-3.70	4.00-4.60	0.50	0.15	—	Si-0.20, Zr-0.04, B-0.016
Rene 80	60.50	13.00-15.00	9.00-10.00	3.00-5.00	0.18	4.00-6.00	3.00	—	—	—	W-3.00-5.00, Zr-0.04, B-0.015
Rene 80 H	60.30	14.00	9.00	4.00	0.16	4.70	3.00	—	—	—	W-4.00, B-0.015, Zr-0.01, HF-0.80
Rene 85	57.20-59.20	9.30	14.00 - 16.00	3.25	0.27	3.25	5.25	—	—	—	W-5.35, Zr-0.03, B-0.015
Rene 88	55.00	16.00	13.00	4.00	—	3.75	2.10	0.25 Max.	—	0.7	W - 4.00 B - 0.02 Max.
Rene 95	61.50	13.00-15.00	7.00-9.00	3.50	0.15-0.17	2.50	3.40-4.40	1.00	0.15m	3.50	W-3.50, B0.01, Zr-0.05, Si-0.20m
Rene 100	60.50	9.50	15.00	3.00	0.18	4.20	5.50	1.00m	—	—	B-0.015, Zr-0.06, V-1.00
Rene 125	59.00	9.00	10.00	2.00	0.10	2.60	4.80	—	—	—	Zr-0.05, Ta-3.80, HF-1.60, W-7.00, B-0.015



COBALT ALLOYS

Designation	Co	Cr	Ni	W	Mo	C	Ti	Al	Fe	Cb	Other
HS-25 (L605)	52.00	20.00	10.00	15.00	1.00 max	0.15	—	—	3.00	—	—
HS-27	30.00	25.00	32.00	—	5.50	0.40	—	—	1.00	—	0.30-Mn, 0.60-Si
HS-30	51.00	26.00	15.00	—	6.00	0.45	—	—	1.00	—	0.60-Mn, 0.60-Si
HS-31 (X40)	53.00	25.50	10.50	7.50	—	0.50	—	—	2.00 m	—	0.60-Mn, 0.50-Si
HS-36	52.84	19.00	10.00	15.00	—	0.40	—	—	1.00	—	1.20-Mn, 0.50-Si, 0.03-Zr, 0.03-B
HS-38	52.84	19.00	10.00	15.00	—	0.40	—	—	1.00	—	1.20-Mn, 0.50-Si, 0.03-Zr, 0.03-B
HS-93	6.00	17.00	0.50m	—	16.00	3.00	—	—	Bal	—	1.90-V, 1.00-Mn, 1.50-Si
HS-98 M-2	40.00	28.00-32.00	2.00-5.00	17.00-20.00	0.80	1.70-2.20	—	—	2.50	—	1.00-Si, 1.00-Mn, 3.70-4.70-V
HS-100	43.00	34.00	—	19.00	—	2.00	—	—	—	—	—
HS-150	43.35-48.15	28.00	3.00m	—	1.50m	0.05-0.15	—	—	18.00-22.00	—	1.00-Si, 0.30-1.00-Mn
HS-151	65.00	20.00	1.00	12.70	—	0.50	—	—	2.00 m	—	1.00-Mn, 1.00-Si, 0.05-B
HS-152	63.55	21.00	1.00m	11.00	—	0.45	—	—	2.00 m	—	0.50-Mn, 0.50-Si
HS-156	62.30	28.00	3.00	4.00	—	1.60	—	—	—	—	1.10-Si
HS-157	71.03	21.00	—	4.50	—	0.07	—	—	—	—	1.00-Si, 2.40-B
HS-158	62.10	26.00	3.00	5.50	—	0.75	—	—	0.75	—	1.20-Si, 0.70-B
HS-188	36.00	20.00-24.00	20.00-24.00	13.00-16.00	—	0.05-0.15	—	—	3.00	—	0.20-Si, 0.03-0.15-La
HS-190	52.00	24.00-28.00	3.00	13.00-15.00	—	—	—	—	5.00	—	1.00-Mn, 1.00-Si, 1.00-B
HS-589	46.00	15.50-18.50	—	—	14.50-17.50	2.90-3.40	—	—	—	—	0.50-Mn, 0.50-Si, 1.65-2.10-V



NICKEL ALLOYS WITH COBALT

Designation	Ni	Cr	Co	Mo	C	Ti	Al	Fe	Mn	Cb	Other
Rene 142	60.30	6.80	12.00	2.00	0.12	—	6.20	—	—	—	W-5.00, Ta-6.00, Hf-1.50, B-0.015, Zr-0.02, Re - 3.00
Rene 220	57.40	18.00	12.00	3.00	0.02	1.00	0.50	—	—	5.00	Ta-3.00, B-0.010
Rene N4	60.60	10.00	8.00	2.00	—	3.50	4.20	—	—	0.50	W-6.00, Ta-5.00, Hf-0.20
Rene N5	62.60	7.00	8.00	2.00	—	—	6.20	—	—	—	W-5.00, Ta-6.00, Hf-0.20, Re-3.00
Rene N6	54.20	4.00	12.00	1.00	—	—	5.80	—	—	—	W-6.00, Ta-7.00, Hf-5.00, Re-5.00
Rodar(Kovar)	29.00	—	17.00	—	—	—	—	Bal	0.30	—	—
RR 2000	61.50	10.00	15.00	3.00	—	4.00	5.50	—	—	—	V-1.00
S497	20.00	14.00	20.00	4.00	0.45	—	—	Bal	0.47	4.00	Si-0.61, W-4.00
S500	20.00	20.50	20.00	4.00	0.43	—	—	Bal	1.25	4.00	Si-0.40, W-4.00
S590	20.00	20.50	20.00	4.00	0.43	—	—	Bal	1.35	4.00	Si-0.60, W-4.00-5.00
SC 180	60.20	5.00	10.00	2.00	—	1.00	5.20	—	—	—	W-5.00, Ta-8.50, Hf-0.1, Re-3.00
SEL or SEL-1	45.70	15.00	26.00	4.50	0.08	2.50	4.40	1.00m	0.30m	—	Si-0.50m, B-0.015
SEL 15	56.70	11.00	14.50	6.50	0.07	2.50	5.40	0.50m	0.30m	0.50	Si-0.50m, B-0.015, W-1.50
SM200	57.50	9.00	10.00	2.50	0.15	2.00	5.00	0.25	—	1.00	W-12.50, Zr-0.05, B-0.015
SRR 99	66.30	8.00	5.00	—	—	2.20	5.50	—	—	—	W-10.00, Ta-3.00
Supertherm	35.00	26.00	15.00	—	0.50	—	—	Bal	—	—	W-5.00, Si-1.60
TAZ-8B	64.30	6.00	5.00	4.00	0.12	—	6.00	—	—	1.50	W-4.00, Ta-8.00, B-0.004, Zr-1.00
Tenex	35.00	20.00	6.00	—	0.40	—	—	Bal	—	—	W-7.00
Thermalloy T63CW	36.00	26.00	15.00	—	0.50	—	—	Bal	—	—	Si-2.00, W-5.00
Thermalloy F-17	17.00	—	10.50	4.50	0.03	—	—	Bal	—	—	Ti + Al Added
Thermo-span	23.5-25.5	5-6	28-30	—	0.05 Max.	0.7-1.0	0.3-0.6	30-38	0.5 Max.	4.5-5.2	Si 0.2-0.3



COBALT ALLOYS

Designation	Co	Cr	Ni	W	Mo	C	Ti	Al	Fe	Cb	Other
F-75	60.00	28.00	—	—	5.50	0.25	—	—	—	—	—
FSX 414	50.00	29.50	10.50	7.00	—	0.25	—	—	2.00	—	1.00-Mn, 1.00-Si, 0.012-B
FSX 418	48.58	29.50	10.50	7.00	—	0.25	—	—	2.00	—	1.00-Mn, 1.00-Si, 0.012-B, 0.15-Y
FSX 430	51.17	29.50	10.00	7.50	—	0.40	—	—	—	—	0.50-Y, 0.90-Zr, 0.027-B
H-53	6.70	10.50	0.70	0.45	0.85	0.08	—	—	Bal	0.40	1.30-Mn, 0.15-Si, 0.40-V
Havar	42.50	20.00	13.00	2.80	2.00	0.20	—	—	Bal	—	1.60-Mn, 0.04-Be
Haynes 188	41.86	22.00	22.00	14.00	—	0.10	—	—	—	—	0.04-La
HE 1049	43.60	26.00	10.00	15.00	—	0.40	—	—	3.00 m	—	0.80-Mn, 0.80-Si, 0.40-B
HS-1	50.00	33.00	2.00	12.00	—	2.50	—	—	2.50	—	0.80-Mn, 0.50-Si
HS-3	50.00	30.50	3.00 (max)	12.50	—	2.45	—	—	3.00 max	—	1.00-Mn, 1.00-Si
HS-4	51.00	30.00	3.00 (max)	14.00	1.50 (max)	1.00	—	—	3.00 max	—	1.00-Mn, 1.50-Si
HS-6	66.00	30.00	3.00 (max)	4.50	1.50m	1.10	—	—	3.00 max	—	1.00-Mn, 1.50-Si
HS-6B	52.90	30.00	3.00 (max)	4.50	1.50	1.10	—	—	3.00 max	—	2.00-Mn, 2.00-Si
HS-6K	51.40	31.00	3.00 (max)	4.50	1.50	1.60	—	—	3.00 max	—	2.00-Mn, 2.00-Si
HS-7	67.20	26.00	—	5.50	—	0.40	—	—	—	—	0.50-Mn, 0.40-Si
HS-8	61.80	29.00	—	—	6.25	0.45	—	—	1.50	—	0.40-Mn, 0.60-Si
HS-12	59.00	30.50	3.00 max	8.50	—	1.35	—	—	3.00 max	—	1.00-Mn, 1.00-Si
HS-19	53.00	31.00	3.00 (max)	10.50	—	1.70	—	—	3.00 max	—	1.00-Mn, 1.00-Si
HS-20	45.00	33.00	—	18.00	—	2.50	—	—	—	—	—
HS-21	62.00	27.00	2.50	—	5.50	0.25	—	—	1.00	—	1.00-Mn, 1.00-Si, 0.007-B
HS-23	66.00	24.00	2.00	5.00	—	0.40	—	—	1.00	—	0.30-Mn, 0.60-Si



NICKEL ALLOYS WITH COBALT

Designation	Ni	Cr	Co	Mo	C	Ti	Al	Fe	Mn	Cb	Other
Thetaloy (PWA651)	47.50	25.00	12.50	3.00	0.38	—	—	—	2.50	—	W-7.00, Si-1.00
Ticonium	35.00	25.00	31.00	6.00	0.06	—	—	Bal	0.80	—	Si-0.30
TRW 1900 Mod	60.67	10.30	10.00	—	0.13	1.00	6.30	—	—	1.50	V-0.50, Hf-0.50, W-9.00, Zr-0.10
TRW 1900	61.66	10.30	10.00	—	0.11	1.00	6.30	—	—	1.50	B-0.03, Zr-0.10, W-9.00
TRW 2278	60.14	10.30	10.00	—	0.13	1.00	6.30	—	—	1.50	B-0.03, Zr-0.10, Ta-0.50, W-9.00, Hf-0.50, V-0.50
TRW NASA I-5	61.52	10.00	10.00	1.00	0.13	1.00	6.30	—	—	—	B-0.02, Zr-0.03, W-5.50, Ta-4.50
TRW NASA II-b	56.82	10.00	10.00	2.00	0.13	1.00	4.50	—	—	—	B-0.02, Zr-0.03, Hf-1.00, W-5.50, Ta-8.00, V-1.00
TRW NASA II-d	56.55	10.00	10.00	2.00	0.13	1.00	4.50	—	—	1.00	B-0.02, Hf-1.00, Ta-8.00, W-5.50, Zr-0.30
TRW NASA III-9	54.82	10.00	10.00	2.00	0.13	1.00	4.50	—	—	—	B-0.02, Re-4.00, Ta-8.00, W-5.50, Zr-0.03
TRW NASA IV-Y	62.90	6.00	5.00	2.00	0.15	1.00	5.40	—	—	1.00	B-0.02, Hf-2.00, Zr-0.03, W-5.50, Re-1.00, Ta-8.00
TRW NASA VI-A	61.49	6.10	7.50	2.00	0.13	1.00	5.40	—	—	0.50	B-0.02, Zr-0.13, Re-0.50, W-5.80, Ta-9.00, Hf-0.43
Udimet 15	57.30	15.00	15.00	3.50	0.15	4.00	5.00	—	—	—	Zr-0.05
Udimet 400	59.87	17.50	14.00	4.00	0.06	2.50	1.50	—	—	0.50	Zr-0.07
Udimet 500	53.00	19.00	19.00	4.00	0.08	3.00	3.00	4.00m	0.75	—	Si-0.75, W-4.00, B-0.005
Udimet 520	56.00	19.00	12.00	6.00	0.08	3.00	2.00	—	—	—	W-1.00 B-0.005
Udimet 600	52.00	17.50	16.50	4.00	0.10	2.90	4.20	4.00m	—	—	B-0.04m
Udimet 700	52.00	15.00	18.50	5.00	0.07	3.40	4.30	1.00m	0.15	—	Si-0.20 B-0.030
Udimet 710	55.00	18.00	14.80	3.00	0.07	5.00	2.50	—	—	—	W-1.50 B-0.020
Unitemp AE-2-1-DA	59.45	12.00	10.00	3.00	0.35	3.00	4.60	—	—	—	W-6.00 Zr-0.10 Ta-1.50
Unitemp AF 1753	51.49	16.25	7.20	1.60	0.24	3.20	1.90	9.50	0.05	—	Si-0.10 W-8.40 B-0.008 Zr-0.06



NICKEL COPPER ALLOYS

Designation	Ni	Cu	C	Al	Fe	Mn	Cr	Si	Other
Type 2550 Chace Bimetal	54.20	15.70	—	—	Balance	0.70	—	—	—
Type 6550 Chace Bimetal	23.00	9.00	—	—	Balance	36.10	—	—	—
Type 6850 Chace Bimetal	15.70	14.10	—	—	Balance	56.20	—	—	—
Type 6975 Chace Bimetal	8.40	15.10	—	0.60	Balance	60.40	2.80	—	—
Type 7000 Chace Bimetal	25.30	9.40	—	—	Balance	37.50	—	—	—
Constantan	47.00	52.00	—	—	—	1.00	—	—	—
Copel (Ferry)	45.00	55.00	—	—	—	—	—	—	—
Copper Nickel, 10%	10.00	88.70	—	—	1.30	—	—	—	—
Copper Nickel, 30%	30.00	70.00	—	—	—	—	—	—	—
Cunico I	21.00	50.00	—	—	—	—	—	—	Co-29.00
Cupro Nickel 70/30	30.00	68.75	—	—	0.50m	0.75m	—	—	—
Cupro Nickel 70/30 E.B.	30.00	Balance	—	—	0.50m	0.75m	—	—	Cb added
Cupro Nickel 80/20	20.00	79.85	—	—	0.75m	0.40m	—	—	—
Cupro Nickel 90/10	10.00	89.25 max	—	—	0.75-2.00	—	—	—	—
Eureka	40.00	60.00	—	—	—	—	—	—	—



NICKEL COPPER ALLOYS

Designation	Ni	Cu	C	Al	Fe	Mn	Cr	Si	Other
Advance	45.00	55.00	—	—	—	—	—	—	—
Ampcoloy 558	63.00	31.00	—	—	2.00	1.00	—	1.50	—
Ampcoloy 559	65.00	30.00	—	—	2.00	1.00	—	0.20	—
Carbondale Silver	18.00	66.00	—	—	—	—	—	—	Zn-16.00
S-120 Chace Bimetal	23.80	7.90	—	—	Balance	31.80	0.20	—	—
S-696 Chace Bimetal	55.20	17.80	—	—	Balance	0.50	—	—	—
S-992 Chace Bimetal	32.10	28.20	—	—	—	39.70	—	—	—
Type 1020 Chace Bimetal	14.30	57.30	—	—	Balance	—	0.20	—	—
Type 1025 Chace Bimetal	17.70	48.80	—	—	Balance	—	0.40	—	—
Type 1030 Chace Bimetal	20.30	37.60	—	—	Balance	—	0.50	—	—
Type 1040 Chace Bimetal	21.70	31.30	—	—	Balance	—	0.70	—	—
Type 1050 Chace Bimetal	23.10	25.10	—	—	Balance	—	0.80	—	—
Type 1070 Chace Bimetal	24.10	17.70	—	—	Balance	—	1.20	—	—
Type 1090 Chace Bimetal	25.10	13.70	—	—	Balance	—	1.30	—	—
Type 1100 Chace Bimetal	25.40	12.20	—	—	Balance	—	1.30	—	—
Type 2000 Chace Bimetal	52.30	15.80	—	—	Balance	0.50	—	—	—



NICKEL COPPER ALLOYS

Designation	Ni	Cu	C	Al	Fe	Mn	Cr	Si	Other
Waukesha No. 4	23.00-27.00	54.00-60.00	—	—	3.00	2.00-3.00	—	1.00	Sn-4.00-6.00, Zn-6.00
Waukesha No. 7	23.00-27.00	54.00-60.00	—	—	3.00	—	—	—	Zn-4.00-7.00 Pb-4.00-7.00 Sn-3.00
Waukesha No. 11	23.00-27.00	61.00-67.00	—	—	6.00-9.00	1.00-2.00	—	0.05 max	—
Waukesha No. 118	18.00-21.00	63.00-69.00	—	—	8.00	—	—	—	Zn-3.00-5.00, Pb-3.50-4.50, Sn-2.50-3.50
Waukesha No. 120	23.00-26.00	58.00-61.00	—	—	1.50-2.50	—	—	—	Zn-3.00-5.00, Sn-5.50-6.50, Pb-3.50-4.50
WBD Weld 60	65.00	27.00	—	—	—	3.50	—	1.00	Ti-2.00
WBD Weld 67	31.00	67.00	—	—	—	0.75	—	—	—
C 70100	Ni/Co-3.00-4.00	Balance	—	—	0.05	0.50	—	—	Zn-0.25
C 70200	Ni/Co-2.00-3.00	Balance	—	—	0.10	0.40	—	—	Pb-0.05
C 70400 Copper Nickel, 5%	Ni/Co-4.80-6.20	Balance	—	—	1.30-1.70	0.30-0.80	—	—	Pb-0.05, Zn-1.00
C 70500 Copper Nickel, 7%	Ni/Co-5.80-7.80	Balance	—	—	0.10	0.15	—	—	Pb-0.054, Zn-0.20
C 70600 Copper Nickel, 10%	Ni/Co-9.00-11.00	Balance	—	—	1.00-1.80	1.00	—	—	Pb-0.05, Zn-1.00



COBALT ALLOYS

Designation	Co	Cr	Ni	W	Mo	C	Ti	Al	Fe	Cb	Other
MAR-M 509	53.00	23.50	10.00	7.00	—	0.60	0.20	—	2.00m	—	3.50-Ta, 0.50-Zr, 0.010m-B, 0.10m-Mn, 0.40m-Si
MAR-M 905	51.85	20.00	20.00	—	—	0.05	0.50	—	—	—	0.10-Zr, 7.50-Ta
MAR-M 918	51.45	20.00	20.00	—	—	0.05	—	—	0.50m	—	0.20m-Mn, 0.20m-Si, 7.50-Ta, 0.10-Zr
Melco 2	60.98	30.00	0.50	8.10	—	0.25	—	—	—	—	0.012-B, 0.15-Y
Melco 9	47.09	31.80	9.90	7.85	—	0.27	—	—	—	—	0.008-B, 2.95-Cu, 0.13-Y
Melco 10	49.93	31.80	9.90	7.85	—	0.42	—	—	—	—	0.10-Y
Melco 14	49.07	28.70	10.70	7.40	—	0.40	—	—	—	—	0.30-Mn, 3.10-Ta, 0.15-Hf, 0.18-Y
ML 1700	59.40	25.00	—	15.00	—	0.20	—	—	—	—	0.40-B
MP 20N	50.00	20.00	20.00	—	10.00	—	—	—	—	—	—
MP 35N	35.00	20.00	35.00	—	10.00	—	—	—	—	—	—
M-159 Multiphase	36.00	19.00	25.00	—	7.00	—	3.00	0.20	9.00	0.50	—
NASA Co-W-Re	67.60	3.00	—	25.00	—	0.40	1.00	—	—	—	1.00-Zr, 2.00-Re
Nivaflex	45.00	18.00	21.00	4.00	4.00	0.03	1.00	—	Bal	—	0.30-Be
Nivco	73.50	—	22.50	—	—	0.02	1.80	0.22	0.30	—	1.10-Zr, 0.35-Mn, 0.15-Si
Nivco 10	73.33	—	22.50	—	—	0.05m	1.80	0.22	1.00m	—	0.35-Mn, 0.15-Si, 0.60-Zr
Oerstit 260	28.00	—	15.00	—	—	—	8.00	7.00	Bal	—	5.00-Cu
Oerstit 300	22.00	—	17.00	—	—	—	2.00	9.00	Bal	—	3.00-Cu
Oerstit 450K	42.00	—	14.00	—	—	—	8.00	7.00	Bal	—	4.00-Cu
Oneral	55.00	28.00	6.00	—	10.00	0.09	—	—	—	—	0.03-Zr + Ti
Oneral M47	50.00	27.50	6.50	—	10.50	0.80	0.03	—	Bal	—	1.00-Mn, 1.00-Si, 0.10-Zr, 0.05-0.20-Ti + Zr
Oneral S90	50.00	27.50	17.50	—	5.00	0.30	0.30	—	Bal	—	0.01XB-Ti + Zr, B added
P-6	45.00	—	6.00	—	—	—	—	—	Bal	—	5.00-V
Permendur	50.00	—	—	—	—	—	—	—	Bal	—	0.40-Mn



NICKEL COPPER ALLOYS

Designation	Ni	Cu	C	Al	Fe	Mn	Cr	Si	Other
Monel 506 (H)	64.00	30.00	0.10	—	1.50	—	—	3.20	S-0.008
Monel 507 (Rh-Monel)	Balance	30.00-31.00	0.55	—	1.50	0.80	—	2.70	S-0.008
Monel C	63.00-70.00	Balance	0.20	—	2.50m	2.00m	—	—	—
Monel D	60.00 min.	27.00-30.00	0.25	0.50	3.50	1.50	—	3.50-4.50	—
Monel E	65.00	30.00	0.18	—	3.00 max	—	—	—	Cb-1.00-3.00
Monel G	63.00-70.00	Balance	0.30	—	2.50	2.00	—	—	—
Nickel Silver, 55-18	18.00	55.00	—	—	—	—	—	—	Zn-27.00
Nickel Silver, 65-10	10.00	65.00	—	—	—	—	—	—	Zn-25.00
Nickel Silver, 65-12	12.00	65.00	—	—	—	—	—	—	Zn-23.00
Nickel Silver, 65-15	15.00	65.00	—	—	—	—	—	—	Zn-20.00
Nickel Silver, 65-18	18.00	65.00	—	—	—	—	—	—	Zn-17.00
Platnam	52.00	33.00	—	0.30	0.50	—	—	—	Sn-13.00
Waukesha No. 0	28.00-32.00	47.00-53.00	—	—	—	—	—	—	Pb-4.00-6.00, Sn-10.00-13.00, Sb-2.50-3.50
Waukesha No. 1	20.00-30.00	48.00-54.00	—	—	—	—	—	—	Pb-5.00-7.00 Sn-1.50-2.50 Zn-16.00-20.00
Waukesha No. 3	28.00-32.00	61.00-67.00	—	—	2.00-3.00	1.00-2.00	—	1.00-2.00	—



COBALT ALLOYS

Designation	Co	Cr	Ni	W	Mo	C	Ti	Al	Fe	Cb	Other
Permendur 2V (Hyperco 50)	48.50	—	—	—	—	—	—	—	Bal	—	2.00-V
Phynox	40.00	20.00	15.00	—	10.50	0.13	—	—	Bal	—	—
PWA 653	64.00	21.00	1.00 m	11.00	—	0.45	—	—	2.00	2.00	0.50m-Mn, 0.50m-Si
Pyromet X-12	6.00	10.50	—	—	4.75	0.12	—	—	Bal	—	Cu-1.25, 0.90-Mn, 0.25-Si, 0.08-N
Pyromet X-15	20.00	15.00	0.20m	—	2.90	0.03m	—	—	Bal	—	0.10m-Mn, 0.10m-Si
Pyrotool 15	20.00	15.00	0.20m	—	2.90	0.03m	—	—	Bal	—	0.10m-Mn, 0.10m-Si
Refractaloy 70	30.00	20.00	21.00	4.20	8.00	0.04	—	—	Bal	—	2.00-Mn, 0.30-Si
Refractaloy 80	30.00	20.00	20.00	5.00	10.00	0.10	—	—	Bal	—	0.60-Mn, 0.70-Si
Remalloy 17	11.00-13.00	—	—	—	17.00	—	—	—	69.00-72.00	—	0.30-Mn
Remalloy 20	11.00-13.00	—	—	—	20.00	—	—	—	Bal	—	0.30-Mn
Remendur	50.00	—	—	—	—	—	—	—	Bal	—	4.00-6.00-V
Rexalloy	46.00	33.00	—	17.00	—	2.20	—	—	1.00	—	—
S-816	42.00-45.00	19.00-21.00	19.00-21.00	4.00	4.00	0.38	—	—	4.00	4.00	1.50-Mn, 0.70-Si
S-816 Mod	53.00	25.00	5.00	4.00	4.00	0.38	—	—	2.00	—	1.20-Mn, 0.40-Si, 1.00-B
S-816+B	42.20	20.00	20.00	4.00	4.00	0.40	—	—	3.00	4.00	1.00-Mn, 0.40-Si, 1.00-B
Sermalloy A1	38.00	—	14.00	—	—	—	8.00	7.50	Bal	—	3.00-Cu
Sermalloy A2	24.00	—	12.00	—	—	—	—	7.50	Bal	—	0.20-Si, 2.00-Cu
SM 302	56.00	21.50	1.50	10.00	—	0.85	—	—	—	—	9.00-Ta
Stainless Invar	54.00-56.00	5.00	—	—	—	—	—	—	36.00-37.00	—	—
Star J	45.00	32.00	2.50	17.50	—	2.50	—	—	Bal	—	—
Supermendur	49.00	—	—	—	—	—	—	—	49.00	—	2.00-V



NICKEL COPPER ALLOYS

Designation	Ni	Cu	C	Al	Fe	Mn	Cr	Si	Other
Ferry (Copel)	45.00	55.00	—	—	—	—	—	—	—
German Silver	8.00-18.00	47.00-57.00	—	—	—	—	—	—	Sn/Pb-Balance, Zn-25.00-30.00
Incramet 800	15.00	Balance	—	10.00	0.70	—	—	—	Co-1.50
Kunifer 5	5.00	93.80	—	—	1.20	—	—	—	—
Kunifer 10	10.00	88.00	—	—	2.00	—	—	—	—
Kunifer 30	30.00	68.00	—	—	0.70	0.80	—	—	—
Monel 400	Balance	31.50	0.12	—	1.35	0.90	—	0.15	—
Monel 401	42.50	Balance	0.05	—	0.25	1.65	—	0.01	Co-0.50m
Monel 402	55.00-60.00	40.00	0.12	—	1.20	0.90	—	0.10	S-0.005
Monel 403	55.00-60.00	38.00-42.00	0.12	—	0.05	1.80	—	0.25	S-0.005
Monel 404	54.50	44.00	0.06	0.02	0.05	0.01	—	0.02	—
Monel R405	66.00	31.50	0.18	—	1.35	0.90	—	0.15	—
Monel 406	84.00	13.00	0.12	—	1.35	0.90	—	0.15	—
Monel 410	Balance	30.00-31.00	0.20	—	3.00 max	0.80	—	1.60	S-0.0008
Monel 411	Balance	32.00-33.00	0.20	—	1.50	0.80	—	1.60	S-0.0008, Cb-1.30
Monel 450	30.50	Balance	0.03	—	0.55	0.75	—	—	—
Monel 474	Balance	45.00-47.00	0.01	Trace	0.01	Trace	—	0.015	S-0.001
Monel 501	65.00	29.50	0.23	2.80	1.00	0.60	—	0.15	Ti-0.50
MonelK500	65.00	29.50	0.15	2.80	1.00	0.60	—	0.15	Ti-0.50
Monel 501 (Kr-Monel)	Balance	29.00-30.00	0.23	2.00-4.00	1.00	0.60	—	0.15	Ti-0.50, Si-0.005
Monel 505 (S)	64.00	29.00	0.08	—	2.00	0.08	—	4.00	S-0.008



COBALT ALLOYS

Designation	Co	Cr	Ni	W	Mo	C	Ti	Al	Fe	Cb	Other
Tangtung G	46.00	28.00	—	16.00	1.00-3.00	2.00	—	—	2.00	—	5.00-Cb or Ta
Ticonium	29.00	25.00	30.00	—	6.00	0.06	—	—	—	—	—
ULTIMET	44.71-63.23	23.50-27.50	7.00-11.00	1.00-3.00	4.00-6.00	0.02-0.10	—	—	1.00-5.00	—	0.015 max-B, 0.10-1.50-Mn, 0.03-0.12-N, 0.030 max-P, 0.020 max-S, 0.05-1.00-Si
Umco 50	47.00-52.00	28.00	—	—	—	0.12	—	—	21.00	—	0.60-Mn, 0.70-Si
Umco 51	49.33	28.00	—	—	—	0.27	—	—	19.00	2.10	0.60-Mn, 0.70-Si
V-36	41.33	25.00	20.00	2.00	4.00	0.27	—	—	3.00	2.00	1.00-Mn, 0.40-Si, 1.00-Ti
Vicalloy 1	52.00	—	—	1.90	—	—	—	—	Bal	—	0.30-Mn, 10.00-V
Vicalloy 2	51.70	—	—	—	—	0.20	—	—	Bal	—	0.30-Mn, 14.00-V
Vitalium	61.85-63.85	30.00	—	—	5.00-7.00	0.40	—	—	—	—	0.75m-Mn
W-912	30.00	20.00	25.00	8.00	4.00	0.35	—	—	Bal	—	—
WAUC-65	5.00	14.00	—	2.50	4.00	1.10	—	—	Bal	—	0.35-Mn, 0.35-Si, 2.50-V
WF-31	53.71	20.00	10.00	10.70	2.60	0.15	1.00	—	—	—	1.42-Mn, 0.42-Si
WI-52	64.00	21.00	1.00m	11.00	—	0.45	—	—	2.00	2.00	0.50m-Mn, 0.50m-Si
X-40 (HS31)	55.50	25.00	10.00	7.50	—	0.50	—	—	1.50	—	—
X-45	52.20	25.00	10.50	7.00	—	0.25	—	—	2.00 m	2.00	1.00-Mn, 0.010-B
X-45(b)	53.74	25.50	10.50	7.00	—	0.25	—	—	2.00(c)	—	1.0(c)-Mn, 0.010-B
X-50	40.00	22.50	20.00	12.00	—	0.76	—	—	2.50	—	0.60-Mn, 0.50-Si
X-63	58.00	23.00	10.00	—	6.00	0.40	—	—	1.00	—	—
670	52.90	20.00	10.00	15.00	—	0.10	—	—	—	—	1.50-Mn, 0.50-Si



NICKEL COPPER ALLOYS

Designation	Ni	Cu	C	Al	Fe	Mn	Cr	Si	Other
C 78800	Ni/Co 9.00- 11.00	63.00- 67.00	—	—	0.25	0.50	—	—	Pb-1.50-2.00, Zn-Balance
C 79000	Ni/Co 11.00- 13.00	63.00- 67.00	—	—	0.35	0.50	—	—	Pb-1.50-2.20, Zn-Balance
C 79200	Ni/Co 11.00- 13.00	59.00- 66.50	—	—	0.25	0.50	—	—	Pb-0.80-1.40, Zn-Balance
C 79300	Ni/Co 11.00- 13.00	55.00- 59.00	—	—	0.50	0.50	—	—	Pb-0.50-2.00, Zn-Balance
C 79600 Leaded Nickel Silver, 10%	Ni/Co 9.00- 11.00	43.50- 46.50	—	—	—	1.50- 2.50	—	—	Pb-0.80-1.20, Zn-Balance
C 79800	Ni/Co 9.00- 11.00	45.50- 48.50	—	—	0.25	1.50- 2.50	—	—	Pb-1.50-2.50, Zn-Balance
C 79900	Ni/Co 6.50- 8.50	47.50- 50.50	—	—	0.25	0.50	—	—	Pb-1.00-1.50, Zn-Balance
C 94700	Ni/Co 4.50- 6.00	85.00- 90.00	—	0.005	0.25	0.20	—	0.005	Sb-0.15, S-0.05, P-0.05, Sn-4.50-6.00, Pb-0.10, Zn-1.00-2.50
C 94800	Ni/Co 4.50- 6.00	84.00- 89.00	—	0.005	0.25	0.20	—	0.005	Zn-1.00-2.50, Sb-0.15, S-0.05, Sn-4.50-6.00, Pb-0.30-1.00, P-0.05



NICKEL COPPER ALLOYS

Designation	Ni	Cu	C	Al	Fe	Mn	Cr	Si	Other
C 76300	Ni/Co 17.00- 19.00	60.00- 64.00	—	—	0.50	0.50	—	—	Pb-0.50-2.00, Zn-Balance
C 76400	Ni/Co 16.50- 19.50	58.50- 61.50	—	—	0.25	0.50	—	—	Pb-0.05, Zn-Balance
C 76600	Ni/Co 11.00- 13.50	55.00- 58.00	—	—	0.25	0.50	—	—	Pb-0.10, Zn-Balance
C 76700 Nickel Silver, 56.50-15	Ni/Co 14.00- 16.00	55.00- 58.00	—	—	—	0.50	—	—	Zn-Balance
C 77000 Nickel Silver 55-18	Ni/Co 16.50- 19.50	53.50- 56.50	—	—	0.25	0.50	—	—	Pb-0.10, Zn-Balance
C 77300	Ni/Co 9.00- 11.00	46.00- 50.00	—	0.01	—	—	—	0.04- 0.25	Pb-0.05, P-0.25, Zn-Balance
C 77400	Ni/Co 9.00- 11.00	44.00- 47.00	—	—	—	—	—	—	Pb-0.20, Zn-Balance
C 77600 Nickel Silver, 43.50-13	Ni/Co 12.00- 14.00	42.00- 45.00	—	—	0.20	0.25	—	—	Pb-0.25, Zn-Balance, Sn-0.15
C 78200	Ni/Co 7.00- 9.00	63.00- 67.00	—	—	0.35	0.50	—	—	Pb-1.50-2.50, Zn-Balance



NICKEL COPPER ALLOYS

Designation	Ni	Cu	C	Al	Fe	Mn	Cr	Si	Other
C 99300 Incramet 800	13.50- 16.50	Balance	—	10.70- 11.50	0.40- 1.00	—	—	0.02	Sn-0.05, Pb-0.02, Co-1.00-2.00
C 99400	1.00- 3.50	Balance	—	0.50- 2.00	1.00- 3.00	—	—	0.50- 2.00	Pb-0.25, Zn-0.50-5.00
C 99500	3.50- 5.50	Balance	—	0.50- 2.00	3.00- 5.00	0.50	—	0.50- 2.00	Pb-0.25, Zn-0.50-2.00
C 99600 Incramute 1	0.20	Balance	0.05	1.00- 2.80	0.20	39.00- 45.00	—	0.10	Zn-0.20, Sn-0.10, Pb-0.02, Co-0.20
C 99700	4.00- 6.00	54.00 min.	—	0.50- 3.00	1.00	11.00- 15.00	—	—	Sn-1.00, Pb-2.00, Zn-19.00-25.00
C 99750	5.00	55.00- 61.00	—	0.25- 3.00	1.00	17.00- 23.00	—	—	Sn-0.50-2.50, Zn-17.00-23.00



NICKEL COPPER ALLOYS

Designation	Ni	Cu	C	Al	Fe	Mn	Cr	Si	Other
C 70690	Ni/Co 9.00- 11.00	Balance	—	—	0.005	0.001	—	—	Pb-0.001, Zn-0.001
C 70700	Ni/Co 9.50- 10.50	Balance	—	—	0.05	0.50	—	—	—
C 70800 Copper Nickel, 11%	Ni/Co 10.50- 12.50	Balance	—	—	0.10	0.15	—	—	Pb-0.05, Zn-0.20
C70900	Ni/Co 13.50- 16.50	Balance	—	—	0.60	0.60	—	—	Pb-0.05, Zn-1.00
C 71000 Copper Nickel, 20%	Ni/Co 19.00- 23.00	Balance	—	—	1.00	1.00	—	—	Pb-0.05, Zn-1.00
C 71100	Ni/Co 22.00- 24.00	Balance	—	—	0.10	0.15	—	—	Pb-0.05, Pb-0.20
C 71300	Ni/Co 23.50- 26.50	Balance	—	—	0.20	1.00	—	—	Pb-0.05, Zn-1.00
C 71500 Copper Nickel, 30%	Ni/Co 29.00- 33.00	Balance	—	—	0.40- 1.00	1.00	—	—	Pb-0.05, Zn-1.00
C 71580	Ni/Co 29.00- 33.00	Balance	—	—	0.50	0.30	—	—	Pb-0.05, Zn-0.05



NICKEL COPPER ALLOYS

Designation	Ni	Cu	C	Al	Fe	Mn	Cr	Si	Other
C 96300	Ni/Co 18.00- 22.00	Balance	—	—	0.40- 1.00	1.00	—	0.70	Pb-0.03, Nb-1.00
C 96400	Ni/Co 28.00- 32.00	65.00- 69.00	0.15	—	0.25- 1.50	1.50	—	0.50	Pb-0.03, Nb-0.50-1.50
C 96600	Ni/Co 29.00- 33.00	Balance	—	—	0.80- 1.10	1.00	—	0.15	Pb-0.01, Be-0.40-0.70
C 96700	Ni/Co 29.00- 33.00	Balance	—	—	0.70- 1.00	0.70	—	0.15	Ti-0.10-0.20, Pb-0.01, Be-1.10-1.20 Zr-0.10-0.20
C 96800	Ni/Co 9.50- 10.50	Balance	—	—	0.50	0.05- 0.30	—	0.05	Pb-0.005, Nb-0.10-0.30
C 97300	Ni/Co 11.00- 14.00	53.00- 58.00	—	0.005	1.50	0.50	—	0.15	Zn-17.00-25.00, Sb-0.35, Sn-1.50-3.00, Pb-8.00-11.00, S-0.08, P-0.05
C 97400	Ni/Co 15.50- 17.00	58.00- 61.00	—	—	1.50	0.50	—	—	Zn-Balance, Sn-2.50-3.50, Pb-4.50-5.50
C 97600	Ni/Co 19.00- 21.50	63.00- 67.00	—	0.005	1.50	1.00	—	0.15	Zn-3.00-9.00, Sb-0.25, S-0.08, P-0.05, Sn-3.50-4.50, Pb-3.00-5.00
C 97800	Ni/Co 24.00- 27.00	64.00- 67.00	—	0.005	1.50	1.00	—	0.15	Zn-1.00-4.00, Sb-0.20, S-0.08, P-0.05, Sn-4.00-5.00, Pb-1.00-2.50



NICKEL COPPER ALLOYS

Designation	Ni	Cu	C	Al	Fe	Mn	Cr	Si	Other
C 71590	Ni/Co 29.00- 33.00	Balance	—	—	0.005	0.001	—	—	Pb-0.001, Zn-0.001
C 71700	Ni/Co 29.00- 33.00	Balance	—	—	0.40- 1.00	—	—	—	Be-0.30-0.70
C 71900	Ni/Co 28.00- 32.00	Balance	0.01	—	0.50	0.20- 1.00	2.40- 3.20	0.25	Zr-0.02-0.25, Ti-0.01-0.020
C 72200	Ni/Co 15.00- 18.00	Balance	—	—	0.70- 1.00	1.00	0.30- 0.70	0.03	Ti-0.03
C 72500	Ni/Co 8.50- 10.50	Balance	—	—	0.60	0.20	—	—	Pb-0.05, Zn-0.50, Sn-1.80-2.80
C 73200	Ni/Co 19.00- 23.00	70.00 min.	—	—	0.60	1.00	—	—	Pb-0.05, Zn-3.00-6.00
C 73500	Ni/Co 16.50- 18.50	70.50- 73.50	—	—	0.25	0.50	—	—	Pb-0.10, Zn-Balance
C 73800 Nickel Silver, 70-12	Ni/Co 11.00- 13.00	68.50- 71.50	—	—	0.25	0.50	—	—	Zn-Balance, Pb-0.05
C 74000	Ni/Co 9.00- 11.00	69.00- 73.50	—	—	0.25	0.50	—	—	Pb-0.10, Zn-Balance



NICKEL COPPER ALLOYS

Designation	Ni	Cu	C	Al	Fe	Mn	Cr	Si	Other
C 94900	Ni/Co 4.00- 6.00	79.00- 81.00	—	0.005	0.30	0.10	—	0.005	S-0.08, P-0.05, Sn-4.00-6.00, Pb-4.00-6.00, Sb-0.25
C 95200	—	86.00 min.	—	8.50- 9.50	2.50- 4.00	—	—	—	—
C 95300	—	86.00 min.	—	9.00- 11.00	0.80- 1.50	—	—	—	—
C 95400	Ni/Co 2.50 min.	83.00 min.	—	10.00- 11.50	3.00- 5.00	0.50	—	—	—
C 95410	Ni/Co 1.50- 2.50	83.00 min.	—	10.00- 11.50	3.00- 5.00	0.50	—	—	—
C 95500	Ni/Co 3.00- 5.50	78.00 min.	—	10.00- 11.50	3.00- 5.00	3.50	—	—	—
C 95600	Ni/Co 0.25	88.00 min.	—	6.00- 8.00	—	—	—	1.80- 3.30	—
C 95700	Ni/Co 1.50- 3.00	71.00 min.	—	7.00- 8.50	2.00- 4.00	11.00- 14.00	—	0.10	Pb-0.03
C 95800	Ni/Co 4.00- 5.00	79.00 min.	—	8.50- 9.50	3.50- 4.50	0.80- 1.50	—	0.10	Pb-0.03
C 96200	Ni/Co 9.00- 11.00	84.50- 87.00	0.10	—	1.00- 1.80	1.50	—	0.30	Pb-0.03, Nb-1.00



NICKEL COPPER ALLOYS

Designation	Ni	Cu	C	Al	Fe	Mn	Cr	Si	Other
C 74300	Ni/Co 7.00- 9.00	63.00- 66.00	—	—	0.25	0.50	—	—	Pb-0.10, Zn-Balance
C 74500 Nickel silver, 65-10	Ni/Co 9.00- 11.00	63.50- 66.50	—	—	0.25	0.50	—	—	Pb-0.10, Zn-Balance
C 75200 Nickel Silver, 65-18	Ni/Co 16.50- 19.50	63.00- 66.50	—	—	0.25	0.50	—	—	Pb-0.10, Zn-Balance
C 75400 Nickel Silver 65-15	Ni/Co 14.00- 16.00	63.50- 66.50	—	—	0.25	0.50	—	—	Pb-0.10, Zn-Balance
C 75700 Nickel Silver 65-12	Ni/Co 11.00- 13.00	63.50- 66.50	—	—	0.25	0.50	—	—	Pb-0.05, Zn-Balance
C 75900	Ni/Co 17.00- 19.00	60.00- 63.00	—	—	0.25	0.50	—	—	Pb-0.10, Zn-Balance
C 76000	Ni/Co 7.00- 9.00	60.00- 63.00	—	—	0.25	0.50	—	—	Pb-0.10, Zn-Balance
C 76100	Ni/Co 9.00- 11.00	59.00- 63.00	—	—	0.25	0.50	—	—	Pb-0.10, Zn-Balance
C 76200	Ni/Co 11.00- 13.50	57.00- 61.00	—	—	0.25	0.50	—	—	Pb-0.10, Zn-Balance



RUSSIAN TITANIUM ALLOYS

ALLOY	Al	Mn	Mo	V	Zr	Cr	Sn	Si	Fe	C max	Fe max	Si max	O max	N max	H max	Others
2B	1.80-2.30	—	—	1.30-1.80	—	—	—	—	—	0.06	0.15	0.10	0.10	0.05	0.015	0.30
3M	3.80-4.70	—	—	—	—	—	—	—	—	0.08	0.20	0.10	0.13	0.05	0.015	0.30
AT-3	2.00-3.50	—	—	—	—	0.20-0.50	—	0.20-0.40	0.20-0.50	0.10	—	—	0.15	0.05	0.008	0.30
BT1-0	0.30-0.70	—	—	—	—	—	—	—	—	0.07	0.25	0.10	0.20	0.04	0.010	0.30
BT 1-00	0.30 max	—	—	—	—	—	—	—	—	0.05	0.15	0.08	0.10	0.04	0.008	0.10
BT3-1	5.50-7.00	—	2.00-3.00	—	—	0.80-2.00	—	0.15-0.40	0.20-0.70	0.10	—	—	0.18	0.05	0.015	0.30
BT5	4.50-6.20	—	0.70 max	1.20 max	—	—	—	—	—	0.10	0.30	0.12	0.20	0.05	0.015	0.30
BT5-1	4.30-6.00	—	—	1.0 max	—	—	2.00-3.00	—	—	0.10	0.30	0.12	0.15	0.05	0.015	0.30
BT6 (VT6)	5.30-6.80	—	—	3.50-5.30	—	—	—	—	—	0.10	0.30	0.15	0.20	0.05	0.015	0.30
BT-8	5.80-7.00	—	2.80-3.80	—	—	—	—	0.20-0.40	—	0.10	0.30	—	0.15	0.05	0.015	0.30
BT-9	5.80-7.00	—	2.80-3.80	—	1.00-2.00	—	—	0.20-0.35	—	0.10	0.25	—	0.15	0.05	0.015	0.30
BT-14	3.50-6.30	—	2.50-3.80	0.90-1.90	—	—	—	—	—	0.10	0.25	0.15	0.15	0.05	0.015	0.30
BT-15	2.30-3.60	—	6.80-8.00	—	—	9.50-11.50	—	—	—	0.10	0.30	0.15	0.12	0.05	0.012	0.30
BT-16	1.80-3.80	—	4.50-5.50	4.00-5.00	—	—	—	—	—	0.10	0.25	0.15	0.15	0.05	0.015	0.30



TITANIUM ALLOYS

Designation	Ti	Al	V	Sn	Mn	Mo	Cr	Zr	Fe	Cb	Other
TI-8-2-1	Bal	8.00	—	—	—	—	—	—	—	2.00	Ta-1.00
TI-8-8-1	Bal	8.00	—	—	—	—	—	8.00	—	—	Co+Ta-1.00
TI-10-2-3	Bal	3.00	10.00	—	—	—	—	—	2.00	—	—
TI-11.5-6-4.5	77.95	—	—	4.55	—	11.50	—	6.00	—	—	—
TI-13-11-3 (B120VCA)	73.00	3.00	13.00	—	—	—	11.00	—	—	—	—
Ti-3Al-2.7Nb-4Zr	Bal	3.00-4.00	7.50-8.50	—	—	3.50-4.50	5.50-6.50	3.50-4.50	0.30 max	—	N-0.03 max, O-0.12 max, H-0.03 max, C-0.005 max, 0.4 max others(total)
TI-15-3	Bal	2.50-3.50	14.00-16.00	2.50-3.50	—	—	2.50-3.50	—	0.25 max	—	H-0.015 max, N-0.05 max, O-0.13 max, C-0.05
TI-15-15	70.00	—	—	—	—	—	—	—	—	—	Ni-15.00, Cu-15.00
Ti-15 Mo Beta Titanium Alloy	Bal	—	—	—	—	15.00	—	—	0.10	—	C-0.05 max, H-0.015 max, O-0.15
TI-17	Bal	5.00	—	2.00	0.05	4.00	4.00	2.00	0.15	—	C-0.03, Cu-0.05, H-0.015 max, N-0.02, O-0.11
TI 150	Bal	—	—	—	—	—	2.80	—	1.50	—	—
TI 485	Bal	—	6.60	0.10	0.10	3.50	9.00	0.30	Residual	0.01	—
TIMETAL 834	Bal	5.50-6.10	—	3.00-5.00	—	0.25-0.75	—	3.00-5.00	0.05 max	0.50-1.00	Si-0.2-0.6, C-0.04-0.08, O-0.075-0.150, N-0.03 max, H-0.006
TIPD	Bal	—	—	—	—	—	—	—	—	—	Pd-0.15-0.20
Unalloyed Titanium	Bal	—	—	—	—	—	—	—	0.20 max	—	N-0.03 max., C-0.10 max., H-0.0125 max., O-0.18 max., Residuals-0.40 max



REFRACTORY ALLOYS

Designation	Ti	Al	V	Sn	Mn	Mo	Cr	Zr	Fe	Nb/Cb	Other
61 Metal	—	—	—	—	—	—	—	—	—	—	W-7.00-8.00, Ta-Bal.
C-103	0.70-1.30	—	—	—	—	—	—	0.70 max	—	Bal	C-0.0100 max, Hf-9.00-11.00, O-0.0300, N-0.0300 max, H-0.0020 max, W-0.50max, Ta-0.50max
C-129Y	—	—	—	—	—	—	—	0.50 max	—	—	W-9.00-11.00, Hf-9.0-11.0, Y-0.05-0.30, Ta-0.50, 0.015max, O-0.025 max, N-0.015 max, H-0.0015 max
Cabot-6	—	—	—	—	—	—	—	—	—	0.50 max	W-2.00-3.00, Ta – bal.
Cabot-10	—	—	—	—	—	—	—	—	—	—	W-9.00-11.00, Ta-Bal.
Cb-28Ta-10W-1Zr	—	—	—	—	—	—	—	0.60-1.10	—	—	C-0.01 max, Ta-26.00-29.00, W-10.00-12.00, O-0.03 max, N-0.015 max, H-0.001 max
Cb-752	—	—	—	—	—	—	—	2.00-3.00	—	—	W-9.00-11.00, C-0.015 max, O-0.02 max, N-0.01 max, H-0.001 max
Fansteel 80 Commercial Grade	—	—	—	—	—	0.005 max	—	0.80-1.20	0.01 max	98.50 min	C-0.0100 max, N-0.0300 max, O-0.0300 max, H-0.0020 max, Hf-0.01 max, Ni-0.005 max, Si-0.005max, Ta-0.20max, W-0.05 max
Fansteel 80 Reactor Grade	—	—	—	—	—	0.005 max	—	0.80-1.20	0.005 max	98.50 min	O-0.015 max, Ta-0.10max, W-0.03 max, C-0.01 max, N-0.03 max, H-0.002 max, Hf-0.01 max, Ni-0.005 max, Si-0.005max
FS-85	—	—	—	—	—	—	—	0.60-1.10	—	—	C-0.01 max, Ta-26.00-29.00, W-10.0-12.0, O-0.03 max, N-0.015 max, H-0.001 max
Mo-1Ti-0.3Zr (TZC)	1.25	—	—	—	—	—	—	0.30	—	—	C-0.15



TITANIUM ALLOYS

Designation	Ti	Al	V	Sn	Mn	Mo	Cr	Zr	Fe	Cb	Other
6-4ELI	Bal	6.00	4.00	—	—	—	—	—	0.20	—	C-0.10max, H-0.015max, N-0.03, O-0.13 max
A-110	Bal	4.00-6.00	—	2.00-3.00	—	—	—	—	0.25-0.50 max	—	N-0.035-0.05 max, C-0.05-0.10 max, H-0.01-0.02 max, O-0.12-0.20 max, 0.05-0.10 max others(each); 0.30-0.40 max others (total)
BETA 21S	Bal	2.5-3.5	—	—	—	14.00-16.00	—	—	—	2.40-3.20	Si-0.15-0.25, Fe-0.40 max., O-0.11-0.17 C-0.05 max., N-0.05 max., H-0.015 max., Others – 0.10 max each., Others – 0.40 max total
CP-TI	99.0+	—	—	—	—	—	—	—	—	—	—
Grade 1 CP-TI	Bal	—	—	—	—	—	—	—	0.20 max	—	N-0.03 max., C-0.10 max., H-0.0125 max., O-0.18 max., Residuals-0.40 max
Grade 2 CP-TI	Bal	—	—	—	—	—	—	—	0.30 max	—	N-0.03 max., C-0.10 max., H-0.0125 max., O-0.25 max., Residuals-0.40 max
Grade 3 CP-TI	Bal	—	—	—	—	—	—	—	0.30 max	—	N-0.05 max., C-0.10 max., H-0.0125 max., O-0.35 max., Residuals-0.40 max
Grade 4 CP-TI	Bal	—	—	—	—	—	—	—	0.50 max	—	N-0.05 max., C-0.10 max., H-0.0125 max., O-0.40 max., Residuals-0.40 max.
Grade 5 6-4TI	Bal	5.50-6.75	3.50-4.50	—	—	—	—	—	0.40 max	—	N-0.05 max., C-0.10 max., H-0.0125 max., O-0.20 max., Residuals-0.40 max.
Grade 6 5-2.5 TI	Bal	4.00-6.00	—	2.00-3.00	—	—	—	—	0.50 max	—	N-0.05 max., C-0.10 max., H-0.0125 max., O-0.20 max., Residuals- 0.40 max.
Grade 7 TI-PD	Bal	—	—	—	—	—	—	—	0.30 max	—	N-0.03 max., C-0.10 max, H-0.0125 max., O-0.25 max., Pd-0.12-0.25, Residuals-0.40 max.
Grade 10	Bal	—	—	3.75-5.25	—	10.00-13.00	—	4.50-7.50	0.35 max	—	N-0.05 max., C-0.10 max., H-0.020 max., O-0.18 max., Residuals-0.40 max
Grade 11 TI-PD	Bal	—	—	—	—	—	—	—	0.20 max	—	N-0.03 max, C-0.10 max, H-0.0125 max, O-0.18, Pd-0.12-0.25, Residuals-0.40 max



MOLY ALLOYS

Designation	Mo	W	Ti	C	Zr	Ag	Other
CP Moly	99.95%	—	—	—	—	—	—
Elkonite 100M	100%	—	—	—	—	—	—
Elkonite G-17	Balance	—	—	—	—	39.50	Cu-0.70
Elkonite G-18	Balance	—	—	—	—	49.50	Cu-0.70
Moly B100	50.00	50.00	—	—	—	—	—
Molybdenum-50W	Balance	49.30	—	0.008	—	—	—
Molybdenum-0.50 Ti Alloy	Balance	—	0.50	—	—	—	—
Molybdenum-0.50 Ti, 0.10 Zirconium	Balance	—	0.50	—	0.10	—	—
TZM Alloy	Balance	—	0.50	—	0.08	—	—
Molybdenum-1.25 Ti, 0.30 Zirconium	Balance	—	1.25	—	0.30	—	—
TZC Alloy	Balance	—	1.25	0.12	0.30	—	—
Molybdenum Silver Elkonite	60.00	—	—	—	—	40.00	—
Molybdenum-20% Tungsten	Balance	20.00	—	—	—	—	—
Molybdenum-30% Tungsten	Balance	30.00	—	—	—	—	—
Molybdenum-Rhenium	50.00	—	—	—	—	—	Re-50.00



TITANIUM ALLOYS

Designation	Ti	Al	V	Sn	Mn	Mo	Cr	Zr	Fe	Cb	Other
Grade 12	Bal	—	—	—	—	0.20-0.40	—	—	0.30 max	—	N-0.03 max., C-0.08 max., H-0.0125 max., O-0.18 max, Ni-0.60-0.90, Residuals-0.30 max.
IMI 443	Bal	—	11.00	—	—	—	15.00	—	—	—	—
IMI 680	Bal	2.25	—	11.00	—	4.00	—	—	—	—	Si-0.20
IMI 700	Bal	6.00	—	—	—	4.00	—	5.00	—	—	Cu-1.00, Si-0.25
IMI 829	Bal	5.50	—	3.50	—	0.30	—	3.00	—	1.00	Si-0.30
IMI 834	Bal	5.50-6.10	—	3.00-5.00	—	0.25-0.75	—	3.00-5.00	0.05 max.	0.70-1.00	Si 0.20-0.60, C-0.04-0.08 O-0.075-0.15, N-0.03, H-0.006
RS-140	Bal	5.00	—	—	—	—	2.00	—	2.00	—	—
TI-1-8-5	86.00	1.00	8.00	—	—	—	—	—	5.00	—	—
TI 1.50-2.75	Bal	—	—	—	—	—	2.75	—	1.50	—	—
TI-1.50-2.80-5	Bal	5.00	—	—	—	—	2.80	—	1.50	—	—
TI-2	98.00	—	—	—	—	—	—	—	—	—	Ni-2.00
TI-2-2	Bal	2.00	—	—	2.00	—	—	—	—	—	—
TI-2-2-2	Bal	—	—	—	—	2.00	2.00	—	2.00	—	—
TI-2.5	Bal	—	—	—	—	—	—	—	—	—	Cu-2.50
TI-2.5-16	Bal	2.50	16.00	—	—	—	—	—	—	—	—
TI-2-11-5-1	81.00	2.00	—	11.00	—	1.00	—	5.00	—	—	—
TI-3-2.5	Bal	3.00	2.50	—	—	—	—	—	—	—	—
TI-3-8-6-4-4	Bal	3.00	8.00	—	—	4.00	6.00	4.00	—	—	—
TI-4-3-1	92.00	4.00	1.00	—	—	3.00	—	—	—	—	—
TI-4-4	92.00	4.00	—	—	4.00	—	—	—	—	—	—
TI-4-4-2-5	Bal	4.00	—	2.00	—	4.00	—	—	—	—	Si-0.50
TI-4-4-4-5	Bal	4.00	—	4.00	—	4.00	—	—	—	—	Si-0.50
Ti-5-1.5-1.5-1.25 (A-110 at)	Bal	5.00	—	—	—	1.25	1.50	—	1.50	—	—



RUSSIAN TITANIUM ALLOYS

ALLOY	Al	Mn	Mo	V	Zr	Cr	Sn	Si	Fe	C max	Fe max	Si max	O max	N max	H max	Others
BT-20	5.50-7.00	—	0.50-2.00	0.80-2.50	1.50-2.50	—	—	—	—	0.10	0.25	0.15	0.15	0.05	0.015	0.30
BT-22	4.40-5.70	—	4.00-5.50	4.00-5.50	—	0.50-1.50	—	—	0.50-1.50	0.10	—	0.15	0.18	0.05	0.015	0.30
BT-23	4.00-6.30	—	1.50-2.50	4.00-5.00	—	0.80-1.40	—	—	0.40-1.00	0.10	—	0.15	0.15	0.05	0.015	0.30
BT-25	6.30-6.90	—	3.70-4.30	—	3.20-4.30	—	1.30-2.30	0.12-0.25	—	0.10	0.20	—	0.15	0.05	0.012	0.30
ET2	2.40-2.90	—	—	—	—	—	—	—	—	0.08	0.20	0.10	0.10	0.03	0.015	0.30
ET3	3.30-3.80	—	—	—	—	—	—	—	—	0.08	0.20	0.10	0.10	0.03	0.015	0.30
ET5	4.20-4.80	—	—	1.60-2.20	—	—	—	—	—	0.08	0.20	0.10	0.10	0.03	0.015	0.30
OT4-0	0.40-1.40	0.50-1.30	—	—	—	—	—	—	—	0.10	0.30	0.12	0.15	0.05	>0.012	0.30
OT4-1	1.50-2.50	0.70-2.00	—	—	—	—	—	—	—	0.10	0.30	0.12	0.15	0.05	0.012	0.30
OT4	3.50-5.00	0.80-2.00	—	—	—	—	—	—	—	0.10	0.30	0.12	0.15	0.05	0.012	0.30
PT3V	3.50-5.00	—	—	1.20-2.50	—	—	—	—	—	0.10	0.25	0.12	0.15	0.04	0.015	0.30
TL3	3.00-4.50	—	—	0.40 max	—	—	—	—	—	0.15	0.25	0.12	0.15	0.04	0.008	0.50
TL5	3.50-5.00	—	—	1.50-2.50	—	—	—	—	—	0.15	0.25	0.12	0.15	0.04	0.008	0.50



TITANIUM ALLOYS

Designation	Ti	Al	V	Sn	Mn	Mo	Cr	Zr	Fe	Cb	Other
TI-5-2-2-4-4	Bal	5.00	—	2.00	—	4.00	4.00	2.00	—	—	—
TI-5-2.5	92.50	5.00	—	2.50	—	—	—	—	—	—	—
Ti-5Al-2.5Sn	Bal	4.00-6.00	—	2.00-3.00	—	—	—	—	0.25-0.50 max	—	N-0.035-0.05 max, C-0.05-0.10 max, H-0.01-0.02 max, O-0.12-0.20 max, 0.05-0.10 max others(each); 0.30-0.40 max others (total)
Ti-5Al-2.5Sn-ELI	Bal	4.00-6.00	—	2.00-3.00	—	—	—	—	0.25-0.50 max	—	N-0.035-0.05 max, C-0.05-0.10 max, H-0.01-0.02 max, O-0.12-0.20 max, 0.05-0.10 max others(each); 0.30-0.40 max others (total)
TI-5-3	Bal	3.00	—	—	—	—	5.00	—	—	—	—
TI-5-5-3	Bal	5.00	5.00	—	—	5.00	3.00	—	—	—	—
TI-5-5-5	Bal	5.00	—	5.00	—	—	—	5.00	—	—	—
TI-5-6-2-1	Bal	5.00	—	6.00	—	1.00	—	2.00	—	—	Si-0.25
TI-6-2-1-1	90.00	6.00	—	—	—	1.00	—	—	—	2.00	Ta-1.00
TI-6-2-2-2-2	Bal	6.00	—	2.00	—	2.00	2.00	2.00	—	—	Si-0.25
TI-6-2-4-2	86.00	6.00	—	2.00	—	2.00	—	4.00	—	—	—
TI-6-2-4-6	82.00	6.00	—	2.00	—	6.00	—	4.00	—	—	—
TI-6-4	90.00	6.00	4.00	—	—	—	—	—	—	—	—
TI-6-5-.5-.25	Bal	6.00	—	—	—	0.50	—	5.00	—	—	Si-0.25
TI-6-6-2	Bal	6.00	6.00	2.00	—	—	—	—	—	—	C-0.70
TI-7-4	89.00	7.00	—	—	—	4.00	—	—	—	—	—
TI-7-12	Bal	7.00	—	—	—	—	—	12.00	—	—	—
TI-8	92.00	—	—	—	8.00	—	—	—	—	—	—
TI-811	Bal	7.35-8.35	0.75-1.25	—	—	0.75-1.25	—	—	0.30 max	—	N-0.05 max, C-0.08 max, H-0.015 max, O-0.12 max
TI-8-1-1	90.00	8.00	1.00	—	—	1.00	—	—	—	—	—
Ti-8Al-1Mo-1V	Bal	7.35-8.35	0.75-1.25	—	—	0.75-1.25	—	—	0.30 max	—	N-0.05 max, C-0.08 max, H-0.015 max, O-0.12 max



TUNGSTEN ALLOYS

Designation	W	Mo	Ni	Cu	Co	Wc	Ag	Re	Other
Elkonite G-13	—	—	—	—	—	Balance	50.00	—	—
Elkonite G-14	—	—	—	—	—	Balance	40.00	—	—
Elkonite TC-5	5.00	—	—	50.00	—	Balance	—	—	—
Elkonite TC-10	3.30	—	—	44.00	—	Balance	—	—	—
G-E WN100	Balance	—	0.25-1.00	—	—	—	—	—	—
Gyromet 1000	90.00	—	3.00	—	—	—	—	—	Cu/Mo/Fe-7.00
Gyromet 1100	90.00	—	4.50	—	—	—	—	—	Fe/Mo- Balance
HD 17	90.00	—	6.00	4.00	—	—	—	—	—
HD 17 D	90.00	—	7.00	—	—	—	—	—	Fe-3.00
HD 17.5	92.50	—	5.25	—	—	—	—	—	Fe-2.25
HD 18	95.00	—	3.50	1.50	—	—	—	—	—
HD 18 D	95.00	—	3.50	—	—	—	—	—	Fe-1.50
HD 18.5	97.00	—	2.10	—	—	—	—	—	Fe-0.90
Heavy Tungsten W2	97.50	—	2.50	—	—	—	—	—	—
Heavy Tungsten W5	95.00	—	3.30	1.70	—	—	—	—	—
Heavy Tungsten W10	90.00	—	—	—	—	—	—	—	Ni/Cu-10.00
Hevimet-1	90.00	—	7.50	2.50	—	—	—	—	—
Hevimet-3	90.00	—	7.50	2.50	—	—	—	—	—
Mallory 1000A	Balance	—	6.00	4.00	—	—	—	—	—
Mallory 1000B	Balance	—	3.50	1.50	—	—	—	—	—
Mallory 2000	95.00	—	—	—	—	—	—	—	Ni/Cu-Balance
Mallory 3000	Balance	—	7.00	—	—	—	—	—	Fe-3.00
Mallory 3950	Balance	—	3.50	—	—	—	—	—	Fe-1.50
Mallory 3970	Balance	—	2.10	—	—	—	—	—	Fe-0.90



TUNGSTEN ALLOYS

Designation	W	Mo	Ni	Cu	Co	Wc	Ag	Re	Other
Carboloy 905	—	—	—	—	4.00	92.00	—	—	TaC-4.00
Carboloy 907	—	—	—	—	6.00	74.00	—	—	TaC-20.00
Carboloy 999	—	—	—	—	3.00	97.00	—	—	—
Densalloy	90.00	—	6.00	4.00	—	—	—	—	—
Elkonite 1W3	Balance	—	—	45.00	—	—	—	—	—
Elkonite 3W3	Balance	—	—	32.00	—	—	—	—	—
Elkonite 5W3	Balance	—	—	30.00	—	—	—	—	—
Elkonite 10W3	Balance	—	—	25.00	—	—	—	—	—
Elkonite 20S	74.00	—	—	—	—	—	26.00	—	—
Elkonite 30S	Balance	—	—	—	—	—	30.00	—	—
Elkonite 30W3	Balance	—	—	20.00	—	—	—	—	—
Elkonite 35S	Balance	—	—	—	—	—	34.00	—	—
Elkonite 40S	Balance	—	—	—	—	—	40.00	—	—
Elkonite 40W3	Balance	—	—	13.35	—	—	—	—	—
Elkonite 45S	Balance	—	—	—	—	—	45.00	—	—
Elkonite 50S	Balance	—	—	—	—	—	49.00	—	—
Elkonite 50W3	Balance	—	—	10.36	—	—	—	—	—
Elkonite 100W	100%	—	—	—	—	—	—	—	—
Elkonite 2050C	Balance	—	—	50.00	—	—	—	—	—
Elkonite 2110	Balance	—	—	—	—	—	90.00	—	—
Elkonite 2125C	25.00	—	—	75.00	—	—	—	—	—
Elkonite 2140C	Balance	—	2.00	58.00	—	—	—	—	—
Elkonite 2150	50.00	—	—	—	—	—	50.00	—	—
Elkonite 3042	—	—	—	—	—	Balance	58.00	—	—
Elkonite 3150	—	—	—	—	—	Balance	50.00	—	—
Elkonite 4050	Balance	—	—	—	—	—	50.00	—	—
Elkonite 4055	Balance	—	—	—	—	19.60	46.00	—	—
Elkonite G-12	—	—	—	—	—	Balance	65.00	—	—



TUNGSTEN ALLOYS

Designation	W	Mo	Ni	Cu	Co	Wc	Ag	Re	Other
WA-4	—	—	—	—	3.00	97.00	—	—	—
WA-5	—	—	—	—	8.50	72.00	—	—	TiC-8.00, TaC-11.50
WA-7	—	—	—	—	7.50	76.50	—	—	TiC-12.00, TaC-4.00
WA-8	—	—	—	—	5.00	75.00	—	—	TiC-16.00, TaC-4.00
WA-10	—	—	—	—	9.00	91.00	—	—	—
WA-12	—	—	—	—	13.00	87.00	—	—	—
WA-14	—	—	—	—	25.00	75.00	—	—	—
WA-35	—	—	—	—	6.00	94.00	—	—	—
WA-41	—	—	—	—	8.00	92.00	—	—	—
WA-47	—	—	—	—	8.00	78.00	—	—	TiC-8.00, TaC-6.00
WA-59	—	—	—	—	8.00	91.00	—	—	TiC-1.00
WA-68	—	—	—	—	6.00	79.50	—	—	TaC-6.00, TiC-8.50
WA-69	—	—	—	—	5.00	91.00	—	—	TaC-4.00
WCC 17 (W3)	90.00	—	7.00	—	—	—	—	—	Fe-3.00
WCC 17C (W3)	90.00	—	7.00	3.00	—	—	—	—	—
WCU	85.00-90.00	—	—	10.00-15.00	—	—	—	—	—
WN102	95.00	—	—	—	—	—	—	—	Ni/Fe-Balance
WN103	90.00	—	—	—	—	—	—	—	Ni/Cu-Balance



REFRACTORY ALLOYS

Designation	Ti	Al	V	Sn	Mn	Mo	Cr	Zr	Fe	Nb/Cb	Other
Molybdenum alloy 362	0.40-0.55	—	—	—	—	Bal	—	—	0.010 max	—	C-0.010-0.040, N-0.001 max, Ni-0.005 max, O-0.003 max, Si-0.010 max
Molybdenum alloy 363	0.40-0.55	—	—	—	—	—	—	0.06-0.12	0.010 max	—	C-0.01-0.04, Si-0.010 max, Ni-0.005 max, N-0.001 max, O-0.0030 max, H-0.0005 max
Molybdenum alloy 364	0.40-0.55	—	—	—	—	—	—	0.06-0.12	0.010 max	—	C-0.01-0.04, Si-0.005 max, Ni-0.005 max, N-0.002 max, O-0.030 max, H-0.0005 max
Tantaloy 60 metal	—	—	—	—	—	—	—	—	—	—	W-9.00-11.00, Ta-Bal.
Tantaloy 63 metal	—	—	—	—	—	—	—	—	—	0.5 max	W-2.00-3.00, Ta - bal.
Wah Chang WC-1Zr Commercial Grade	—	—	—	—	—	0.005 max	—	0.80-1.20	0.01 max	98.5 min	C-0.01 max, N-0.03 max, O-0.03 max, H-0.002 max, HF-0.01 max, Ni-0.005 max, Si-0.005max, Ta-0.20 max, W-0.05 max
Wah Chang WC-1Zr Reactor Grade	—	—	—	—	—	0.005 max	—	0.80-1.20	0.005 max	98.5 min	O-0.015 max, Ta-0.10max, W-0.03 max, C-0.01 max, N-0.03 max, H-0.002 max, HF-0.01 max, Ni-0.005 max, Si-0.005max
WC 103	0.70-1.30	—	—	—	—	—	—	0.70 max	—	Bal	C-0.100 max, HF-9.0-11.0, O-0.0300, N-0.0300 max, H-0.0020 max, W-0.50 max, Ta-0.5 max
Zircaloy 2	—	—	—	1.20-1.70	—	—	0.05-0.15	Bal.	0.07-0.20	—	Ni-0.03-0.08



TUNGSTEN ALLOYS

Designation	W	Mo	Ni	Cu	Co	Wc	Ag	Re	Other
Tungsten-10 Moly	90.00	10.00	—	—	—	—	—	—	—
Tungsten-10 Rhenium-Thoria	88.00	—	—	—	—	—	—	10.00	ThO ₂ -2.00
Tungsten-15 Moly	85.00	15.00	—	—	—	—	—	—	—
Tungsten-24 Rhenium-Thoria	74.00	—	—	—	—	—	—	24.00	ThO ₂ -2.00
Tungsten-25 Rhenium	75.00	—	—	—	—	—	—	25.00	—
Tungsten-26 Rhenium	74.00	—	—	—	—	—	—	26.00	—
Tungsten-30 Moly	70.00	30.00	—	—	—	—	—	—	—
Tungsten-35 Rhenium-18 Molybdenum	47.00	18.00	—	—	—	—	—	35.00	—
Tungsten-40 Moly	60.00	40.00	—	—	—	—	—	—	—
Tungsten-50 Moly	50.00	50.00	—	—	—	—	—	—	—
Tungsten 09991	99.00	—	1.00	—	—	—	—	—	—
UC6	—	—	6.50	—	—	93.50	—	—	—
WA-1	—	—	—	—	6.00	94.00	—	—	—
WA-2	—	—	—	—	6.00	94.00	—	—	—
WA-3	—	—	—	—	4.30	95.70	—	—	—
WAg (W3)	85.00-90.00	—	—	—	—	—	—	10.00-15.00	—



REFRACTORY ALLOYS

Designation	Ti	Al	V	Su	Mn	Mo	Cr	Zr	Fe	Nb/Cb	Other
Zircaloy 4	—	—	—	1.20-1.70	—	—	0.07-0.13	Bal	0.18-0.24	—	—
Zirconium Gr. 701	—	—	—	—	—	—	—	—	—	—	C-0.05max, Hf-4.50max, H-0.005, N-0.025, Zr+Hf-99.50min., Fe+Cr-0.05max
Zirconium Gr. 702	—	—	—	—	—	—	—	—	—	—	C-0.05max, Hf-4.50max, H-0.005, N-0.025, Zr+Hf-99.20min, Fe+Cr-0.20max
Zirconium Gr. 703	—	—	—	—	—	—	—	Bal	—	—	Hf-4.50 max
Zirconium Gr. 705	—	—	—	—	—	—	—	Bal	—	2.0-3.0	Hf - 4.50 max., N- 0.025 max. Fe+Cr -0.20 max., C-0.05 max. H - 0.005 max., O-0.18 max.
Zirconium Commercial Grade	—	—	—	—	—	—	—	—	—	—	Zr+Hf-99.50
Zirconium Reactor Grade	—	—	—	—	—	—	—	99.60	—	—	—
Zirconium Gr. R60001	0.0050 max	0.0075	—	—	0.0050 max	—	0.020 max	Bal	0.150 max	—	Ni-0.0070 max, Co-0.0020 max, W-0.010 max, Cu-0.0050 max, C-0.027 max, B-0.00005 max, Cd-0.00005 max, Hf-0.010 max, H-0.0025 max, O-0.150 max, N-0.0050 max, Si-0.012 max, U-0.00035 max



TUNGSTEN ALLOYS

Designation	W	Mo	Ni	Cu	Co	Wc	Ag	Re	Other
Sil-Tung 175	85.00	—	—	—	—	—	15.00	—	—
Silver-Tungsten Elkonite 20S	72.50	—	—	—	—	—	27.50	—	—
Ticol	11.00	3.00	—	—	—	—	—	—	C-0.08, Hf-2.00, Cb-Balance
Tung-Sil	Balance	—	—	—	—	—	27.75	—	—
Tungsten-Tantalum	98.50	—	—	—	—	—	—	—	Ta-1.50
Tungsten-1% Thoria	99.00	—	—	—	—	—	—	—	ThO ₂ -1.00
Tungsten-1.5% Thoria	98.50	—	—	—	—	—	—	—	ThO ₂ -1.50
Tungsten-2% Thoria	98.00	—	—	—	—	—	—	—	ThO ₂ -2.00
21 Metal	85.00-90.00	—	—	—	—	—	10.00-15.00	—	—
27 Metal	90.00	—	5.00	—	—	—	—	—	Fe/Co-5.00
77 Metal	Balance	—	6.00	4.00	—	—	—	—	—
98 Metal	98.00	—	1.00	1.00	—	—	—	—	—
98%W-2MO	98.00	2.00	—	—	—	—	—	—	—
99 Metal	99.00	—	1.00	—	—	—	—	—	—
Tungsten-3 Moly	97.00	3.00	—	—	—	—	—	—	—
Tungsten-3 Rhenium	97.00	—	—	—	—	—	—	3.00	—
Tungsten-5 Moly	95.00	5.00	—	—	—	—	—	—	—
Tungsten-5 Rhenium	95.00	—	—	—	—	—	—	5.00	—
Tungsten-5 Rhenium-Thoria	93.00	5.00	—	—	—	—	—	—	ThO ₂ -2.00
Tungsten-7 Moly	93.00	7.00	—	—	—	—	—	—	—



TUNGSTEN ALLOYS

Designation	W	Mo	Ni	Cu	Co	Wc	Ag	Re	Other
Anviloy 1100	90.00	4.00	4.00	—	—	—	—	—	Fe-2.00
Anviloy 1150	90.00	4.00	4.00	—	—	—	—	—	Fe-2.00
Anviloy 1200	90.00	4.00	4.00	—	—	—	—	—	Fe-2.00
Carboloy 44A	—	—	—	—	6.00	94.00	—	—	—
Carboloy 55A	—	—	—	—	13.00	87.00	—	—	—
Carboloy 55B	—	—	—	—	16.00	84.00	—	—	—
Carboloy 77B	—	—	—	—	16.00	57.00	—	—	TaC-27.00
Carboloy 78	—	—	—	—	8.00	76.00	—	—	TaC-4.00, TiC-12.00
Carboloy 78B	—	—	—	—	9.00	79.00	—	—	TaC-4.00, TiC-8.00
Carboloy 90	—	—	—	—	10.00	90.00	—	—	—
Carboloy 115	—	—	—	—	11.50	88.50	—	—	—
Carboloy 120	—	—	—	—	12.00	88.00	—	—	—
Carboloy 190	—	—	—	—	25.00	75.00	—	—	—
Carboloy 210	—	—	—	—	4.00	28.00	—	—	Cr ₃ C ₂ -2.00, TaC-2.00, TiC-64.00
Carboloy 231	—	—	—	—	10.00	90.00	—	—	—
Carboloy 241	—	—	—	—	10.00	90.00	—	—	—
Carboloy 248	—	—	—	—	11.00	89.00	—	—	—
Carboloy 258	—	—	—	—	13.00	87.00	—	—	—
Carboloy 268	—	—	—	—	16.00	84.00	—	—	—
Carboloy 320	—	—	—	—	6.00	64.00	—	—	TaC-4.50, TiC-25.50
Carboloy 350	—	—	—	—	4.50	71.00	—	—	TaC-12.00, TiC-12.50
Carboloy 370	—	—	—	—	8.50	72.00	—	—	TaC-11.50, TiC-8.00
Carboloy 616	—	—	16.00	—	—	82.00	—	—	Cr-2.00
Carboloy 779	—	—	—	—	9.00	91.00	—	—	—
Carboloy 820	—	—	—	—	10.00	90.00	—	—	—
Carboloy 860	—	—	—	—	5.00	91.00	—	—	TaC-4.00
Carboloy 883	—	—	—	—	6.00	94.00	—	—	—
Carboloy 895	—	—	—	—	6.00	94.00	—	—	—



EATON VALVE ANALYSIS

Designation	Ni	Cr	Co	Mo	C	Mn	Si	W	Fe	P	Other
EMS-217 17-4PH (AMS-5643)	3.00-5.00	15.50-17.50	—	—	0.07 max	1.00 max	1.00 max	—	Bal.	0.040 max	S-0.050 max
EMS-218 (SAE-1018)	—	—	—	—	0.15-0.20	0.60-0.90	0.15-0.30	—	Bal.	0.040 max	S-0.050 max
EMS-219 Gaman HS	—	20.50-22.00	—	—	0.47-0.57	11.00-13.00	2.30-3.00	—	Bal.	0.030 max	S-0.030 max, N-0.40 min.
EMS-220 (21-55N)	4.25-5.50	20.00-21.50	—	—	0.30-0.40	5.00-6.25	0.50 max	—	Bal.	0.040 max	N-0.20-0.30, S-0.040 max, Cu-1.00 max
EMS-221 (SAE-8620-H)	0.35-0.75	0.35-0.65	—	0.15-0.25	0.17-0.23	0.60-0.95	0.20-0.35	—	Bal.	0.035 max	S-0.040 max
EMS-222 (21-2N) (SAE-EV-12)	1.50-2.75	19.25-21.50	—	—	0.50-0.60	7.00-9.50	0.08-0.25	—	Bal.	0.050 max	N-0.20-0.40, S-0.090 max
EMS-223 Inconel #718 (AMS-5622A)	50.00-55.00	17.00-21.00	1.00 max	2.80-3.30	0.08 max	0.35 max	0.35 max	—	Bal.	0.015 max	Cb & Ta-4.75-5.50, Al-0.20-0.80, S-0.015 max, Ti-0.65-1.15, B-0.006 max
EMS-224 (Mod. 746)	1.40-1.90	20.50-22.00	—	—	0.65-0.75	5.50-6.90	0.25 max	—	Bal.	0.040 max	S-0.025-0.055, N-0.18-0.28
EMS-225 (SAE-8622-H)	0.35-0.75	0.35-0.65	—	0.15-0.25	0.19-0.25	0.60-0.95	0.20-0.35	—	Bal.	0.035 max	S-0.040 max
EMS-226 (SAE-52100)	—	1.30-1.60	—	—	0.98-1.10	0.25-0.45	0.20-0.35	—	Bal.	0.025 max	S-0.025 max



EATON VALVE ANALYSIS

Designation	Ni	Cr	Co	Mo	C	Mn	Si	W	Fe	P	Other
SAE-1547 (Same as above)	—	—	—	—	0.42-0.51	1.30-1.65	0.15-0.30	—	Bal.	0.040 max	S-0.050 max
EMS-210 Nimonic 80A (SAE-HEV-5)	Bal.	19.00-22.00	1.00 max	—	0.10 max	1.00 max	1.00 max	—	2.00 max	—	Cu-0.50 max, S-0.015 max, Ti-2.10-2.85, Al-1.00-1.60
EMS-211 Modified Nimonic 80A	Bal.	23.00-27.00	1.00 max	—	0.10 max	1.00 max	1.00 max	—	2.00 max	—	Cu-0.50 max, S-0.015 max, Ti-2.10-2.85, Al-1.00-1.60
EMS-213 Stellite F (SAE-VF-5)	20.50-23.50	23.00-27.00	Bal.	—	1.50-2.00	0.50 max	1.50 max	10.50-13.50	3.00 max	—	—
EMS-214 Modified EMS-88 (EXP-1122)	Bal.	22.00-25.00	0.50 max	—	0.07 max	2.00-2.50	0.20 max	—	2.00 max	—	Al-0.20 max, Cu-0.20 max, S-0.010 max, Ti-2.75-3.35
EMS-215 InconelX550 (SAE-HEV-3) Inco-751	70.00 min.	14.00-17.00	1.00 max	—	0.10 max	1.00 max	0.50 max	—	5.00-9.00	—	Cb & Ta-0.70-1.20, Al-0.90-1.50, S-0.015 max, Ti-2.20-2.75, Cu-0.50 max
EMS-216 Cast Stellite #6	3.00 max	27.00-31.00	Bal.	1.50 max	0.90-1.40	1.00 max	1.50 max	3.50-5.50	3.00 max	—	—



AMS NUMBERS

AMS No.	Other Names	AMS No.	Other Names
4923	2-Cr, 2-Mo, 2-Fe Ti	4970	7-Al, 4-Mo Ti
4971	6-Al, 6-V, 2-Sn, Ti	5347	15-5 Ph
4972	8-Al, 1-Mo, 1-V, Ti	5348	15-5 Ph
4973	8-Al, 1-Mo, 1-V, Ti	5349	416 SS
4974	11-Sn, 5-Zr, 2.30-Al, 1-Mo, 0.21-Si, Ti	5350	410 SS
4975	6-Al, 2-Sn, 4-Zr, 2-Mo, Ti	5351	410 SS
4976	6-Al, 2-Sn, 4-Zr, 2-Mo, Ti	5352	440 C Mod.
4977	Beta III Ti	5353	431 Mod.
4978	6-Al, 6-V, 2-Sn, Ti	5354	Greek Ascology
4979	6-Al, 6-V, 2-Sn, Ti	5355	17-4 Ph, Custom 630
4980	Beta III Ti	5356	15-5 Ph
4981	6-Al, 2-Sn, 2-Zr, 6-Mo, Ti	5357	15-5 Ph
4982	45-Cb, Ti	5358	302 Mod.
4983	10-V, 2-Fe, 3-Al	5359	Am-355
4985	6-Al, 4-V, Ti	5360	316 Mod.
4991	6-Al, 4-V, Ti	5361	316 Mod.
4995	5-Al, 2-Sn, 2-Zr, 4-Cr, 4-Mo	5362	347 SS
4996	6-Al, 4-V Ti	5363	347 SS
4997	5-Al, 2-Sn, 2-Zr, 4-Cr, 4-Mo	5364	347 SS
4998	6-Al, 4-V, Ti	5365	310 SS
5132	EMS-47	5366	310 SS
5221	Ni Span C, 902	5368	Am-355
5223	Ni Span C, 902	5369	19-9 DL
5225	Ni Span C, 902	5370	304 L
5340	17-4 Ph	5371	304 L
5341	303 SS	5372	431 Mod.



EATON VALVE ANALYSIS

Designation	Ni	Cr	Co	Mo	C	Mn	Si	W	Fe	P	Other
EMS-1 Sil. #1 (SAE-HNV-3)	0.40 max	8.00-9.00	—	—	0.40-0.50	0.20-0.60	3.00-3.50	—	Bal.	0.030 max	S-0.030 max
EMS-4 (SAE-3140) (AMS-6335)	1.10-1.40	0.55-0.75	—	—	0.38-0.43	0.70-0.90	0.20-0.35	—	Bal.	0.035 max	S-0.040 max
EMS-7 (SAE-71360) (PWA-144-B) (SAE-HNV-7)	—	3.00-4.00	—	—	0.50-0.60	0.20-0.40	0.20-0.40	12.00-15.00	Bal.	0.030 max	S-0.030 max
EMS-10 (21-4N) (SAE-EV-8)	3.25-4.50	20.00-22.00	—	—	0.47-0.57	8.00-10.00	0.08-0.25	—	Bal.	0.050 max	S-0.090 max, N-0.38-0.50
EMS-11 (WAD-8110) Cobalt Chrome CBC	0.65 max	11.50-14.00	2.50-3.50	0.45-0.95	1.20-1.50	0.40 max	0.65 max	—	Bal.	0.030 max	S-0.030 max
EMS-19 "V" Alloy (SAE-HNV-2) (GM-8440) (Chrys. -MS-3115)	—	1.85-2.50	—	—	0.35-0.45	0.20-0.40	3.60-4.20	—	Bal.	0.040 max	S-0.040 max
EMS-21 Sil. #142 (SAE-EV-9) (AMS-5700)	13.00-15.00	13.00-15.00	—	0.20-0.50	0.40-0.50	0.70 max	0.30-0.80	1.75-3.00	Bal.	0.030 max	S-0.030 max
EMS-26 2112 (SAE-EV-3)	10.50-12.50	20.00-22.00	—	—	0.15-0.25	1.00-1.50	0.75-1.25	—	Bal.	0.030 max	S-0.030 max
EMS-31 Sil.X-10 (SAE-EV-5)	7.50-8.50	18.00-20.00	—	—	0.30-0.45	0.80-1.30	2.75-3.25	—	Bal.	0.030 max	S-0.030 max



AMS NUMBERS

AMS No.	Other Names	AMS No.	Other Names
4501	Copper	4924	5-Al, 2.50-Sn Ti
4530	Berylo 25	4925	4-Al, 4-Mn Ti
4532	Berylo 25	4926	5-Al, 2.50-Sn Ti
4544	R-Monel/Sheet	4927	5-Cr, 3-Al Ti
4602	Copper	4928	6-Al, 4-V Ti
4650	Berylo 25	4929	5.40-Al, 1.40-Cr, 1.30-Fe, 1.25-Mo Ti
4725	Berylo 25	4930	6-Al, 4-V Ti
4775	EMS-29	4933	8-Al, 1-V, 1-Mo Ti
4900	Pure Ti	4934	6-Al, 4-V Ti
4901	Pure Ti	4935	6-Al, 4-V Ti
4902	Pure Ti	4936	6-Al, 6-V, 2-Sn Ti
4905	6-Al, 4-V Ti	4941	Pure Ti
4907	6-Al, 4-V Ti	4942	Pure Ti
4908	8-Mn Ti	4943	3-Al, 2.5-V Ti
4909	5-Al, 2.50-Sn Ti	4944	3-Al, 2.5-V Ti
4910	5-Al, 2.50-Sn Ti	4951	Pure Ti
4911	6-Al, 4-V Ti	4953	5-Al, 2.50-Sn Ti
4912	4-Al, 3-Mo, 1-V Ti	4954	6-Al, 4-V Ti
4913	4-Al, 3-Mo, 1-V Ti	4955	8-Al, 1-Mo, 1-V Ti
4914	15-3-3-3 Ti	4956	6-Al, 4-V Ti
4915	8-Al, 1-Mo, 1-V Ti	4958	6-Al, 4-V Ti
4916	8-Al, 1-Mo, 1-V Ti	4959	13-V, 11-Cr, 3-Al Ti
4917	13.50-V, 11-Cr, 3-Al Ti	4965	6-Al, 4-V Ti
4918	6-Al, 6-V, 2-Sn Ti	4966	5-Al, 2.50-Sn Ti
4919	6-Al, 2-Sn, 4-Zr, 2-Mo Ti	4967	6-Al, 4-V Ti
4920	6-Al, 4-V Ti	4968	5-Zr, 5-Al, 5-Sn Ti
4921	Pure Ti	4969	5.40-Al, 1.40-Cr, 1.30-Fe, 1.25-Mo Ti



EATON VALVE ANALYSIS

Designation	Ni	Cr	Co	Mo	C	Mn	Si	W	Fe	P	Other
EMS-33 XB (AMS-5710) (SAE-HNV-6)	1.00-1.60	19.00-21.00	—	—	0.76-0.86	0.20-0.60	1.90-2.60	—	Bal	0.030 max	S-0.030 max
EMS-43 TXCR (SAE-EV-2)	3.50-4.00	23.50-24.50	—	—	0.35-0.42	4.00-4.50	0.60-1.00	—	Bal	0.030 max	S-0.030 max
EMS-47 High Carbon (AMS-5132)	—	—	—	—	0.90-1.30	0.15-0.50	0.35 max	—	Bal	0.040 max	S-0.050 max
EMS-48 (8020) Bright Ray (SAE-VF-1) (AMS-5682)	Bal.	19.00-21.00	—	—	0.15-0.30	0.60-1.00	0.30 max	—	1.00 max	—	S-0.030 max
EMS-57 (SAE-NV-5) SAE-8645	0.40-0.70	0.40-0.60	—	0.15-0.25	0.43-0.48	0.75-1.00	0.20-0.35	—	Bal	0.040 max	S-0.040 max
EMS-58 (SAE-VF-3) Eatonite	37.00-41.00	27.00-31.00	9.00-11.00	—	2.00-2.75	—	1.00 max	14.00-16.00	8.00 max	—	—
EMS-61 N-155 (AMS-5767) (SAE-HEV-1)	19.00-21.00	20.00-22.50	18.50-21.00	2.50-3.50	0.08-0.16	1.00-2.00	1.00 max	2.00-3.00	Bal	0.030 max	Cb & Ta-0.75-1.25, S-0.030 max, N-0.10-0.20
EMS-62 Sil. 746 (SAE-EV-11)	1.40-1.90	20.50-22.00	—	—	0.65-0.75	5.50-6.90	0.45-0.85	—	Bal	0.040 max	S-0.025-0.055, N-0.18-0.28
EMS-63 Stellite #6 (SAE-VF-2) (AMS-5788)	3.00 max	26.00-30.00	Bal	1.00 max	0.90-1.40	0.50 max	0.70-1.50	3.50-5.50	3.00 max	—	—



EATON VALVE ANALYSIS

Designation	Ni	Cr	Co	Mo	C	Mn	Si	W	Fe	P	Other
EMS-227 (DV-2A) EXP-1193	—	19.75-21.25	—	—	0.50-0.56	11.00-12.50	0.25 max	1.75-2.25	Bal	0.030 max	Cb-0.75-1.25, N-0.40-0.50, S-0.030 max, V-0.030-0.50
EMS-228 (DV-28) EXP-1194	—	19.75-21.25	—	—	0.50-0.56	11.00-12.50	0.80-1.20	1.75-2.25	Bal	0.030 max	Cb-0.75-1.25, N-0.40-0.50, S-0.030 max, V-0.30-0.50
EMS-229 (EXP-1130)	3.00 max	28.00-32.00	Bal.	—	0.90-1.40	2.00 max	2.00 max	3.50-5.50	3.00 max	—	—
EMS-230 (EXP-1134) Waspalloy	Bal.	18.00-21.00	12.00-15.00	3.50-5.00	0.030-0.10	0.10 max	0.15 max	—	2.00 max	0.015 max	Zr-0.02-0.08, Al-1.20-1.60, B-0.003-0.010, S-0.015 max, Ti-2.75-3.25, C-0.10 max
EMS-231 (Silcrome X-BE) (Magnaflux Quality)	1.00-1.60	19.00-21.00	—	—	0.76-0.86	0.20-0.60	1.90-2.60	—	Bal	0.030 max	S-0.030 max
EMS-232 (SAE-8822-H)	0.35-0.75	0.35-0.65	—	0.30-0.40	0.19-0.25	0.70-1.05	0.20-0.35	—	Bal	0.035 max	S-0.040 max
EMS-233 (SAE-4140) (AMS-6382) Aircraft Quality	0.25 max	0.80-1.10	—	0.15-0.25	0.38-0.43	0.75-1.00	0.20-0.35	—	Bal	0.025 max	S-0.025 max, Cu-0.35 max
EMS-238	55.00-58.00	22.30-22.90	1.00	1.70-2.30	—	—	—	—	Bal	—	Cb-0.70-1.00, B-0.003-0.007, Ti-2.10-2.40, Al-1.10-1.40



EATON VALVE ANALYSIS

Designation	Ni	Cr	Co	Mo	C	Mn	Si	W	Fe	P	Other
SAE-1547 (Same as above)	—	—	—	—	0.42-0.51	1.30-1.65	0.15-0.30	—	Bal.	0.040 max	S-0.050 max
EMS-210 Nimonic 80A (SAE-HEV-5)	Bal.	19.00-22.00	1.00 max	—	0.10 max	1.00 max	1.00 max	—	2.00 max	—	Cu-0.50 max, S-0.015 max, Ti-2.10-2.85, Al-1.00-1.60
EMS-211 Modified Nimonic 80A	Bal.	23.00-27.00	1.00 max	—	0.10 max	1.00 max	1.00 max	—	2.00 max	—	Cu-0.50 max, S-0.015 max, Ti-2.10-2.85, Al-1.00-1.60
EMS-213 Stellite F (SAE-VF-5)	20.50-23.50	23.00-27.00	Bal	—	1.50-2.00	0.50 max	1.50 max	10.50-13.50	3.00 max	—	—
EMS-214 Modified EMS-88 (EXP-1122)	Bal.	22.00-25.00	0.50 max	—	0.07 max	2.00-2.50	0.20 max	—	2.00 max	—	Al-0.20 max, Cu-0.20 max, S-0.010 max, Ti-2.75-3.35
EMS-215 InconelX550 (SAE-HEV-3) Inco-751	70.00 min.	14.00-17.00	1.00 max	—	0.10 max	1.00 max	0.50 max	—	5.00-9.00	—	Cb & Ta-0.70-1.20, Al-0.90-1.50, S-0.015 max, Ti-2.20-2.75, Cu-0.50 max
EMS-216 Cast Stellite #6	3.00 max	27.00-31.00	Bal.	1.50 max	0.90-1.40	1.00 max	1.50 max	3.50-5.50	3.00 max	—	—



AMS NUMBERS

AMS No.	Other Names	AMS No.	Other Names
5663	Inconel 718	5692	316 SS
5664	Inconel 718	5693	302 SS
5665	Inconel 600	5694	310 SS
5666	Inconel 625	5695	310 SS
5667	Inconel X-750	5696	316 SS
5668	Inconel X-750	5697	304 SS
5669	Inconel X-750	5698	Inconel X-750
5670	Inconel X-750	5699	Inconel X-750
5671	Inconel X-750	5700	14-14-2
5672	Custom 455	5701	Inconel 706
5673	17-7 Ph, Custom 631	5702	Inconel 706
5703	Inconel 706	5732	A-286
5704	Waspalloy	5733	Discaloy
5705	12.8-Cr, 8-Ni, 2.5-Si	5734	A-286
5706	Waspalloy	5735	A-286
5707	Waspalloy	5736	A-286
5708	Waspalloy	5737	A-286
5709	Waspalloy	5738	303 F
5710	20-Cr, 1.3-Ni, 2.3-Si	5739	Almar 362
5711	Hastelloy S	5740	Almar 362
5712	Rene 41	5741	W-545
5713	Rene 41	5742	Incoloy 801
5714	Inconel 722	5743	AM-355
5715	Inconel 601	5744	AM-355
5716	RA-330	5745	AM-350
5717	RA-333	5746	D-979



AMS NUMBERS

AMS No.	Other Names	AMS No.	Other Names
5609	410 Mod.	5637	302 SS
5610	416 F	5638	18-8 W/0.50 Mo. (303 SS)
5611	410 Mod.	5639	304 SS
5612	410 Mod.	5640	303 SS
5613	410 SS	5641	303 SS
5614	403	5642	303 F, 303 + Cb
5615	414 SS	5643	17-4 Ph, Custom 630
5616	Greek Ascology	5644	17-7 Ph
5617	Custom 455	5645	321 SS
5646	347 SS	5674	347 SS
5647	304 L	5675	Incoloy 92
5648	316 SS	5676-77	Nichrome V (80-20)
5649	316 F, 316 Fm, 316 SS	5678	17-7 Ph
5650	309 S	5679	Inconel, Fm 62
5651	310 SS	5680	347 SS
5652	314 SS	5681	347 SS
5653	316 L	5682	Nichrome V (80-20)
5654	347 SS	5683	Inconel 600
5655	Crucible 422, Carpenter 636	5684	Inconel 600
5656	Armco 21-6-9, Nitronic 40	5685	305 SS
5657	Ph 15-7 Mo.	5686	305 SS
5658	Armco 15-5 Ph	5687	Inconel 600
5659	Armco 15-5 Ph	5688	302 SS
5660	Inco 901	5689	321 SS
5661	Incoloy 901	5690	316 SS
5662	Inconel 718	5691	316 SS



AMS NUMBERS

AMS No.	Other Names	AMS No.	Other Names
5859	Custom 450	6358	8740
5860	Custom 455	6359	4340
5862	15-5 Ph	6382	EMS-233
5863	Custom 450	6385	17-22 A(S)
5864	PH13-8 Mo.	6414	4340
5865	TD Nickel	6415	4340
5866	Ni-Thoria	6416	300M
5870	Inco 601	6419	300M
5871	Inco 800	6431	D6AC
5872	C 263	6436	17-22 Av
5873	Hastelloy S	6437	Pyromet 822, H-11
5874	29-Fe, 22-Cr, 21-Ni, 18.5-Co, 3.2-Mo, 2.8-W, 0.78-Ta, 0.30-Al, 0.05-Zr, 0.05-La, 0.20-N	6438	D6AC
5875	Elgiloy	6440	52100 Vac-Melt
5876	Elgiloy	6444	52100 Vac-Melt
5880	440 C	6447	52100
5890	Ni-Thoria, TD Nickel	6458	17-22 A(S)
5895	A-286	6465	HY-180
6466	Type 502 SS	7460	6-Al, 4-V Ti
6467	Type 502 SS	7461	6-Al, 4-V Ti
6468	HP 9-4-20	7464	H-11
6485	Pyromet 822, H-11	7469	Rene 41
6487	Pyromet 822, H-11	7470	Greek Ascology
6788	Pyromet 822, H-11	7471	Waspalloy
6490	M-50	7474	Armco 17-4 Ph
6491	M-50	7475	MP-159
6501	Maraging 250	7477	A-286



AMS NUMBERS

AMS No.	Other Names	AMS No.	Other Names
5342-43	17-4 Ph, Custom 630	5373	Stellite 6
5344	17-4 Ph, Custom 630	5375	Hs-23
5346	15-5 Ph	5376	N-155, Multimet
5377	713 Lc	5410	In 738
5378	HS-27	5500	302 SS
5380	Hs-30	5501	304 SS
5382	Hs-31, X-40	5502	501 SS
5383	Inconel Alloy 718	5503	430 SS
5384	Udimet 500	5504-05	410 SS
5385	Hs-21	5506	420 SS
5387	Stellite 6	5507	316 L
5388-89	Hastelloy C	5508	Greek Ascology
5390	Hastelloy X	5509	D-979
5391	Inconel 713 C	5510	321 SS
5392	Ni Resist 1 A	5511	304 SS
5393	Ni Resist 2 A	5512	347 SS
5394	Ni Resist D-2 (20 Ni)	5513	304 SS
5395	Ni Resist D-2 C (22 Ni)	5514	305 SS
5396	Hastelloy B	5515	302 SS
5397	Waspalloy	5516	302 SS
5398	17-4 Ph	5517-18	301 SS
5399	Rene 41	5519	301 SS
5400	15-5 Ph	5520	Ph-15-7 Mo
5401	Inco 625	5521	310 SS
5402	Inco 625	5522	314 SS
5403	Rene 80	5523	309 S



AMS NUMBERS

AMS No.	Other Names	AMS No.	Other Names
5775	AM-350	5817	Greek Ascoloy
5776	410 SS	5821	410 SS
5777	410 SS	5823	11.8-Cr, 2.8-Ni, 1.6-Co, 1.8-Mo, 0.32-V, Bal Fe
5778	FM 69	5824	17-4 Ph
5779	Inco X-750	5825	17-4 Ph, Custom 630
5780	AM-355	5826	17-4 Ph
5781	AM-355	5827	17-4 Ph, Custom 630
5782	19-9 W Mo.	5828	Waspaloy
5783	19-9 W Mo.	5829	Nimonic 90
5784	29-9	5832	Inco 718
5785	29-9	5833	Elgiloy
5786	Hastelloy W	5834	Elgiloy
5787	Hastelloy W	5837	Inco 625
5788	Stellite #6	5838	Hastelloy S
5789	Stellite #31	5840	Ph 13-8 Mo.
5841	Mp 159	6260	9310 Vac-Melt
5842	Mp 159	6265	9310 Vac-Melt
5843	Mp 159	6302	17-22 As
5844	Mp 35 N	6303	17-22 Av
5845	Mp 35 N	6304	17-22 A
5846	U-700	6305	17-22 A
5850	Ph 15-7 Mo.	6322	8740
5851	Astroloy	6323	8740
5852	Astroloy	6325	8740
5858	A-286	6335	EMS-4



AMS NUMBERS

AMS No.	Other Names	AMS No.	Other Names
5404	C 101	5524	316 SS
5405	B 1900	5525	A-286
5406	B 1900 Hf	5526	19-9 DL
5407	Mm 200	5527	19-9 DL
5409	In 738	5528-29	17-7 Ph
5530	Hastelloy C	5560	304 SS
5531-32	N-155, Multimet	5561	Nitronic 40 (21-6-9)
5533	S-590	5562	Nitronic 40 (21-6-9)
5534	S- 816	5563	304 SS
5535	I-750 M	5564	304 SS
5536	Hastelloy X	5565	304 SS
5537	Hs-25	5566	304 SS
5538-39	19-9 Dx	5567	304 SS
5540	Inconel 600	5568	17-7 Ph
5541	Inconel W (722)	5570	321 SS
5542	Inconel X	5571	347 SS
5543	W-545	5572	310 SS
5544	Waspaloy	5573	316 SS
5545	Rene 41	5574	309 S
5546	Am-350	5575	347 SS
5547	Am-355	5576	321 SS
5548	Am-350	5577	310 SS
5549	Am-355	5578	Custom 455
5550	Inconel 702	5579	19-9 DL
5551	M-252, J-1500	5580	Inconel 600



AMS NUMBERS

AMS No.	Other Names	AMS No.	Other Names
5718	M-152 Jethete	5747	Inconel 750
5719	M-152 Jethete	5748	Crucible AFC-77
5720	19-9 DL	5749	BG-42
5721	19-9 DL	5750	Hastelloy C
5722	19-9 DL	5751	Udimet 500
5723	19-9 Dx	5753	Udimet 500
5724	19-9 Dx	5754	Hastelloy X
5725	Timken, 16-25-6	5755	Hastelloy W
5726	A-286	5756	M-252, J-1500
5727	Timken, 16-25-6	5757	M-252, J-1500
5728	Timken, 16-25-6	5758	MP35N
5729	19-9 Dx	5759	HS-25
5731	A-286	5761	Pyromet X-15
5762	203 SS	5794	N-155, Multimet
5763	Custom 450	5795	N-155, Multimet
5764	22-13-5	5796	L-605
5765	S-816	5797	L-605
5766	Incoloy 800	5798	Hastelloy X
5767	N-155, Multimet	5799	Hastelloy X
5768	N-155, Multimet	5800	Rene 41
5769	N-155, Multimet	5801	Haynes 188
5770	S-590	5804	A-286
5771	Hastelloy N	5805	A-286
5772	Haynes 188	5811	A-286 Mod.
5773	Custom 450	5812	Ph 15-7 Mo.
5774	AM-350	5813	Ph 15-7 Mo.



AMS NUMBERS

AMS No.	Other Names	AMS No.	Other Names
5552	Incoloy 801	5581	Inco 625
5553	N-201	5582	Inconel X-750
5554	Am-350	5583	Inco 750
5555	N-205	5585	N-155, Multimet
5556	347 SS	5586	Waspaloy
5557	321 SS	5587	Hastelloy X
5558	347 SS	5588	Hastelloy X
5559	321 SS	5589	Inconel 718
5590	Inconel 718	5618	440 C
5591	410 SS	5620	420 SS
5592	RA-330 (35-18)	5621	420 SS
5593	RA-333	5622	Inco 718
5594	AM-355	5622	Custom 630, 17-4 Ph
5595	Armco 21-6-9, Nitronic 40	5623	9.50-Ni, 5.5-Mn
5596	Inco 718	5624	12.5-Ni, 4.5-Mn, 4-Cr
5597	Inco 718	5625	9.5-Ni, 5.5-Mn
5598	Inconel X-750	5626	18-4-1 (T-1)
5599	Inconel 625	5627	430 SS
5600	302 SS	5628	431 SS
5601	Armco Ph 14-8 Mo	5629	Armco Ph 13-8 Mo.
5602	501 (5 Cr.) SS	5630	440 C
5603	Armco Ph 14-8 Mo	5631	440 A
5604	Armco 17-4 Ph, Custom 630	5632	440 F
5605	Inconel 706	5633	CG 27
5606	Inconel 706	5634	CG 27
5607	Hastelloy N	5635	303 Pb
5608	Haynes Alloy No. 188	5636	302 SS



PWA NUMBERS

PWA Spec.	AISI or Brand	PWA Spec.	AISI or Brand
1039	Stellite 6 B	1078	Hastelloy C
1041	Astroloy	1079	AM-363
1042	Haynes 188	1086	Astroloy
1043	Inco 706	1087	C-263
1047	Incoloy 901	1088	Haynes 188
1048	Inconel 718	1089	410, 410 MOD
1049	Inco 903	1091	H-46
1051	Astroloy	1092	A 286
1052	A-286 (MOD TINDUR)	1095	WC-103 (C-103)
1055	Hastelloy S	1096	Astroloy
1057	Waspaloy	1100	IN-100 IMP
1058	IN 100 Modified	1103	A-286 (MOD TINDUR)
1060	Inconel 600	1105	Inconel 718
1061	Waspaloy	1106	IN-100 MOD
1062	Inconel 600	1112	Waspaloy MOD
1063	Inconel X	1113	Waspaloy MOD
1064	Haynes 25, (L-605)	1114	Inconel 718
1065	Inconel 718	1117	Waspaloy
1066	Hastelloy X	1123	316 SS
1067	Hastelloy N	1127	Haynes 230
1068	Inconel 718	1130	Haynes 214
1069	Inconel 625	1132	Inconel 718
1070	Inconel 600	1133	Inconel 625
1071	Astroloy	1134	Cronidur™ X30
1072	Inconel 625	1135	MAR-M-247
1073	Modified In 100	1143	Incoloy 909
1074	In 100 Modified	1146	Inconel 718
1075	A 286	1149	Astroloy



PWA NUMBERS

PWA Spec	AISI or Brand	PWA Spec.	AISI or Brand
777	410 SS	1012	Hastelloy N
778	BG-42	1013	Astroloy
779	WD-65	1014	TD Nickel
780	C=0.10(m) Mg=0.40-0.75 P=0.10-0.17 S=0.05(m) Si-2.00 (m) Ni=9.00-12.00, Cr=19.00-22.00 Se=0.20-0.35	1015	Haynes 188
781	C=0.20(m) Mn=2.00(m) P=0.05(m) S=0.05(m) Si=2.00(m) Ni=8.00(min) Cr= 18.00(min) Mo=2.00(min)	1016	Waspaloy
784	C=0.15-0.30 Mn=1.00(m) P=0.03(m) S=0.03(m) Si=0.75-2.00 Cr=20.00-25.00 Ni=10.00-14.00 W=2.50-3.50	1017	Inconel 720
786	C-0.25 max Cr=15.50-17.50 Ni=3.50-5.00 Cu=3.50-4.50 Ti-0.20 Fe-Bal	1019	Udimet 700
787	19 Cr, 2.3 Ni	1021	Astroloy
788	A 286 Stainless	1022	Incoloy 901
789	B-100 Stainless NM-100	1023	Astroloy
791	AM-363	1024	Incoloy 901
793	M-50	1025	Inco 706
796	AM-363	1026	Inco 706
817	17-22 A	1027	Waspaloy
1002	Inco 901	1028	In-100
1003	Incoloy 901	1029	A-286
1004	Waspaloy	1030	Waspaloy
1005	Waspaloy	1031	Inconel X
1006	Astroloy, Udimet 700	1032	Haynes 25 (L-605)
1007	Waspaloy	1033	Inconel 718
1008	Astroloy, Udimet 700	1035	TD Nickel
1009	Inconel 718	1036	Hastelloy N
1010	Inconel 718 C	1037	Haynes 25 (L-605)
1011	Nimonic 115	1038	Hastelloy X



PWA NUMBERS

PWA Spec.	AISI or Brand	PWA Spec.	AISI or Brand
1471	Waspaloy	1494	IN-100
1472	Inconel 718 MOD.	1495	IN-939
1474	Haynes 230	6000	Nickel 200
1475	Waspaloy	6000-1	Nickel 201
1477	Inconel 718	6005	Commercially Pure Nickel 200
1480	Cr=5.00 Co=10.00 W=6.00 Ta=9.00 Al=5.00 Mo=2.00 Ni=60.00	6005-1	Nickel 201
1483	IN-792 MOD.	6010	Nickel 200
1484	Cr=5.00 Co=10.00 W=6.00 Ta=9.00 Al=5.00 Mo=2.00 Ni=60.00 Re=3.00	6010-1	Nickel 201
1487	IN-792 MOD.	6015	Nickel 200
1489	MAR-M-247	6015-1	Nickel 201
1490	Inconel 718	7235	A-286
1493	ALLOY 454		



AMS NUMBERS

AMS No.	Other Names	AMS No.	Other Names
6512	Maraging 250, NiMark 200, 18 Ni 200	7478	A-286
6514	Maraging 300, NiMark 300, 18 Ni 300	7481	A-286
6520	Maraging 250	7482	A-286
6521	Maraging 300	7701	Mumetal
6522	H-11	7702	Mumetal
6523	9-4-20	7705	Mumetal
6524	9-4-30	7718	Fe-Ni
6525	9-4-20	7725	Hevimet
6526	9-4-30	7805	Mo
6543	Hy-180	7817	Mo Alloy
6544	Hy-180	7819	Mo Alloy
6546	9-4-25	7849	Ta
7228	304 SS	7878	WC Powder-Cobalt Coated
7229	347 SS	7879	WC-Co
7232	Inconel 600	7880	WC-Co
7235	A-286	7897	W
7236	L-605	7898	W
7237	Hastelloy X		



PWA NUMBERS

PWA Spec.	AISI or Brand	PWA Spec.	AISI or Brand
1275	Alloy C+	1338	Powder, Molybdenum (CP)
1276	Alloy C	1340	Powder, Nickel Aluminum Mixture
1277	Alloy C+	1350	Coating, 60 Fe-27 Cr-13 Al-0.7Y
1280	Wire Form, Ti-13-3-11	1351	Coating, 62 Co-23 Cr-14.5 Al-0.65Y
1301	Powder, 88 Tungsten Carbide-12 Cobalt	1353	Powder, Nickel Graphite
1302	Powder, 88 Tungsten Carbide-12 Cobalt	1359	Powder Nickel or Nickel Chromium Coated
1304	Powder, Chromium Carbide	1401	In 100
1305	Powder, 75 Chromium Carbide+25 (80Ni-20 Cr Alloy)	1402	B-1900
1306	Powder, Chromium Carbide, Commercially Pure	1419	Nx 188
1307	Powder, 75 Chromium Carbide+25 (80 Nickel-20 Chromium Alloy)	1422	Mar M 200+Hf
1312	Powder, Zirconium Oxide	1424	Mar M 200+Hf
1313	Powder, Molybdenum, Commercially Pure	1447	Mar M-247
1314	Powder, Cobalt Alloy	1449	Rene 80
1315	Powder, 80 Nickel-20 Chromium Alloy Coarse	1450	B-1900
1316	Powder, Cobalt Alloy, Fine	1451	Inconel 738
1317	Powder, 80 Nickel-20 Chromium Alloy	1453	Inco 706
1318	Powder, Cobalt Alloy	1454	CRM 18 D
1319	Powder, 80 Nickel-20 Chromium Alloy, Fine	1455	Modified B-1900
1321	Powder, 80 Nickel-20 Aluminum	1456	Inconel 792
1323	Powder, Nickel	1458	Udimet 700
1324	Powder, Nickel	1464	Greek Ascology
1325	Powder, Chromium Oxide	1466	Inconel 792
1328	Powder, Tungsten	1467	Inconel 792
1334	Wire Nickel Aluminum	1468	Inconel 625
1337	Powder, Nickel Aluminum	1469	Inconel 718



PWA NUMBERS

PWA Spec.	AISI or Brand	PWA Spec.	AISI or Brand
1154	440C	1214	Titanium 6Al-2 Sn-4 Zr-2 Mo
1155	9310	1215	Titanium-6Al-4V
1158	2024	1216	Titanium-6Al-2 Sn-4 Zr-6 Mo
1161	Incoloy 909	1217	Titanium Plate
1163	Haynes 230	1218	Titanium 6Al- 2 Sn-4 Zr-2 Mo-0.25 Si
1164	Waspaloy	1219	Titanium 6Al- 2 Sn-4 Zr-6 Mo
1171	MP35N	1220	6Al, 2Sn, 4Zr 6Mo Ti
1177	GLIDCOP ®	1222	6Al, 2Sn, 4Zr 2Mo Ti
1191	Incoloy 909	1223	6Al, 2Sn, 4Zr 2Mo Ti
1192	Incoloy 909	1224	6Al, 2Sn, 4Zr 2Mo Ti
1195	410, 410 MOD	1225	6Al, 2Sn, 4Zr 2Mo Ti
1196	Stellite 6B	1227	Ti-6-2-4-6
1198	Haynes 242	1228	Ti-8Al-4V
1199	THERMOSPAN ®	1230	Sheets & Strip Ti-13-3-11
1200	B-120 VCA, Barg Billet Form Ti-13-3-11	1231	6Al, 2Sn, 4Zr, 2Mo Ti
1201	Titanium Sponge	1233	TIMETAL 21S
1202	Titanium, 8Al-1Mo-1V Ti	1240	Ti-5Al-2.5Sn (A-110AT)
1203	Titanium, 5-Al 5-Sn 5-Zr	1241	IMI 834
1204	Titanium 8-Al 1Mo-1V Ti	1260	Titanium 3Al-2.5V Seamless Tubing
1205	Ti 2Al, 11Sn, 5Zr, 1 Mo	1261	Titanium 5Al-2.5 Sn
1206	Ti 2Al, 11Sn, 5Zr, 1 Mo	1262	Titanium 6Al-4V
1207	6Al, 2Sn, 6V Ti	1263	8Al-1V-1Mo Ti
1208	6Al, 2Sn, 6V Ti	1264	Ti-8Al-4V
1209	Titanium 6Al-2 Sn-4 Zr-2 Mo	1265	Ti-6-2-4-2
1210	Titanium 6Al-2 Sn-4 Zr-2 Mo	1267	Ti-6-2-4-2
1211	Titanium 6Al-2 Sn-4 Zr-2 Mo-0.25 Si	1272	Alloy C
1212	Titanium 6Al-2 Sn-4 Zr-6 Mo	1273	Alloy C+
1213	6 Al-4V Ti	1274	Alloy C



PWA NUMBERS

PWA Spec.	AISI or Brand	PWA Spec.	AISI or Brand
76	310 SS	652	Waspaloy
90	Waspaloy	653	Wi-52
91	Ti 8 Al, 1 V, 1 Mo	654	Wi-52
92	Waspaloy	655	Inco 713c
93	Astroloy	656	Udimet 700
95	N-155	657	Sm 302 (Mar M 302)
96	Inco 718	658	In 100
114	Inco 903	659	Mar-M 200
115	MP 35 N	660	Mar-M 302 (Sm 302)
125	Custom 455	661	Inconel 600
143	14-14-2	662	Coast Metals 63
144	EMS-7	663	B-1900
300	Waspaloy	664	Mar M 200
640	Stellite 1016	665	Inco 722
641	Haynes 188	672	C=0.10(m) Mn=1.00(m) S=0.030(m) Si=1.00(m) Cr= 19.00-22.00 Ti=2.00-2.70 Al=1.00-1.50 Fe=5.00(m) Cobalt if determined 1.00(m) Ni+Co Balance
642	Inconel 713	673	Nimonic 75
643	NX 188	675	Waspaloy
644	Stellite 31	676	Ti 150
645	B-1900	678	Inco 721 (M)
647	MAR M 509	679	2 Mo, 2 Cr, 2 Fe Ti
649	Inco-718	682	6 Al-4V- Titanium
650	C=0.20-0.35 Mn=1.00(m) Si=1.00(m) Cr=25.50-29.50 Mo=4.50-6.50 Ni=1.75-3.25 Fe=2.00	683	6 Al-4V- Titanium
651	Thetaloy	684	110 Al



PWA NUMBERS

PWA Spec.	AISI or Brand	PWA Spec.	AISI or Brand
685	5 Al, 2.5 Sn, Ti	735	Maraging
686	Waspaloy	737	Maraging
687	Waspaloy	738	Maraging
688	Udimet 500	739	Maraging
689	Udimet 700	742	Bower 315
690	EMS-90	743	X-40
691	Stellite #1	744	X-40
692	Coating Alloy, Coast Metals 63, 98-M2	749	17-22 A
694	Coast Metals 64	752	C=0.07-0.12 Mn=0.30-0.60 P=0.030(m) S=0.030(m) Si=0.35(m) Cr=11.50-13.00 Mo=0.40-0.60 Ni=0.60(m)
695	Cp Ti	754	310 SS
696	Wire Ti-5-2.5	757	310 SS
698	82 Au, 18 Ni (Brazing)	758	C=0.35-0.50 Mn=0.60-0.90 P=0.03(m) S=0.03(m) Si=0.80-1.20 Cr= 12.00-14.00 Ni=12.00-14.00 Mo=1.50-2.00 Cb=2.50-3.50 Co=9.00-11.00 W=2.00-3.00
699	72 Ag, 28 Cu	762	310 SS
707	56 Ag, 42 Cu, 2 Ni	765	440 C Mod Stainless
708	41 Au, 27 Pd, 22 Ni, 10 Cr	766	B-400 Stainless
721	C=0.40-0.70 Mn=3.50-5.50 P=0.04 S=0.03 Si=0.50 Ni=11.00-14.00 Cr=3.00-5.00 Mo=0.50	767	347 Stainless
723	SAE 52100	768	17-22 A
724	Bower 315	770	347 Stainless
725	M-50	771	B-400
726	H-11	772	Invar 36 Fm
727	H-11	773	Invar 42
733	17-22 A	774	Invar 49
734	Maraging 18 Ni	775	49 Ni



THE CHEMICAL ELEMENTS

Name	Symbol	Atomic Weight	Melting Point C°
Scandium	Sc	45.10	1200
Selenium	Se	78.96	220
Silicon	Si	28.06	1430
Silver	Ag	107.880	960.5
Sodium	Na	22.991	97.7
Strontium	Sr	87.63	770
Sulphur	S	32.066	119
Tantalum	Ta	180.95	2996
Technetium	Tc	99	2700
Tellurium	Te	127.61	450
Terbium	Tb	159.2	327
Thallium	Tl	204.39	300
Thorium	Th	232.05	1800
Thulium	Tm	168.94	?
Tin	Sn	118.70	231.9
Titanium	Ti	47.90	1820
Tungsten	W	183.92	3410
Uranium	U	238.07	1130
Vanadium	V	50.95	1735
Xenon	Xe	131.3	-112
Ytterbium	Yb	173.04	1800
Yttrium	Y	88.92	1490
Zinc	Zn	65.38	419.5
Zirconium	Zr	91.22	1750



Name	Symbol	Atomic Weight	Melting Point C°
Molybdenum	Mo	95.95	2625
Neodymium	Nd	144.27	840
Neon	Ne	20.183	-248.6
Neptunium	Np	237	?
Nickel	Ni	58.69	1455
Niobium (Also Known As Columbium)	Nb	92.91	2415
Nitrogen	N	14.008	-210.0
Osmium	Os	190.2	2700
Oxygen	O	16.0000	-218
Palladium	Pd	106.7	1554
Phosphorous	P	30.98	44.1
Platinum	Pt	195.23	1773.5
Plutonium	Pu	239	?
Polonium	Po	210.0	600
Potassium	K	39.096	63
Praseodymium	Pr	140.92	940
Promethium	Pm	147	?
Protactinium	Pa	231	3000
Radium	Ra	226.05	700
Radon	Rn	222	-71
Rhenium	Re	186.31	3170
Rhodium	Rh	102.91	1966
Rubidium	Rb	85.48	39
Ruthenium	Ru	101.1	2500
Samarium	Sm	15.43	1300



WEIGHTS AND MEASURES

CUBIC MEASURE

- 1,728 cubic inches = 1 cubic foot
- 27 cubic feet = 1 cubic yard
- 128 cubic feet = 1 cord (wood)
- 2,150.42 cubic inches = 1 standard bushel
- 40 cubic feet = 1 ton (shipping)
- 231 cubic inches = 1 U.S. standard gallon
- 1 cubic foot = about 4/5 of a bushel

LONG MEASURE

- 12 inches = 1 foot
- 3 feet = 1 yard
- 5 1/2 yards = 1 rod
- 40 rods = 1 furlong
- 8 furlongs = 1 sta. mile
- 3 miles = 1 league

MARINERS MEASURE

- 6 feet = 1 fathom
- 120 fathoms = 1 cable length
- 7 1/2 cable lengths = 1 mile
- 5,280 feet = 1 statute mile
- 6,085 feet = 1 nautical mile

DRY MEASURE

- 2 pints = 1 quart
- 8 quarts = 1 peck
- 4 pecks = 1 bushel
- 36 bushels = 1 chaldron

SURVEYORS MEASURE

- 7.92 inches = 1 link
- 25 links = 1 rod
- 4 rods = 1 chain
- 10 sq. chains or 160 sq. rods = 1 acre
- 640 acres = 1 square mile
- 360 sq. miles (6 miles sq.) = 1 township

LIQUID MEASURE

- 4 gills = 1 pint
- 2 pints = 1 quart
- 4 quarts = 1 gallon
- 31 1/2 gallons = 1 barrel
- 2 barrels = 1 hogshead



DENSITIES, WEIGHTS & MEASURES

Calculating Weights:

- Rounds:** Diameter² x 0.785 x Density = Weight per Inch
- Rectangles:** Thickness x Width x Density = Weight per Inch
- Shapes:** Average Square Area (Add Square Areas: 2) x Density = Weight per Inch
- Hex:** AF² (Across Flats) x 0.866 x Density = Weight per Inch
- Tubing:** O.D.² x 0.785 x Density = Weight per Inch of Outside Diameter
- I.D.² x 0.785 x Density = Weight per Inch of Inside Diameter
- Weight per Inch of O.D. Minus Weight per Inch of I.D. = Weight per Inch of Tubing

Densities (lb/in³)

Stainless Steel	Stainless Steel	Nickel Alloys	Nickel Alloys
13-8	0.279 T300	0.288 Hast C276	0.321 Rene '41
15-5	0.282 High Speed and Tool Steel	0.291 Haynes 214	0.291 Waspaloy
15-7PH	0.282 M-1	0.285 Haynes 230	0.324 Nickel Alloys with Cobalt
17-7PH	0.282 M-2	0.295 Haynes 242	0.327 MP35N
301	0.29 M-4	0.288 H-X	0.297 Cobalt Alloys
302	0.29 M-7	0.287 Inco 600	0.306 HS 25
303	0.29 M-42	0.288 Inco 601	0.293 HS 188
304	0.29 M-50	0.281 Inco 625	0.305 Titanium
316	0.29 T-15	0.296 Inco 718	0.296 6-4
321	0.29 Nickel Alloys	0.298 Inco X 750	0.298 Ti GD 1
A20CB3	0.292 600	0.304 Inco 825	0.294 Ti GD 2
AM 350	0.286 625	0.305 Inco 925	0.294 Ti GD 3
C250	0.289 718	0.296 Monel 400	0.318 Ti GD 4
C300	0.289 A286	0.286 Monel 405	0.318 Ti GD 7
C350	0.292 Hast 630	0.297 Monel 500	0.305 Ti GD 8
Custom 455	0.28 Hast B2	0.333 Ni 200	0.321
ELGILOY	0.30 Hast C4	0.312 Ni 201	0.321 Zr
T250	0.288 Hast C22	0.314 Ni Span C	0.293



WEIGHTS AND MEASURES

SQUARE MEASURE

1 square centimeter = 0.1550 square in.
 1 square inch = 6.452 square cm
 1 square decimeter = 0.1076 square feet

1 square ft = 9.2903 square decimeters

1 square meter = 1.196 square yards
 1 square yard = 0.8361 square meters

1 acre = 160 square rods

1 square rod = 0.00625 acre

1 hectare = 2.47 acres

1 acre = 0.4047 hectares

1 square kilometer = 0.386 square miles

1 square mile = 2.59 square kilometers

144 square inches = 1 square foot

9 square feet = 1 square yard

30 1/2 square yards = 1 square rod

40 squares rods = 1 rood

4 roods = 1 acre

640 acres = 1 square mile

WEIGHTS

1 gram = 0.03527 ounces

1 ounce = 28.35 grams

1 kilogram = 2.2046 pounds

1 pound = 0.4536 kilograms

1 metric ton = 0.98421 English ton

1 English ton = 1.016 metric ton

APOTHECARIES WEIGHT

20 grains = 1 scruple

3 scruples = 1 dram

8 drams = 1 ounce

12 ounces = 1 pound

(ounce & pound are same as in Troy Weight)

AVOIRDUPOIS WEIGHT

27 11/32 grains = 1 dram

16 drams = 1 ounce

16 ounces = 1 pound

25 pounds = 1 quarter

4 quarters = 1 cwt.

2,000 lbs. = 1 short ton

2,240 pounds = 1 long ton

TROY WEIGHT

(used for weighing gold, silver & jewels)

24 grains = 1 pwt.

20 pwt. = 1 ounce

12 ounces = 1 pound

CLOTH MEASURE

2 1/2 inches = 1 nail

4 nails = 1 quarter

4 quarters = 1 yard



WEIGHTS AND MEASURES

METRIC EQUIVALENTS
(Linear Measure)

1 centimeter = 0.3937 inches

1 inch = 2.54 centimeters

1 decimeter = 3.937 inches = 0.328 feet

1 foot = 3.048 decimeters

1 meter = 39.37 inches = 1.0936 yards

1 yard = 0.9144 meter

1 dekameter = 1.9884 rods

1 rod = 0.5029 dekameters

1 kilometer = 0.62137 miles

1 mile = 1.6093 kilometers

APPROXIMATE METRIC
EQUIVALENTS

1 decimeter \approx 4 inches

1 liter \approx 1.06 quarts liquid, 0.9 qts. dry

1 meter \approx 1.1 yards

1 kilometer \approx 3/4 of a mile

1 hectoliter \approx 2 3/4 of a bushel

1 hectare \approx 2 1/2 acres

1 kilogram \approx 2 1/5 pounds

1 stere or cubic meter \approx 1/4 of a cord

1 metric ton \approx 2,204.62 pounds

MEASURE OF VOLUME

1 cubic centimeter = 0.051 cubic inches

1 cubic inch = 16.39 cubic centimeters

1 cubic decimeter = 0.0353 cubic feet

1 cubic foot = 28.317 cubic decimeters

1 cubic meter = 1.308 cubic yards

1 cubic yard = 0.7646 cubic meters

1 stere = 0.2759 cords

1 cord = 3.624 steres

1 liter = 0.908 quart dry = 1.0567 quarts liquid

1 dekaliter = 2.6417 gallons = 1.135 pecks

1 gallon = 0.3785 dekaliter

1 peck = 0.881 dekaliter

1 hectoliter = 2.8375 bushels

1 bushel = 0.3524 hectoliters

TIME MEASURE

60 seconds = 1 minute

60 minutes = 1 hour

24 hours = 1 day

7 days = 1 week

28, 29, 30 or 31 days = 1 calendar month

30 days = 1 month (In computing interest)

365 days = 1 year

366 days = 1 leap year



THE CHEMICAL ELEMENTS

Name	Symbol	Atomic Weight	Melting Point C°
Actinium	Ac	227.05	1050
Aluminum	Al	26.97	660.2
Americium	Am	241	?
Antimony	Sb	121.76	630.5
Argon	A	39.944	-189
Arsenic	As	74.91	814.0
Astatine	At	211	?
Barium	Ba	137.36	104
Berkelium	Bk	245	?
Beryllium	Be	9.02	1280
Bismuth	Bi	209.0	271
Boron	B	10.82	2040
Bromine	Br	79.916	-7.2
Cadmium	Cd	112.41	320.9
Calcium	Ca	40.08	850
Californium	Cf	248	?
Carbon	C	12.011	3700
Cerium	Ce	140.13	600
Cesium	Cs	132.91	28
Chlorine	Cl	35.457	-101
Chromium	Cr	52.01	1850
Cobalt	Co	58.94	1495
Columbium	Cb	92.91	2415
Copper	Cu	63.54	1083
Curium	Cm	245	?



THE CHEMICAL ELEMENTS

Name	Symbol	Atomic Weight	Melting Point C°
Dysprosium	Dy	162.46	?
Erbium	Er	167.2	1250
Europium	Eu	152.0	?
Fluorine	F	19.00	-223
Francium	Fr	223	?
Gadolinium	Gd	158.93	?
Gallium	Ga	69.72	29.8
Germanium	Ge	72.60	958
Gold	Au	197.0	1063.0
Hafnium	Hf	178.6	1700
Helium	He	4.003	-271
Holmium	Ho	164.94	?
Hydrogen	H	1.0080	-259
Indium	In	114.76	156.4
Iodine	I	126.92	114
Iridium	Ir	192.2	2454
Iron	Fe	55.85	1539
Krypton	Kr	83.7	-157.0
Lanthanum	La	138.92	826
Lead	Pb	204.39	300
Lithium	Li	6.940	186
Lutetium	Lu	174.99	?
Magnesium	Mg	24.32	650
Manganese	Mn	54.94	1245
Mercury	Hg	200.61	-38.87



WEIGHT CONVERSIONS

1 LONG TON = 2,240 Pounds
(GROSS) = 20 Cubic Weight
 = 1.016047 Kilo Ton
 = 1.12 Short Ton

1 SHORT TON = 2,000 Pounds
(NET) = 0.90718 Kilo Ton
 = 0.892857 Long Ton

1 METRIC TON = 1,000 Kilo Grammes
 = 2,204.62 Pounds
 = 0.9842064 Long Ton
 = 1.10231 Short Ton

MEASUREMENTS: 1 M/T = 40 Cubic Feet
 1,000 B.M. = 2.08 Tons Measurement



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CONVERSION TABLES

VOLUME EQUIVALENTS

	Gal. (U.S.)	Gal. (Imp.)	Cu. Ft.	Cu. In.	Liter
1 Gal. (Imp.)	—	1.2009	0.1605	277.46	4.5459
1 Gal. (U.S.)	0.8327	—	0.1337	231.0	3.7853
1 cu. Ft.	6.228	7.481	—	1728.0	28.32
1 cu. In.	0.0036	0.0043	0.0006	—	0.0164
1 liter	0.2200	0.2642	0.0353	61.024	—

WEIGHT EQUIVALENTS

	Metric Ton	Short Ton	Long Ton	LB.	KG.
1 metric ton	—	1.1023	0.9842	2204.6	1000.0
1 short (net) ton	0.9072	—	0.8929	2000.0	907.2
1 long (gross) ton	1.0160	1.12	—	2240.0	1016.0
1 lb.	0.0005	0.0005	0.0004465	—	0.4536
1 kg.	0.001	0.0010	0.0010	2.2046	—



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CONVERSION TABLES

MEASURE EQUIVALENTS

Table with 7 columns: Unit, In., Ft., Yd., Mile, M., Km. Rows include 1 in., 1 ft., 1 yd., 1 mile, 1 m., 1 km.

AREA EQUIVALENTS

Table with 5 columns: Unit, Sq. m., Sq. ft., Sq. yd., Acre. Rows include 1 sq. m., 1 sq. ft., 1 sq. yd.



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Table with 5 columns: Unit, Sq. m., Sq. ft., Sq. yd., Acre. Rows include 1 sq. m., 1 sq. ft., 1 sq. yd.



TEMPERATURE SCALES

Temperature scale conversion table with columns for Kelvin, Celsius, and Fahrenheit, ranging from 173 to 373.

°C = degrees centigrade °K = degrees Kelvin
°F = degrees Fahrenheit °Ra = degrees Rankine
°R = degrees Reaumur

Temperature Points:

°C = 0.555 (°F - 32) = 1.25 °R
°F = 1.8°C + 32 = 2.25 °R + 32
°R = 0.8°C = 0.444 (°F - 32)

Temperature Differences:

1 °C = 9/5°F = 4/5°R
1 °F = 5/9°C = 4/9°R
1 °R = 5/4°C = 9/4°F

Absolute Zero of Temperature:

0°K = - 273.16°C = -459.28°F

Zero Points of Scales:

0°C = 0°R = 32°F
0°F = -17.78°C = -14.22°R



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