

COMPILATION AND INDEX OF TRADE NAMES, SPECIFICATIONS, AND PRODUCERS OF STAINLESS ALLOYS AND SUPERALLOYS

Prepared by

Ward F. Simmons

and

Russell B. Gunia

Consultant (Formerly U. S. Steel Corporation)

Issued under the auspices of

ASTM Committee A-1 on Steel, Stainless Steel,
and Related Alloys

and

The Metals and Ceramics Information Center
Battelle Columbus Laboratories



DS 45A

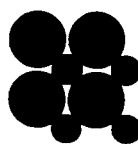


AMERICAN SOCIETY FOR TESTING AND MATERIALS

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Foreword

The purpose of this compilation is the tying together of the trade names, producers' designations, and specifications for stainless steels and superalloys, thus easing the problem of identifying some of these alloys. This publication is *not* intended as a procurement directory or buyer's guide.

The information contained in this compilation is based on the data supplied by 80 U. S. producers (usually melters) of stainless steels, corrosion and heat resistant castings, and superalloys. This revision also contains powder-metallurgy-produced products.

This document does not include information from processers such as forgers, rerollers, wire drawers, etc., since they are not primary metal producers.

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INTRODUCTION

This compilation lists the compositions, applicable specifications, trade names, and manufacturers of commercial stainless steels and superalloys produced in the United States. The information included was obtained directly from the alloy producers. Materials covered include stainless steels, heat and corrosion resistant alloy castings, and superalloys (those alloys containing approximately 12 percent chromium and up). Thermocouple alloys, controlled-expansion alloys, and magnetic alloys are not included.

The users of public specification documents for metals and alloys have a persistent problem in the recognition of many alloys, particularly those which are proprietary, because the use of trade names is not permitted in these documents and because numeric designations have not been completely standardized. The situation is especially complicated in the case of the stainless alloys and superalloys where various trade names and numeric designations are often used for the same alloy.

Since trade names may not be used in ASTM specifications to identify an alloy, the chemical composition, an arbitrary number, or some industry-wide accepted designation, such as AISI or ACI numbers, must be used. In turn, the users of the specifications are faced with the tedious task of correlating the ASTM designations with their more familiar trade names. In some Committee A-10 specifications "XM" numbers have been used to identify proprietary alloys. The XM numbers and chemical requirements are given in the Appendix.

Because of this situation, Committee A-10 initiated a program to identify, collect, and list the various designations and trade names used for the metals and alloys within the A-10 scope (there are also a few alloys under ASTM Committee B-2 jurisdiction in this compilation). The aim was to list the alloys by their usual or trade designation and show the various producers' trade names, the approximate chemical composition, and the applicable public specifications, in the hope that a useful index to these alloys would result.

Organization

The organization of this revision remains unchanged, but the format has been modified to conserve space by using a tabular arrangement of the information. The tabular format also should be easier to use.

The alloys have been separated into seven groups, but there are no sharp dividing lines between the groups and some alloys have been placed arbitrarily.

In general, the alloys in each group are arranged alphanumerically, although some closely related alloys are located in the compilation near similar compositions. For instance, alloys with designations resembling AISI numbers are located with the AISI alloys.

Group 1, the AISI stainless steels, is based upon the AISI Steel Products Manual -- Stainless and Heat Resisting Steels (April, 1963), and Supplementary Information (February, 1969).

The steels listed in the AISI Manual are considered to be AISI Standard Types and are identified as AISI Type XXX in the alloy designation column in this compilation. The AISI 600 series numbers* are not "standard" AISI designations, but they have been included in this compilation since they are sometimes used for identification purposes.

Alloy Designations

Each alloy in this compilation is listed by its commonly used designation, or if it is a proprietary alloy, by the designation used by the proprietor, usually a trade name. Other often used designations, other than trade names, have also been included in the listing. For example, the listing for the cobalt-base alloy, Crucible WF-11, also shows L-605 and AISI 670. Information available to the authors regarding proprietorship is not complete, but an effort has been made to identify proprietary alloys. Whenever the information was made available to the authors, proprietary alloys were identified by a letter P in the Alloy Designation column and again in the Producer Designations column to indicate the proprietor.

Chemical Composition

Either the nominal chemical composition or the compositional ranges given in one of the applicable specifications have been used. In the latter case, the compositional limits for some of the alloys, particularly the stainless steels and corrosion or heat resistant castings, may differ slightly depending upon which specification was used. No attempt has been made to show the compositional variations intended to produce optimum properties for specific purposes. For the standard AISI types, the compositions used are from Table 2-1 of the AISI Steel Products Manual - Stainless and Heat Resisting Steels.

Applicable Specifications

Applicable public specifications (limited to ASTM, AMS, Military and Federal), as identified by the producers, have been included. As an aid to ASTM specification users and ASTM specification writing committees, the ASTM specifications have been identified according to product form.

Producer Designations

For a particular material, the designations or trade names used by the various producers are shown followed, in parentheses, by producer code numbers from Table 1.

In some cases, a producer manufacturing a proprietary alloy under license from the proprietor may use the proprietor's trade-name to identify the alloy. This constitutes a misuse of the proprietor's trade name. In this revision of DS 45, the authors have avoided this type of misuse of trade names.

Also, in the interests of uniformity and brevity, the myriad of trade names related to the "standard AISI" or closely related steels in Group 1 have not been listed.

*Contributions to the Metallurgy of Steel - High Temperature High Strength Alloys", American Iron and Steel Institute, February, 1963.

TABLE 1. CODE NUMBERS FOR THE PRODUCERS SUPPLYING DATA FOR THIS COMPILATION*

1 Abex Corp. Engineered Products Div. Elyria, Ohio 44035 Research Center Mahwah, N. J. 07430	18 Driver-Harris Co. Harrison, N. J. 07029
2 Allegheny Ludlum Industries, Inc. Research Center Alabama & Pacific Avenues Brackenridge, Pa. 15014	19 The Duraloy Co. Scottdale, Pa. 15683
3 Alloy Foundries Div. The Eastern Company Naugatuck, Conn. 06770	20 Earle M. Jorgensen Co. P. O. Box 2358 Los Angeles, Calif. 90054
4 Teledyne Allvac P. O. Box 759 Monroe, N. C. 28110	21 Eastern Stainless Steel Co. P. O. Box 1975 Baltimore, Md. 21203
5 Aloyco Division, Walworth Co. 1400 West Elizabeth Ave. Linden, N. J. 07036	22 Elgiloy Co. Div. of American Gage & Machine Co. 853 Dundee Ave. Elgin, Ill. 60120
6 Ampco Metal Division Ampco-Pittsburgh Corp. P. O. Box 2004 Milwaukee, Wis. 53201	23 Esco Corp. 2141 N. W. 25th Ave. Portland, Oregon 97210
7 Armco Steel Corp. Advanced Materials Div. P. O. Box 1697 Baltimore, Md. 21203	24 Fansteel Metallurgical Corp. No. One Tantalum Place North Chicago, Ill. 60064
8 Alloy Division Howmet Corp. Roy Street Dover, N. J. 07801	25 Green River Steel Corp. Owensboro Kentucky
9 Babcock & Wilcox Tubular Products Div. P. O. Box 401 Beaver Falls, Pa. 15010	26 Hamilton Watch Company Precision Metals Div. Lancaster, Pa. 17604
10 Bethlehem Steel Corp. Bethlehem, Pa. 18016	27 H. K. Porter Co., Inc. Fabricated Metals Div. 13th & Pennsylvania Aves. Prospect Park, Pa. 19076
11 Birdsboro Corp. Birdsboro, Pa. 19508	28 ITT Harper Inc. 8200 Lehigh Ave. Morton Grove, Ill. 60053
12 Braeburn Alloy Steel Div. Continental Copper & Steel Ind. Braeburn, Pa. 15016	29 Harvey Aluminum, Inc. 19200 South Western Ave. Torrance, Calif. 90509
13 Cannon-Muskegon Corp. P. O. Box 506 Muskegon, Mich. 49443	30 The Hica Corp. P. O. Box 6065 Shreveport, La. 71106
14 Carpenter Technology Corp. P. O. Box 662 Reading, Pa. 19603	31 Hoskins Mfg. Co. 4445 Lawton Ave. Detroit, Mich. 48208
15 Cooper Alloy Corp. Hillside, N. J. 07205	32 The International Nickel Co., Inc. Huntington Alloy Products Div. Huntington, W. Va. 25720
16 Colt Industries Crucible Inc. Stainless Steel and Alloy Divisions Box 226 Midland, Pa. 15059	33 Jessop Steel Co. Washington, Pa. 15301
17 Deemcr Steel Casting Co. New Castle, Delaware 19720	34 Joslyn Stainless Steels 1701 McKinley Ave. Fort Wayne, Ind. 46801
	35 The Kanthal Corp. Wooster Street Bethel, Conn. 06801
	36 Latrobe Steel Co. Latrobe, Pa. 15650

*Producers' code numbers 64-80 were added with this revision.

TABLE 1. (Cont.)

37	Lebanon Steel Foundry Lebanon, Pa. 17042	55	TRW Metals Div. Minerva, Ohio 44657
38	Martin Metals Co.* Martin-Marietta Corp. 1450 So. Rolling Road Baltimore, Md. 21227	56	Stellite Division Cabot Corporation 1020 West Park Ave. Kokomo, Ind. 46901
39	Bishop Tube Co. Whittaker Corp. Frazer, Pa. 19355	57	U. S. Steel Corp. 600 Grant Street Pittsburgh, Pa. 15230
40	Metal Products Div. Howmet Corp. P. O. Box 600 Plymouth, Mich. 48170	58	U. S. Pipe and Foundry Co. Burlington, N. J. 08016
41	Midvale-Heppenstall Co. Nicetown, Philadelphia, Pa. 19140	59	Universal-Cyclops Specialty Steel Division Cyclops Corp. 650 Washington Road Pittsburgh, Pa. 15228
42	Teledyne Ohiocast P. O. Box 900 Springfield, Ohio 45502	60	Waukesha Foundry Co. 1300 Lincoln Ave. Waukesha, Wis. 53186
43	Oklahoma Steel Castings Co. P. O. Box 2709 Tulsa, Oklahoma 74101	61	Westinghouse Electric Corp. Specialty Metals Div. RD No. 2, Box 45 Blairsville, Pa. 15717
44	Quaker Alloy Casting Co. Myerstown, Pa. 17067	62	Wilbur B. Driver Co. 1875 McCarter Highway Newark, N. J. 07104
45	Rolled Alloys, Inc. 5311 Concord Ave. Detroit, Mich. 48211	63	Wyman-Gordon Co. Worcester, Mass. 01601
46	Sandusky Foundry & Machine Co. Sandusky, Ohio 44870	64	Airco Vacuum Metals 735 Ashby Ave. Berkeley, California 94710
47	Sandvik Pacific, Inc. 2311 S. Pullman St. Santa Ana, Calif. 92705	65	Bishop Tube Co. Damascus Tube Division Frazer, Pa. 19355
48	Sharon Steel Corp. Sharon, Pa. 16146	66	G. O. Carlson, Inc. Thorndale, Pa. 19372
49	The Shenango Co. 611 Marion Road Columbus, Ohio 43207	67	Centrifugal Products Inc. 3245 Cherry Ave. Long Beach, Calif. 90807
50	Simonds Steel Div. Wallace-Murray Corp. Ohio Street Lockport, N. Y. 14094	68	Certified Alloy Products Inc. 3245 Cherry Ave. Long Beach, Calif. 90807
51	Special Metals Corp. New Hartford, N. Y. 13413	69	Carondelet Foundry Co. 2101 So. Kingshighway St. Louis, Missouri 63110
52	Stainless Foundry & Eng., Inc. 5150 No. 35th Street Milwaukee, Wis. 53209	70	Federal-Mogul Corp. Metal Powder Division 26555 Northwestern Highway Southfield, Mich. 48075
53	Standard Steel Div. Baldwin-Lima-Hamilton Corp. Burnham, Pa. 17009	71	Glidden-Durkee Division SCM Corporation Metals Group P. O. Box 217 Johnstown, Pa. 15907
54	The Timken Co. Canton, Ohio 44706		

*MAR-M alloys are now made under license by: (8), (51) and (55) (others to be licensed).

TABLE 1. (Cont.)

72	Hoeganaes Corporation Riverton, New Jersey 08077	77	Phoenix Steel Corp. Claymont, Delaware 19703
73	Ingersoll Steel Division Borg Warner Corp. P. O. Box 370 New Castle, Ind. 47362	78	Republic Steel Corp. Special Metals Div. 410 Oberlin Road SW Massillon, Ohio 44646
74	Jones & Laughlin Steel Corp. Stainless and Strip Division 21000 Mound Road Warren, Mich. 48090	79	Washington Steel Corp. Washington, Pa. 15301
75	McLouth Steel Corp. 300 So. Livernois Ave. Detroit, Mich. 48217	80	Whittaker Corporation Nuclear Metals Division West Concord, Mass. 01781
76	Metallurgical International Inc. One Coldstream Way New Shrewsbury, New Jersey 07724	81	Fisher Cast Steel Products, Inc.* P. O. Box 567 West Jefferson, Ohio 43162

*Producer of high-alloy castings. Specific information received too late for inclusion.

GROUP 1

AISI 200, 300, AND 400 SERIES STAINLESS STEELS
AND RELATED ALLOYS

201	309 Cb+Ta	330	420
202	310	330 H C	420 F
300	310 Cb	332	420 F Se
301	310 S	347	425
302	311	347 H	429
302 B	312	347 F Se	430
302 B Mod.	314	347 Se	430 F
302 HQ	316	348	430 F Se
303	316 H	348 H	430 M
303 Se	316 L	384	430 Ti
303 (S)	316 L Si	385	431
303 L	316 F	386	431 Mod.
303 MA	316 Cb	387	434
304	316 N	403	434 F
304 H	317	405	436
304 L	317 L	409	440 A
304 N	318	410	440 B
304 LN	D 319	410 L	440 C, AISI 617
305	D319 L	410 S	440 F
308	321	410 Cb	440 F Se
308 L	321 H	414	442
309	322	414 L	443
309 S	326	416	446
309 S Cb	329	416 Se	

Allegheny HWT
 Allegheny MF-1
 Allegheny OR-1
 AM 363
 Armco 15-16 WR
 Armco 18 SR
 Boron Stainless
 Carpenter Stainless No. 404
 Carpenter Stainless No. 20 Cb - 3
 Carpenter Stainless No. 5-F
 Croloy 16-1
 Croloy 20-2Al
 Crucible T303 Plus X
 Crucible Bright E3
 Crucible E2
 Crucible E-3 NT
 Eastern Alloy No. 20, Escallooy 20
 E-Brite 26-1

Hoskins Alloy 750
 Hoskins Alloy 815
 Hoskins Alloy 875
 JalHead 12-15
 JalHead 16-18
 JS-700
 Sandvik 2RK65
 Sandvik 2RE10
 Sandvik 2RN65
 Sandvik 3R19
 Sandvik 3R69
 Sandvik 3RE60
 Sandvik 12R72HV
 USAmet
 Waukesha 17Cr-HiC
 18 Cr - 9 LW
 18 Cr- 18 Ni - 2 Si
 26-2

Alloy Designation	Composition, Percent Nominal or Range	Applicable Specifications	Producer Designations
AISI Type 201	C 0.15 mx, Mn 5.5/7.5, P 0.060 mx, S 0.03 mx, Si 1.0 mx, Cr 16/18, Ni 3.5/5.5, N 0.25 mx, Fe bal.	ASTM A-412 Plate, Sheet & Strip; A-429 Bar MIL-S-17996 QQ-S-766	Type 201 (2) (7) (14) (16) (21) (34) (48) (59) (74) (75) (78) (79), 17-4-6 (57)
AISI Type 202	C 0.15 mx, Mn 7.5/10.0, P 0.060 mx, S 0.03 mx, Si 1.0 mx, Cr 17/19, Ni 4/6, N 0.25 mx, Fe bal.	ASTM A-412 Plate, Sheet & Strip; A-314, A-429 Bar; A-473 Forgings QQ-S-763, 766	Type 202 (2) (7) (14) (16) (34) (48) (74) (75) (78) (79), 18-5-8 (57)
300	C 0.08 mx, Cr 17, Ni 7, Fe bal.	None	Armco 300 (7)
AISI Type 301	C 0.15 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 16/18, Ni 6/8, Fe bal.	ASTM A-167, A-177, Plate, Sheet & Strip; A-314 Billets & Bars; A-368 Wire MIL-S-5059 AMS 5517, 5518, 5519 QQ-S-682, 766 MIL-T-5695	Type 301 (2) (7) (14) (16) (27) (28) (29) (34) (41) (48) (59) (73) (74) (75) (78) (79), 17-7 (21) (57), 12 R11 (47)
AISI Type 302	C 0.15 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 17/19, Ni 8/10, Fe bal.	ASTM A-167, A-177, A-240, Plate, Sheet & Strip; A-276, A-314, A-479, A-493 Bar; A-313, A-368, A-478, A-492, A-580 Wire; A-473 Forgings; A-511 Tube; A-217, A-296, A-351 Castings MIL-S-22216, 7720A, 854, 5059, 46044, 853, 862 MIL-T-5677 MIL-W-6712 AMS-5358, 5515, 5516, 5517, 5518, 5519, 5636, 5637, 5688 QQ-S-763, 766 QQ-W-423	Type 302 (2) (7) (9) (13) (14) (16) (20) (27) (28) (29) (33) (34) (41) (48) (53) (59) (62) (66) (73) (74) (75) (78) (79), 18-8 (21) (57), 12 R10 (47), Vertex 302 (70)
AISI Type 302B	C 0.15 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 2.0/3.0, Cr 17/19, Ni 8/10, Fe bal.	ASTM A-276, A-314 Bar; A-167 Plate, Sheet & Strip; A-580 Wire; A-473 Forgings QQ-S-766	Type 302B (2) (7) (14) (16) (28) (66) (78), 18-8 Si (21) (57)
302B MOD	C 0.08 mx, Mn 2.0 mx, P 0.03 mx, S 0.03 mx, Si 2/3, Cr 17/19, Ni 11/14, Fe bal.	None	Croloy 302B Mod. (9)
302HQ	C 0.08 mx, Mn 2.0 mx, Si 1.0 mx, Cr 17/19, Ni 9/10.5, Cu 3/4, Fe bal.	None	Uniloy 302HQ (59)
AISI Type 303	C 0.15 mx, Mn 2.0 mx, P 0.20 mx, S 0.15 mn, Si 1.0 mx, Cr 17/19, Ni 8/10, Mo 0.60 mx*, Fe bal.	ASTM A-314, A-582 Bar; A-473 Forgings; A-320, 194 Bolting & Nuts; A-581 Wire; A-296 Castings AMS 5640 MIL-W-52263, MIL-S-862, 7720, 853 QQ-S-763-764	Type 303 (2) (7) (13) (14) (16) (28) (29) (33) (34) (50) (59) (66) (74) (78), 18-8 FM (21) (57), 10RA50 (47), Ancor 303 (72)
AISI Type 303Se	C 0.15 mx, Mn 2.0 mx, P 0.20 mx, S 0.06 mx, Si 1.0 mx, Cr 17/19, Ni 8/10, Se 0.15 mn, Fe bal.	ASTM A-314, A-582 Bar; A-473 Forgings; A-320, A-194 Bolt-ing & Nuts; A-511 Tubing; A-581 Wire AMS 5640 MIL-W-52263 QQ-S-763, 764	Type 303 Se (2) (7) (9) (14) (16) (28) (29) (34) (39) (59) (74) (78), 18-8 FM Se (57)

*Optional – reported only when intentionally added.

303S	C 0.15 mx, Mn 2 mx, P 0.02 mx, S 0.15 mx, Si 1.0 mx, Cr 17/19, Ni 8/11, Fe bal.	None	Croloy 303 (Sulphur (9))
303L	C 0.013, P 0.04, S 0.21, Mn 0.18, Si 0.83, Cr 17.8, Ni 12.0, Mo 0.04, Fe bal. (powder)	None	Glidden 303-L (71 powder), Coldstream 303L (76 powder)
303MA ^P	C 0.15 mx, Mn 2.0 mx, P 0.04 mx, S 0.11/0.16, Si 1.0 mx, Cr 17/19, Ni 8/10, Mo 0.40/0.60, Al 0.60/1.0, Fe bal.	ASTM A-581 (XM-2) Wire; A-582 (XM-2) Bar	Uniloy 303-MA (59) ^P
AISI Type 304	C 0.08 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 18/20, Ni 8/10.5, Fe bal.	ASTM A-276, A-314, A-479, A-493 Bar; A-193, A-194, A-320 Bolting & Nuts; A-182 Flanges & Fittings; A-336, A-473 Forgings; A-213, A-249, A-269, A-270, A-271, A-312, A-320, A-336, A-358, A-376, A-409, A-430, A-511, A-632 Pipe & Tube; A-167, A-240 Plate, Sheet & Strip; A-313, A-478, A-492, A-580 Wire AMS 5501, 5513, 5560, 5565, 5566, 5567, 5639, 5697 Military MIL-F-20138 MIL-S-853, 854, 862, 5059, 18170, 18171, 23195, 23196 MIL-T-8504, 8506, 6845 MIL-W-17481 Federal QQ-S-763, 766 QQ-W-423	Type 304 (2) (7) (9) (10) (16) (20) (25) (27) (28) (29) (33) (34) (39) (41) (48) (50) (53) (54) (56) (59) (62) (65) (66) (73) (74) (75) (77) (78) (79), Type 304 Project 70 (14), 19-9 (21), SR10 (47), 18-8S (57), Vertx 304 (70)
304H	C 0.04/0.10, Mn 2.0 mx, P 0.04 mx, S 0.03 mx, Si 0.75 mx, Cr 18/20, Ni 8/11, Fe bal.	ASTM A-213, A-249, A-271, A-312, A-376, A-430, A-452 Pipe & Tube	304H (9) (14) (54), 5 R10 (47)
AISI Type 304L	C 0.03 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 18/20, Ni 8/12, Fe bal.	ASTM A-167, A-240 Plate, Sheet & Strip; A-276, A-314, A-479 Bar; A-213, A-249, A-269, A-312, A-511, A-632 Pipe & Tube; A-182 Flanges & Fittings; A-473 Forgings; A-478, A-580 Wire AMS 5370, 5371, 5511, 5647 MIL-S-22216, 18170, 4043, 23195, 23196, 862, 18171, 853, 854 QQ-S-763, 766	Type 304L (2) (7) (9) (14) (16) (20) (25) (27) (29) (33) (34) (39) (48) (50) (53) (54) (65) (66) (73) (74) (75) (77) (78) (79), 19-9L (21), 3R12 & 2R16 (47), 18-8L (57) Glidden 304L (71), Ancor 304L (72), Coldstream 304L (76)
304N	C 0.08 mx, Mn 2.0 mx, Si 1.0 mx, Cr 18/20, Ni 8/10.5, N 0.10/0.30, Fe bal.	ASTM A-276 Bar; A-240 Plate, Sheet & Strip; to be added to the above specifications as XM-20 and XM-21	304N (14) (16) (39) (57) (74)
304LN	C 0.03 mx, Mn 2.0 mx, Si 1.0 mx, Cr 18/20, Ni 8/10.5, N 0.10/0.15, Fe bal.	None	304LN (57)
AISI Type 305	C 0.12 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 17/19, Ni 10.5/13, Fe bal.	ASTM A-167, A-240 Plate, Sheet & Strip; A-276, A-314, A-493 Bar; A-249, A-511 Tube; A-473 Forgings; A-313, A-478, A-492, A-580 Wire MIL-W-17481 QQ-S-763, 766, 423 AMS 5514, 5685, 5686 QQ-W-423	Type 305 (2) (7) (9) (14) (16) (27) (33) (34) (39) (48) (59) (62) (66) (73) (74) (75) (78) (79), 18-12 (21), 18-8 FS (57)

AISI Type 308	C 0.08 mx, Mn 2.0 mx, P 0.045 mx, S 0.030 mx, Si 1.0 mx, Cr 19/21, Ni 10/12, Fe bal.	ASTM A-167 Plate, Sheet & Strip; A-276, A-314 Bar; A-473 Forgings; A-580 Wire MIL-E-19933 MIL-R-5031 QQ-S-766	Type 308 (2) (7) (14) (16) (27) (28) (34) (36) (59) (66) (74) (78), 20-10S (57), 3R13 (47)
308L	C 0.021, Mn 1.7, Si 0.38, P 0.012, S 0.023, Cr 20.3, Ni 9.8, Fe bal.	None	308L (2) (7) (16) (34) (36)
AISI Type 309	C 0.20 mx, Mn 2.0 mx, P 0.045 mx, S 0.030 mx, Si 1.0 mx, Cr 22/24, Ni 12/15, Fe bal.	ASTM A-167 Plate, Sheet & Strip; A-276, A-314 Bar; A-249, A-312, A-358, A-409, A-511 Pipe & Tube; A-473 Forgings; A-580 Wire AMS 5523, 5650 MIL-S-862 QQ-S-763, 766 MIL-R-5031 MIL-E-19933	Type 309 (2) (7) (9) (14) (16) (20) (27) (28) (33) (34) (36) (45) (50) (53) (56) (59) (65) (66) (73) (74) (78) (79), 25-12 (57)
AISI Type 309S	C 0.08 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 22/24, Ni 12/15, Fe bal.	ASTM A-167, A-240 Plate, Sheet & Strip; A-276, A-314 Bar; A-473 Forgings; A-511 Tube; A-580 Wire AMS 5523, 5574, 5650 QQ-S-766, 763	Type 309S (2) (7) (9) (14) (16) (28) (33) (34) (39) (45) (50) (59) (66) (73) (74) (75) (78) (79), 25-12 (21), 25-12S (57)
309S Cb	C 0.08 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 22/24, Ni 12/15, Cb = 8 x C mn/1.0 mx, Fe bal.	None	309S Cb (9) (66)
309Cb + Ta	C 0.08 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 22/24, Ni 12/15, Cb + Ta = 8 x C mx/1.0 mx, Fe bal.	None	309Cb + Ta (9) (34)
AISI Type 310	C 0.25 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.5 mx, Cr 24/26, Ni 19/22, Fe bal.	ASTM A-167 Plate, Sheet & Strip; A-276, A-314 Bar; A-213, A-249, A-312, A-336, A-358, A-409, A-511, A-632 Pipe & Tube; A-182 Flanges & Fittings; A-336, A-473 Forgings; A-580 Wire AMS 5572, 5651, 5521, 5694, 5695 MIL-R-5031 MIL-S-22216, 862, 853 MIL-W-17481 MIL-E-19933 QQ-S-763, 766 MIL-N-15721 QQ-W-423	Type 310 (2) (7) (9) (14) (16) (20) (27) (28) (29) (33) (34) (36) (39) (41) (45) (50) (54) (56) (59) (73) (74) (78) (79), 15RE10 (47), 25-20 (57)
310Cb	C 0.08, Mn 1.0, Si 0.8, Cr 25, Ni 20.5, Cb 10 x C mn, Fe bal.	None	Allegheny Stainless Steel 310Cb (2)
AISI Type 310S	C 0.08 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.5 mx, Cr 24/26, Ni 19/22, Fe bal.	ASTM A-167, A-240 Plate, Sheet & Strip; A-276, A-314, A-479 Bar; A-473 Forgings; A-511 Tube; A-580 Wire AMS 5521, 5651, 5577 QQ-S-766, 763	Type 310S (2) (7) (9) (14) (28) (33) (45) (50) (53) (73) (75) (78) (79), 25-20 (21), 25-20S (57), 7RE10 & 7RE12 (47)
311	C 0.15 mx, Mn 2.0 mx, P 0.04 mx, S 0.03 mx, Si 2.5, Cr 20, Ni 25, Fe bal.	None	RA 311 (50)

312	C 0.15 mx, Mn 2.0 mx, Si 0.5 mx, Cr 30, Ni 9, Fe bal.	MIL-E-19933	312 (2) (14)
AISI Type 314	C 0.25 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.5/3.0, Cr 23/26, Ni 19/22, Fe bal.	ASTM A-276, A-314 Bar; A-580 Wire; A-473 Forgings AMS 5522, 5652	Type 314 (2) (7) (14) (16) (27) (33) (50) (78), 25-20 Si (57)
AISI Type 316	C 0.08 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 16/18, Ni 10/14, Mo 2.0/3.0, Fe bal.	ASTM A-167, A-240 Plate, Sheet & Strip; A-276, A-314, A-479, A-493 Bar; A-193, A-194, A-320 Bolting & Nuts; A-213, A-249, A-269, A-312, A-320, A-336, A-358, A-376, A-409, A-430, A-511, A-632 Pipe & Tube; A-182 Flanges & Fittings; A-473, A-336 Forgings; A-313, A-478, A-492, A-580 Wire F-55, F-56 Surgical Implants MIL-S-22216, 7720, 5059 QQ-S-763, 766 AMS-5524, 5648, 5690, 5691, 5573, 5646 MIL-W-17481 MIL-S-5059, 7720 MIL-E-19933, 16715 QQ-W-423	Type 316 (2) (7) (9) (10) (16) (20) (25) (27) (28) (29) (33) (34) (36) (39) (41) (48) (50) (53) (54) (56) (59) (62) (65) (66) (73) (74) (75) (77) (78) (79), 18-12 Mo (21), Esco 45T (23), Type 316 Project 70 (14), 5R60, 6R66, 7R60 (47), 18-8 Mo (57), Vertx 316 (70)
316H	C 0.04/0.10, Mn 2.0 mx, P 0.03 mx, S 0.03 mx, Si 0.75 mx, Cr 16/18, Ni 11/14, Fe bal.	ASTM A-213, A-249, A-312, A-376, A-430, A-452 Pipe & Tube	316H (9) (14) (54), 7R60 (47)
AISI Type 316L	C 0.03 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 16/18, Ni 10/14, Mo 2.0/3.0, Fe bal.	ASTM A-167, A-240 Plate, Sheet & Strip; A-276, A-314, A-479 Bar; A-213, A-249, A-269, A-312, A-511, A-632 Pipe & Tube; A-182 Flanges & Fittings; A-473 Forgings; A-478, A-580 Wire AMS 5507, 5653, 5646 MIL-E-19933 QQ-S-763, 766 MIL-R-5031 MIL-S-862, 7720	Type 316L (2) (7) (9) (14) (16) (20) (25) (27) (28) (29) (33) (34) (36) (39) (48) (50) (53) (54) (59) (65) (66) (73) (74) (75) (77) (78) (79), 18-12 Mo L (21), 3R60 (47), 18-8 Mo L (57), Glidden 316L (71), Ancor 316L (72), Coldstream 316L (76)
316L Si	C 0.018, Mn 0.20, P 0.01, S 0.018, Si 2.33, Cr 17.4, Ni 12.3, Mo 2.18, Fe bal. (powder)	None	Glidden 316L Si (71)
316F	C 0.10 mx, P or S 0.10 mn, Cr 16/18, Ni 10/14, Mo 1.75/2.5, Fe bal.	None	316F (14) (74)
316Cb	C 0.08 mx, Mn 2.0 mx, P 0.03 mx, S 0.03 mx, Si 0.75 mx, Cr 16.25/17.25, Ni 11/14, Cb = 9 x C mn/1.0 mx, Fe bal.	Extrusion Only	Croloy 316Cb (9)
316N	C 0.08 mx, Mn 2.0 mx, Si 1.0 mx, Cr 16/18, Ni 10/14, N 0.10/0.30, Fe bal.	ASTM A-276 Bar; A-240 Plate, Sheet & Strip To be added to the above specifications as XM-22 & XM-23	316N (14) (16) (57)
AISI Type 317	C 0.08 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 18/20, Ni 11/15, Mo 3.0/4.0, Fe bal.	ASTM A-276, A-314 Bar; A-167, A-240 Plate, Sheet & Strip; A-249, A-269, A-312, A-409, A-511, A-632 Pipe & Tube; A-478, A-580 Wire; A-473 Forgings QQ-S-763 MIL-E-19933	Type 317 (2) (7) (9) (14) (16) (27) (33) (34) (50) (65) (66) (73) (74) (75) (78), 19-12 Mo (21), 19-9 Mo (57)

317L	C 0.03 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 18/20, Ni 11/15, Mo 3/4, Fe bal.	ASTM A-167, A-240 Plate, Sheet & Strip	317L (2) (7) (14) (27) (28) (33) (50) (65) (66) (73), 19-12 Mo L (21), 3R64 (47), 19-9 Mo L (57)
318	C 0.08 mx, Cr 17/19, Ni 10/14, Mo 2/3, Cb + Ta 10 x C mn, Fe bal.	None	318 (2) (16) (28) (34) (50), 8R80 (47)
D319 (Former AISI Designation)	C 0.07 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 17.5/19.5, Ni 11/15, Mo 2.25/3.0, Fe bal.	None	319 (2) (21) (33) (66), 319D (34), (50)
D319L	C 0.03 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 17.5/19.5, Ni 11/15, Mo 2.25/3.0, Fe bal.	None	D319L (2), 319L (21), (33) (66)
AISI Type 321	C 0.08 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 17/19, Ni 9/12, Ti 5 x C mn, Fe bal.	ASTM A-167 & A-240 Plate, Sheet & Strip; A-276, A-314, A-479, A-493 Bar; A-193, A-194, A-320 Bolting & Nuts; A-213, A-249, A-269, A-271, A-312, A-320, A-336, A-358, A-376, A-409, A-430, A-511, A-632 Pipe & Tube; A-182 Flanges & Fittings; A-336, A-473 Forgings; A-580 Wire AMS 5510, 5645, 7211, 5557, 5559, 5570, 5576, 5689 MIL-E-19933 MIL-S-22216, 6721, 862, 853, 854 QQ-S-763, 766 MIL-T-860, 6721, 6737	Type 321 (2) (7) (9) (13) (14) (16) (20) (25) (27) (28) (29) (33) (34) (39) (41) (48) (50) (53) (54) (58) (65) (66) (73) (74) (75) (77) (78) (79), 18-10 Ti (21), 8R30 (47), 18-8 Ti (57), Vertx 321 (70)
321H	C 0.04/0.10, Mn 2.0 mx, P 0.03 mx, S 0.03 mx, Si 0.75 mx, Cr 17/20, Ni 9/13, Ti 4 x C mx/0.60 mx, Fe bal.	ASTM A-213, A-249, A-271, A-312, A-376, A-430 Pipe & Tube	321H (2) (9) (14) (54), 8R30 (47)
322	C 0.08 mx, Mn 1.0 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 17, Ni 7, Mo 0.70, Fe bal.	None	322 (50)
326	C 0.05 mx, Mn 1.0 mx, Si 0.6 mx, Cr 25/27, Ni 6/7, Ti 0.25 mx, Fe bal.	None. XM-26	AL326 (2), Uniloy 326 (59)
329 (Former AISI Designation)	C 0.20 mx, Mn 2.0 mx, P 0.04 mx, S 0.03 mx, Si 0.75 mx, Cr 23/28, Ni 2.5/6.0, Mo 1.0/2.0, Fe bal.	ASTM A-268, A-511 Tube	329 (2) (9) (16), Carpenter Stainless No. 7-Mo (14), Esco 36 (23)
330 (Former AISI Designation)	C 0.05, Mn 1.5, Si 1.25, Cr 19, Ni 35, Fe 43	ASTM B-511 Hot rolled and Cold Finished Bars; B-512 Billets and Forged Bars; B-535 Seamless and Welded Pipe; B-536 Sheet, Plate & Strip AMS 5592, 5716	SAE 330 (9), 15-35 (21), Hoskins Alloy 502 (31), 330 (14) (16) (27) (28) (33) (34) (45) (66) (73), RA-330 (45) (50)
330HC	C 0.40, Mn 1.50, Si 1.25, Cr 19, Ni 35, Fe 43	None	RA-330 HC (45) (50)
332	C 0.04, Mn 1.0, Si 0.5, Cr 21.5, Ni 32, Fe bal.	None	Allegheny Stainless Steel 332
AISI Type 347	C 0.08 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 17/19, Ni 9/13, Cb + Ta 10 x C mn, Fe bal.	ASTM A-167 & A-240 Plate, Sheet & Strip; A-276, A-314, A-479, A-493 Bar; A-193, A-194, A-320 Bolting & Nuts; A-213, A-249, A-269, A-271, A-312, A-320, A-336, A-358, A-376, A-409, A-430, A-511,	Type 347 (2) (7) (9) (14) (16) (20) (25) (27) (28) (29) (33) (34) (39) (41) (48) (50) (53) (54) (56) (59) (66) (73) (74) (75) (77) (78) (79), 18-10 Cb (21), 8R40 & 6R40 (47), 18-8 Cb Ta (57), CAPI-864 Cb (68)

AISI Type 347
(Continued)

A-632 Pipe & Tube; A-182
Flanges & Fittings; A-336, A-473
Forgings; A-580 Wire
AMS 5512, 5556, 5558, 5571,
5575, 5646, 5654, 5680, 5681,
7229
MIL-R-5031
QQ-S-763, 766
MIL-S-18170, 6721, 23195,
23196, 862, 853, 18171
MIL-E-19933, 16715
MIL-T-6737, 8606

347H	C 0.04/0.10, Mn 2.0 mx, P 0.03 mx, S 0.03 mx, Si 0.75 mx, Cr 17/20, Ni 9/13, Cb + Ta = 10 + C mn/1.0 mx, Fe bal.	ASTM A-213, A-249, A-271, A-312, A-376, A-430, A-452 Pipe & Tube	347H (9) (14) (54), 8R40 (47)
347F Se	C 0.08 mx, Mn 2.0 mx, P 0.045 mx, S 0.15/0.30, Si 1.0 mx, Cr 17/19, Ni 9/13, Cb + Ta 10 x C mn/1.0 mx, + Se, Fe bal.	None	347F Se (14)
347Se	C 0.04, Mn 1.0, P 0.14, Si 0.5, Cr 18, Ni 11, Se 0.15 mn, Cb + Ta 10 x C mn, Fe bal.	None	347Se (2)
AISI Type 348	C 0.08 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 17/19, Ni 9/13, Cb + Ta 10 x C mn, Ta 0.10 mx, Co 0.20 mx, Fe bal.	ASTM A-167 & A-240 Plate, Sheet & Strip; A-276, A-314, A-479 Bar; A-213, A-249, A-269, A-312, A-358, A-376, A-409, A-632 Pipe & Tube; A-182 Flanges & Fittings; A-473 Forgings; A-580 Wire MIL-S-23195, 23196, 6721, 18171 QQ-S-766	Type 348 (2) (7) (9) (14) (16) (33) (34) (39) (50) (53) (54) (59) (66) (74) (78), 18-10 Cb (21), 18-8 Cb (57)
348H	C 0.04/0.10, Mn 2.0 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 17/20, Ni 9/13, Ta 0.10 mx, Fe bal.	ASTM A-213, A-249, A-312 Tube	348H (9) (14) (54)
AISI Type 384	C 0.08 mx, Mn 2.0 mx, P 0.045 mx, S 0.03 mx, Si 1.0 mx, Cr 15/17, Ni 17/19, Fe bal.	ASTM A-493 Bar & Wire	Carpenter Stainless No. 10 (14), C 10 (27), 34A (28), Type 384 (2) (78), EZ Head (57)
AISI Type 385	C 0.08 mx, Mn 2.0 mx, P 0.045 mx, S 0.030 mx, Si 1.0 mx, Cr 11.5/13.5, Ni 14/16, Fe bal.	ASTM A-493 Bar & Wire	Type 385 (2) (78), 12-15 (57)
386	C 0.03, Mn 1.0, Si 1.0, Cr 17.5, Ni 15.5, Fe bal.	None	386 (2)
387	C 0.02, Mn 0.5, Si 0.5, Cr 17.7, Ni 9.5, Cu 3.5, Fe bal.	None	387 (2)
AISI Type 403	C 0.15 mx, Mn 1.0, P 0.04 mx, S 0.03 mx, Si 0.5 mx, Cr 11.5/13, Fe bal.	ASTM A-176 Plate, Sheet & Strip; A-276, A-314 Bar; A-473 Forgings; A-511 Tube; A-580 Wire AMS 5614 QQ-S-763 MIL-S-861	Type 403 (2) (7) (9) (14) (16) (20) (28) (34) (36) (53) (54) (59) (74) (78), 12 Turbine (57), Vertx 403 (70)
AISI Type 405	C 0.08 mx, Mn 1.0 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 11.5/14.5, Al 0.10/0.30, Fe bal.	ASTM A-176, A-240 Plate, Sheet & Strip; A-276 & A-314 Bar; A-473 Forgings; A-268, A-511 Tube; A-580 Wire	Type 405 (2) (7) (9) (14) (16) (29) (33) (34) (48) (66) (74) (75) (78), 12-Al (57)

AISI Type 405 (Continued)		12 AMS 5628 QQ-S-763 MIL-S-861	
409	C 0.05 mx, Mn 0.55, Si 0.50, Cr 10.5/ 13.5, Ti 0.45 mx, Al 0.50 mx, Fe bal.	ASTM A-176 Plate, Sheet & Strip; A-268 Tubing	409 (16), 100, 100A, & 100B (57)
AISI Type 410	C 0.15 mx, Mn 1.0 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 11.5/13.5, Fe bal.	ASTM A-176, A-240 Plate, Sheet & Strip; A-276, A-314, A-493 Bar; A-193 Bolting & Nuts; A-473, A-336, A-579 Forgings; A-182 Flanges & Fittings; A-268, A-511 Tube; A-580 Wire AMS 5350, 5504, 5505, 5591, 5609, 5612, 5613, 5614, 5776, 5777, 5821 MIL-S-861, 862 QQ-S-763, 766 MIL-W-17481 MIL-E-19933 QQ-W-423	Type 410 (2) (7) (9) (10) (14) (16) (20) (25) (27) (28) (29) (33) (34) (36) (41) (48) (50) (53) (54) (56) (59) (66) (74) (75) (78) (79), SPIN 775 (67), 12 (21) (57), 1C27 (47), Vertx 410 (70)
410L	C 0.017, Mn 0.42, P 0.006, S 0.018, Si 0.88, Cr 12.4, Fe bal. (Powder)	None	Glidden 410-L (71), Ancor 410L (72), Coldstream 410L (76)
410S	C 0.08 mx, Mn 1.0 mx, Si 1.0 mx, Cr 11.5/ 13.5, Ni 0.6 mx, Fe bal.	ASTM A-176, A-240 Plate, Sheet & Strip; A-473 Forgings	410S (77)
410CB	C 0.13, Mn 0.2, Si 0.2, Cr 12, Cb 0.15	AMS-5609	410 Cb (7) (34)
AISI Type 414	C 0.15 mx, Mn 1.0 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 11.5/13.5, Ni 1.25/ 2.5, Fe bal.	ASTM A-276 & A-314 Bar; A-473 Forgings; A-511 Tube; A-580 Wire AMS 5615 QQ-S-763-D	Type 414 (2) (7) (14) (16) (28) (29) (34) (40) (74) (78)
414L	C 0.06 mx, Mn 0.5 mx, Si 0.15, Cr 12.5/ 13, Ni 2.5/3.0, Mo 0.50, Al 0.03, Fe bal.	None	Crucible T414L (16)
AISI Type 416	C 0.15 mx, Mn 1.25 mx, P 0.06 mx, S 0.15 mn, Si 1.0 mx, Cr 12/14, Mo 0.6 mx*, Fe bal.	ASTM A-314, A-582 Bar; A-473 Forgings; A-194 Nuts; A-581 Wire AMS 5610, 5611 MIL-W-52263 MIL-S-853, 854, 861, 862 QQ-S-763, 764	Type 416 (2) (7) (16) (28) (29) (33) (34) (40) (41) (53) (59) (74) (78), Type 416 Project 70 (14), 12 FM (57)
AISI Type 416Se	C 0.15 mx, Mn 1.25 mx, P 0.06 mx, S 0.06 mx, Si 1.0 mx, Cr 12/14, Se 0.15 mn, Fe bal.	ASTM A-314, A-582 Bar; A-473 Forgings; A-511 Tube; A-194 Nuts; A-581 Wire AMS 5610 MIL-W-52263-B QQ-S-764-A	Type 416Se (2) (7) (9) (14) (16) (28) (34) (53) (74) (78)
AISI Type 420	C over 0.15, Mn 1.0 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 12/14, Fe bal.	ASTM A-276, A-314 Bar; A-473 Forgings; A-580 Wire AMS 5506, 5621 QQ-S-763, 766 QQ-W-423	Type 420 (2) (7) (9) (10) (12) (14) (16) (28) (33) (34) (41) (48) (50) (53) (59) (74) (78), 12 High Carbon (57), 6C 27 (47)
AISI Type 420F	C over 0.15, Mn 1.25 mx, P 0.60 mx, S 0.15 mn, Si 1.0 mx, Cr 12/14, Mo 0.6 mx*, Fe bal.	ASTM A-276, A-314 Bars; A-473 Forgings AMS 5620	Type 420 F (2) (7) (14) (28) (34) (59) (74) (78)

*At manufacturer's option; reported only when intentionally added.

420F Se	C over 0.15, P or Se 0.07 mn, Cr 12/14, Mo 0.6 mx, Fe bal.	None	420F Se (14) (74)
425	C 0.58, Mn 0.35, Si 0.35, Cr 14, Fe bal.	None	425 (2)
AISI Type 429	C 0.12 mx, Mn 1.0 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 14/16, Fe bal.	ASTM A-176, A-240 Plate, Sheet & Strip; A-276, A-314, A-493 Bar; A-268 Tubing; A-473 Forgings	Type 429 (16) (78), USS 15 (57)
AISI Type 430	C 0.12 mx, Mn 1.0 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 16/18, Fe bal.	ASTM A-176, A-240 Plate, Sheet & Strip; A-276, A-314, A-493 Bar; A-268, A-511 Tube; A-580 Wire; A-473 Forgings AMS 5503, 5627 QQ-S-763, 766 MIL-W-17481 MIL-S-862 QQ-W-423	Type 430 (2) (7) (9) (10) (14) (16) (20) (27) (28) (29) (33) (34) (40) (45) (48) (50) (53) (59) (62) (66) (74) (75) (77) (78) (79), Alloy 14 (30), USS 17 (57), 2C 34 (47)
AISI Type 430F	C 0.12 mx, Mn 1.25 mx, P 0.06 mx, S 0.15 mn, Si 1.0 mx, Cr 16/18, Mo 0.6 mx*, Fe bal.	ASTM A-314, A-582 Bar; A-473 Forgings; A-581 Wire MIL-W-52263 QQ-S-764	Type 430F (2) (7) (14) (16) (28) (34) (40) (59) (74) (78), 17 FM (57)
AISI Type 430F Se	C 0.12 mx, Mn 1.25 mx, P 0.06 mx, S 0.06 mx, Si 1.0 mx, Cr 16/18, Se 0.15 mn, Fe bal.	ASTM A-314, A-582 Bar; A-473 Forgings; A-581 Wire MIL-W-52263B QQ-S-764A	Type 430F Se (2) (7) (14) (16) (34) (78)
430M	C 0.06, Mn 0.5, Si 0.5, Cr 16, Mo 1.8, Fe bal.	None	430M (2)
430Ti	C 0.10 mx, Mn 1.0 mx, Si 1.0 mx, Ni 0.75 mx, Cr 16/19.5, Ti 5 x C mn/0.75 mx, Fe bal.	ASTM A-268 Tube	430Ti (2) (7) (9) (34) (39) (48) (59) (74), 17Ti (57)
AISI Type 431	C 0.20 mx, Mn 1.0 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 15/17, Ni 1.25/2.5, Fe bal.	ASTM A-276, A-314, A-493 Bar; A-473, A-579 Forgings; A-580 Wire; A-511 Tube AMS 5628 MIL-S-18732 QQ-S-763	Type 431 (2) (7) (9) (14) (16) (29) (37) (53) (56) (59) (74) (78), 33 (23), C-16 (42), 4N2C34 (47), 16-2 (57)
431 Mod.	C 0.15/0.25, Mn 1.0 mx, Si 1.0 mx, Cr 10/13, Ni 1.0/2.0, Mo 0.5, Fe bal.	None	Alloy 15 (30)
431 Mod.	C 0.08/0.15, Mn 1.0 mx, Si 1.0 mx, Cr 15/17, Ni 1.5/2.2, N 0.03/0.12, C + N 0.22 mx, Fe bal.	AMS 5353 MIL-S-22216	AMS 5353 (13) 431 Mod (60)
AISI Type 434 ^P	C 0.12 mx, Mn 1.0 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 16/18, Mo 0.75/1.25, Fe bal.	None	17Mo (57), Type 434 (2) (7) (14) (27) (59) ^P (74) (78) (79)
434F	C 0.03, Mn 0.45, S 0.3, Si 0.45, Cr 17.5, Mo 1.0, Fe bal.	None	434F (2)
AISI Type 436	C 0.12 mx, Mn 1.0 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 16/18, Mo 0.75/1.25, Cb-Ta 5 x C mn/0.70 mx, Fe bal.	None	Type 436 (2) (48) (74) (78) (79), 17Mo Cb (57)
AISI Type 440A	C 0.60/0.75, Mn 1.0 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 16/18, Mo 0.75 mx, Fe bal.	ASTM A-276 & A-314 Bar; A-473 Forgings; A-511 Tube; A-580 Wire	Type 440A (2) (7) (13) (14) (16) (19) (20) (29) (33) (40) (48) (50) (53) (59) (74) (78), 33A (23)

*At manufacturer's option; reported only when intentionally added.

AISI Type 440A (Continued)		14 AMS 5631 QQ-S-763 MIL-S-22216	
AISI Type 440B	C 0.75/0.95, Mn 1.0 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 16/18, Mo 0.75 mx, Fe bal.	ASTM A-276 & A-314 Bar; A-473 Forgings; A-580 Wire QQ-S-763D	Type 440B (2) (3) (7) (14) (16) (20) (29) (33) (40) (50) (59) (74) (78), 33-B (23)
AISI Type 440C, AISI 617	C 0.95/1.20, Mn 1.0 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 16/18, Mo 0.75 mx, Fe bal.	ASTM A-276, A-314, A-493 Bar; A-473 Forgings; A-580 Wire AMS 5352, 5630 QQ-S-763D MIL-S-22216	Type 440C (2) (7) (9) (13) (14) (20) (16) (19) (29) (33) (36) (37) (40) (50) (53) (56) (59) (74) (78), 33C (23), N-7 (3)
440F (Former AISI Designation)	C 0.95/1.20, Cr 16/18, Mo 0.75 mx, S 0.15/0.30, Fe bal.	AMS 5632 QQ-S-763D	440-FM (14), 440F (7) (16) (40) (59)
440F Se	C 0.95/1.20, Cr 16/18, Mo 0.75 mx, Se 0.15/0.30, Fe bal.	None	440F Se (14)
AISI Type 442	C 0.20 mx, Mn 1.0 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 18/23, Fe bal.	ASTM A-176 Plate, Sheet & Strip	21 (57), Type 442 (2) (14) (59) (78)
443 (Former AISI Designation)	C 0.20 mx, Mn 1.0 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 18/23, Cu 0.90/1.25, Fe bal.	ASTM A-268, A-511 Tube	443 (9) (14)
AISI Type 446	C 0.20 mx, Mn 1.5 mx, P 0.04 mx, S 0.03 mx, Si 1.0 mx, Cr 23/27, N 0.25 mx, Fe bal.	ASTM A-176 Plate, Sheet & Strip; A-276 & A-314 Bar; A-473 Forgings; A-268, A-511 Tube, A-580 Wire QQ-S-763	Type 446 (2) (7) (9) (14) (16) (29) (33) (34) (39) (41) (45) (50) (78), 4C54 (47), 27 (57)
Allegheny HWTP (430 Mod. 1; 439)	C 0.07 mx, Mn 0.10-0.60, P 0.30 mx, S 0.30 mx, Si 0.20-0.60, Cr 17.75-18.75, Ni 0.50 mx, Ti 12 x C mn/1.0 mx, Al 0.15 mx, Fe bal.	ASTM A-240 (XM-8) Plate, Sheet & Strip; A-268 (XM-8) Tube	Allegheny HWT Steel (2) ^P
Allegheny MF-1 ^P	C 0.04, Mn 0.5, Si 0.5, Cr 11, Ti 0.5, Fe bal.	ASTM A-176 Plate, Sheet & Strip; A-268 Tube	Allegheny MF-1 (2) ^P
Allegheny OR-1 ^P	C 0.04, Mn 0.25, Si 0.30, Cr 12.5, Ni 0.25, Al 3.2, Ti 0.4, Fe bal.	None	Allegheny OR-1 (2) ^P
AM 363 ^P	C 0.04, Mn 0.15, Si 0.05, Cr 11, Ni 4, Ti 0.25, Fe bal.	None	Allegheny Stainless Steel AM 363 (2) ^P
Armco 15-16WR	C 0.5, Mn 0.40, Si 4.85, Cr 15.2, Ni 17, W 3, Cb 0.25, Fe bal.	None	Armco 15-16 WR (7)
Armco 18SR	C 0.04, Mn 0.30, P 0.020, S 0.010, Si 1.0, Cr 18.0, Ni 0.30, Al 2.0, Ti 0.40, Fe bal.	None	Armco 18 SR (7)
Boron Stainless	C 0.08 mx, Cr 18/20, Ni 8/14, B 1.0/2.0, Fe bal.	None	Carpenter Chrom-Nickel Stainless with Boron (14), Boron Stainless 18-8B (33)
Carpenter Stainless No. 404	C 0.05 mx, Mn 1.0 mx, P 0.030 mx, S 0.030 mx, Si 0.50 mx, Cr 11.0/12.5, Ni 1.25/2.0, Fe bal.	None	Carpenter Stainless No. 404 (14)
Carpenter Stainless No. 20 Cb-3	C 0.07 mx, Mn 2.0 mx, P 0.035 mx, S 0.035 mx, Si 1.0 mx, Cr 19/21, Ni 32/38, Mo 2.0/3.0, Cu 3.0/4.0, Cb + Ta 8 x C mn/1.0 mx, Fe bal.	ASTM B-462 Forged Fittings; B-463 Plate, Sheet & Strip; B-464, B-468, B-474 Pipe & Tube; B-472 Billet & Bar; B-471, B-473, B-475 Wire ASME Case No. 1188-4	Carpenter No. 20 Cb-3 (14), Esco 20E (23), C20 Cb 3(27), This alloy also made by:(39)

Carpenter Stainless No. 5-F	C 0.10 mx, Mn 1.0 mx, P 0.06 mx, S 0.30 mn, Si 1.0 mx, Cr 13/14.5, Ni 0.5 mx, Mo 0.4/0.6, Fe bal.	QQ-S-764B	Carpenter Stainless No. 5-F (14)
Croloy 16-1	C 0.035 mx, Mn 1.0 mx, P 0.03 mx, S 0.03 mx, Si 0.75 mx, Cr 14/16, Ni 1.0/1.5, Al 2.0/2.5, Fe bal.	None	Croloy 16-1 (9)
Croloy 20-2Al	C 0.08 mx, Mn 0.50 mx, P 0.03 mx, S 0.03, Si 1.0/1.4, Cr 20/21.5, Ni 0.30 mx, Al 2.0/2.5, Fe bal.	None	Croloy 20-2Al (9)
Crucible T303 Plus XP	C 0.15 mx, Mn 2.5/4.5, Si 1.0 mx, Cr 17/19, Ni 7/10, Mo 0.6 mx, Fe bal.	AMS 5640 MIL-W-52663 QQ-S-764	Crucible T303 Plus X (16) ^P
Crucible Bright E3	C 0.08 mx, Mn 1.0 mx, P 0.045 mx, S 0.045 mx, Si 1.0 mx, Cr 12.0, Ni 0.5 mx, Ti 5 x C, Fe bal.	None	Crucible Bright E3 (16)
Crucible E2	C 0.08 mx, Mn 1.0 mx, P 0.045 mx, S 0.045 mx, Si 1.0 mx, Cr 10.5/11.75, Ni 0.5 mx, Ti 5 x C or 0.75 mx, Fe bal.	ASTM A-268	Crucible E2 (16)
Crucible E-3NT	C 0.08 mx, Mn 0.30/0.60, Si 0.25/0.50, Cr 13, Ni 0.5 mx, Mo 0.5 mx, Al 0.10/0.30, Fe bal.	None	Crucible E-3NT (16)
Eastern Alloy No. 20, Escalloy 20	C 0.07 mx, Mn 2.0 mx, P 0.035 mx, S 0.035 mx, Si 1.0 mx, Cr 19/21, Ni 24/30, Mo 2/3, Cu 3/4, Cb + Ta 8 x C/1.0 mx, Fe bal.	None	Eastern Alloy No. 20 (21)
E-Brite 26-1 ^P	C 0.005 mx, Mn 0.40 mx, P 0.02 mx, S 0.02 mx, Si 0.40 mx, Cr 25.0/27.5, Mo 0.75/1.50, Cu 0.20 mx, Cu + Ni 0.50 mx, N 0.015 mx,	To be added to ASTM A-268 as XM-27	E-Brite 26-1 (39) (64) ^P (66) (74). Uniloy EB26-1 (59)
Hoskins Alloy 750	Al 4, Cr 15, Fe bal.	None	Hoskins Alloy 750 (31)
Hoskins Alloy 815	Al 4.5, Cr 22, Fe bal.	None	Hoskins Alloy 815 (31)
Hoskins Alloy 875	Al 5.5, Cr 22, Fe bal.	None	Hoskins Alloy 815 (31)
JalHead 12-15	C 0.08 mx, Cr 11/13, Ni 14/16, Fe bal.	None	JalHead 12-15 (74)
JalHead 16-18	C 0.08 mx, Cr 15/17, Ni 17/19, Fe bal.	None	JalHead 16-18 (74)
JS-700	C 0.03, Cr 21, Ni 25, Mo 4.5, Cb 8 x C mn, Fe bal.	None	JS-700 Engineering Alloy (33)
Sandvik 2RK65	C 0.02 mx, Mn 1.8, Si 0.45, Cr 19.5, Ni 25, Mo 4.5, Cu 1.5, Fe bal.	None	Sandvik 2RK65 (47)
Sandvik 2RE10	C 0.02 mx, Mn 1.75, Si 0.30, Cr 24.4, Ni 20.3, Fe bal.	None	Sandvik 2RE10 (49)
Sandvik 2RN65	C 0.02 mx, Mn 1.8, Si 0.45, Cr 17.5, Ni 24, Mo 4.7, Fe bal.	None	Sandvik 2RN65 (47)
Sandvik 3R19 (Type 304L With Increased Nitrogen)	C 0.03 mx, Mn 1.25, Si 0.6, Cr 18.5, Ni 10.3, N 0.18, Fe bal.	None	Sandvik 3R19 (47)

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Sandvik 3R69 (Type 316L With Increased Nitrogen)	C 0.03 mx, Mn 1.7, Si 0.6, Cr 17.4, Ni 12.8, Mo 2.8, N 0.18, Fe bal.	None	Sandvik 3R69 (47)
Sandvik 3RE60	C 0.03 mx, Mn 1.5, Si 1.65, Cr 18.5, Ni 4.7, Mo 2.7, Fe bal.	None	Sandvik 3RE60 (47)
Sandvik 12R72HV	C 0.10, Mn 1.8, Si 0.4, P 0.02 mx, S 0.015 mx, Cr 15, Ni 15, Mo 1.2, Ti 0.40, B 0.0065, Fe bal.	None	Sandvik 12R72HV (47)
USAmet ^P	C 0.07/0.13, Mn 1.0/2.0, Si 0.55/1.4, Cr 16.5/17.5, Ni 7.4/8.3, Mo 0.18/0.8, Fe bal.	None	USAmet (22) ^P
Waukesha 17Cr-HiC	C 1.0, Mn 1.0 mx, Si 1.5 mx, Cr 17, Fe bal.	None	Waukesha 17Cr-HiC (60)
18-9LW	C 0.1 mx, Mn 2.0 mx, Si 1.0 mx, Cr 17/19, Ni 8/10, Cu 3.0/4.0, Fe bal.	ASTM A-493 (XM-7) Bar and Wire FF-S-86C	Allegheny Stainless Steel 18-9 LW (2) Armco 18-9 LW (7), Carpenter Custom Flo 302 HQ (14)
18Cr-18Ni – 2 Si ^P	C 0.07, Mn 1.50, Si 2.0, Cr 18.0, Ni 18.0, Fe bal.	ASTM A-167, A-240 (XM 15) Plate, Sheet & Strip; A-269 (XM 15) Tubing; A-312 (XM 15) Pipe	USS 18-18-2 Stress Corrosion Resistant (57) ^P This alloy also made by: (65)
26-2	C 0.005, Mn 0.11, Si 0.09, Cr 25, Ni 0.4, Mo 2.2, V 0.04, Fe bal.	None	Lescalloy 26-2 (36)

GROUP 2

ACI CORROSION AND HEAT RESISTANT CASTINGS
AND RELATED ALLOYS

CA-6NM	CF-8 C	CT-35 H
CA-15	CF-8 M	CW-12 M – See Hastelloy Alloy C,
CA-15 F	CF-8 M + Cb	Group 6
CA-15 M	CF-10 MC	CY-40, Inconel
CA-15 Modified	CF-12 F	CZ-100
CAF 404	CF-16 F	HA
CA-40	CF-16 Fa	HB-100
CB-7 Cu – See Armco 17-4 PH,	CF-20	HC
Group 4	CG-8M	HC-30
CB-30	CG-12	HD
CC-50	CH-8	HD-40
CD-4 M Cu	CH-10	HE
CE-30	CH-20	HE Modified
CF-3	CK-20	HE-35
CF-3 A	CN-7 M	HF
CF-3 M	CN-7 M + Cb	HH
CF-3 MA	CN-7 M Modified	HH Modified
CF-8	CN-20 M	HH-30
CF-8 A	CT-10	HH-90

HI	HW
HI-50 C	HW-50
HK	HX
HK-30	HX-50
HK-40	N-12 M – See Hastelloy Alloy B, Group 6
HL	Amsco 1
HL-30	Amsco 6
HN	Thermalloy A1
HN-30	Thermalloy F-17
HP-40	Thermalloy 52
HT	Thermalloy 63 C
HT-30	Thermalloy 63 W
HT-50	Thermalloy 63 WC, Supertherm
HT-50 C	Thermalloy 85 EX
HU	50 Cr – 50 Ni
HU-50	60 Cr – 40 Ni
HU-58 Cb	

Alloy Designation	Composition, Percent Nominal or Range	Applicable Specifications	Producer Designations
ACI CA-6NM	C 0.06 mx, Mn 1.0 mx, Si 1.0 mx, Cr 11.5/14, Ni 3.5/4.5, Mo 0.4/1.0, Fe bal.	To be added to ASTM A-296 and A-351	CA-6NM (60)
ACI CA-15	C 0.15 mx, Mn 1.0 mx, Si 1.5 mx, Cr 11.5/14, Ni 1.0 mx, Mo 0.5 mx, Fe bal.	ASTM A-296 & A-351 Castings MIL-S-16993, 22216 AMS 5351	CA-15 (3) (11) (13) (17) (19) (30) (42) (43) (44) (46) (49) (52) (58) (60), ESCO 32 C (23), ① CA-15 (37), Howmet 410 (40), 14S (15)
ACI CA-15 F	C 0.12, Mn 0.65, Si 0.85, Cr 12.5, Ni 0.5, Mo 0.5, and Se, Fe bal.	None	CA-15 F (19) (44)
ACI CA-15 M	C 0.15 mx, Mn 1.0 mx, Si 0.5 mx, P 0.04 mx, S 0.04 mx, Cr 11.5/14, Ni 0.65/1.0, Mo 0.5 mx, Fe bal.	None	CA-15 M (19) (46) (49)
ACI CA-15 Modified	C 0.15 mx, Mn 1.0 mx, Si 1.5 mx, Cr 12, Ni 4, Fe bal.	None	CA-15 Modified (11) (19), ESCO 15M (23), ① CA-15 M (37)
CAF 404	C 0.12 mx, Mn 1.0 mx, Si 2.0 mx, Cr 11/13, Ni 1.0 mx, Cu 1.5/2.0, Fe bal.	None	CAF 404 (69)
ACI CA-40	C 0.20/0.40, Mn 1.0 mx, Si 1.5 mx, Cr 11.5/14, Ni 1.0 mx, Mo 0.5 mx, Fe bal.	ASTM A-296 Castings	CA-40 (3) (13) (19) (30) (42) (43) (44) (46) (52) (58) (60), ESCO 32 (23), ① CA-40 (37), Howmet 420 (40), 14H (15), CAF 420 (69)
ACI CB-30	C 0.3 mx, Mn 1.0 mx, Si 1.5 mx, P 0.04 mx, S 0.04 mx, Cr 18/21, Ni 2.0 mx, Fe bal.	ASTM A-296 Castings	CB-30 (19) (30) (42) (43) (44) (46) (52) (58), Howmet 431 (40), 16 (15)
ACI CC-50	C 0.5 mx, Mn 1.0 mx, Si 1.5 mx, P 0.04 mx, S 0.04 mx, Cr 26/30, Ni 4.0 mx, Fe bal.	ASTM A-296 Castings	ESCO 35 B (23), CC-50 (19) (30) (42) (43) (44) (46) (52) (58), ① CC-50 (37)
ACI CD-4 M Cu	C 0.04 mx, Mn 1.0 mx, Si 1.0 mx, Cr 25/27, Ni 4.75/6.0, Mo 1.75/2.25, Cu 2.75/3.25, Fe bal.	None	CD-4 M Cu (5) (15) (30) (42) (52) (58), ESCO 37PH (23), ① CD (37), CD4MC (3), Tuf-Wear 30 (43), Waukesha 35 (60)
ACI CE-30	C 0.30 mx, Mn 1.5 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 26/30, Ni 8/11, Fe bal.	ASTM A-296 Castings	ESCO 51 C (23), CE-30 (19) (30) (42) (43) (44) (46) (52) (58), 22P (15), ① CE-30 (37), CAF 312 (69)
ACI CF-3	C 0.03 mx, Mn 1.5 mx, Si 2.0 mx, Cr 17/21, Ni 8/12, Fe bal.	ASTM A-296 and A-351 Castings AMS 5370, 5371	CF-3 (3) (5) (11) (13) (19) (30) (42) (43) (44) (46) (49) (52) (58) (60), 17 SELC (15), ESCO 40 L (23), ① CF-3 (37)
ACI CF-3 A	Same as CF-3 but adjusted within the limits to give a higher ferrite-austenite ratio resulting in higher tensile and yield strengths, but at the expense of thermal stability. Not recommended for service at temperatures over 800 F.	ASTM A-351 Castings	CF-3A (5) (43) (46) (60)
ACI CF-3M	C 0.03 mx, Mn 1.5 mx, Si 1.5 mx, Cr 17/21, Ni 9/13, Mo 2.0/3.0, Fe bal.	ASTM A-296 and A-351 Castings	CF-3 M (3) (5) (11) (13) (19) (30) (42) (43) (44) (46) (49) (52) (58) (60), ESCO 45 L (23), ① CF-3 M (37), 17SMELC (15)

ACI CF-3 MA	Same as CF-3M but adjusted within the limits to give a higher ferrite-austenite ratio resulting in higher tensile and yield strengths, but at the expense of thermal stability. Not recommended for service at temperatures over 800 F.	ASTM A-351 Castings	CF-3MA (43) (60)
ACI CF-8	C 0.08 mx, Mn 1.5 mx, Cr 18/21, Ni 8/11, Fe bal.	ASTM A-296 and A-351 Castings ASTM A-451 Centrifugally cast pipe MIL-S-867, 17509, 18262, 23193	Thermalloy A-28 (1), CF-8 (3) (5) (11) (13) (17) (19) (30) (42) (43) (44) (46) (49) (52) (58) (60), ESCO 40 S (23),  CF-8 (37), Howmet 304 (40), CAF 304 (69), 17S (15)
ACI CF-8 A	Same as CF-8 but adjusted within the limits to give a higher ferrite-austenite ratio resulting in higher tensile and yield strengths, but at the expense of thermal stability. Not recommended for service at temperatures over 800 F.	ASTM A-351 Castings	CF-8 A (43) (46) (60)
ACI CF-8 C	C 0.08 mx, Mn 1.5 mx, Si 2.0 mx, Cr 18/21, Ni 9/12, Cb 8 x C mn/1.0 mx, Fe bal.	ASTM A-296 and A-351 Castings ASTM A-451 Centrifugally Cast Pipe MIL-S-867,22216	CF-8 C (3) (5) ( (13) (19) (30) (42) (43) (44) (46) (49) (52) (58) (60), ESCO 41 (23),  CF-8 C (37), Howmet 347 (40), 17SCB (15)
ACI CF-8 M	C 0.08 mx, Mn 1.5 mx, Si 1.0 mx, Cr 18/21, Ni 9/12, Mo 2.0/3.0, Fe bal.	ASTM A-296 and A-351 Castings ASTM A-451 Centrifugally Cast Pipe AMS-5360	Thermalloy A-28 M (1), CF-8 M (3) (5) (11) (13) (17) (19) (30) (42) (43) (44) (46) (49) (52) (58) (60), CAF 320 (69), ESCO 45 S (23),  CF-8 M (37), Howmet 316 (40), 17 SM (15)
CF-8 M + Cb	C 0.08 mx, Si 2.0 mx, Mn 1.5 mx, Cr 18/21, Ni 9/12, Mo 2/3, Cb 0.70, Fe bal.	None	CAF 318 (69)
ACI CF-10 MC	C 0.10 mx, Mn 1.5 mx, Si 1.5 mx, P 0.04 mx, S 0.04 mx, Cr 15/18, Ni 13/16, Mo 1.75/2.25, Cb 10 x C mn/1.2 mx, Fe bal.	ASTM A-351 Castings ASTM A-451 Centrifugally Cast Pipe	CF-10 MC (19) (43) (52)
ACI CF-12 F	C 0.12 mx, Mn 1.5 mx, Si 2.0 mx, Cr 18/21, Ni 9/12, Mo 1.5 mx, Se 0.20/0.35, Fe bal.	None	CF-12 F (30)
ACI CF-16 F	C 0.16 mx, Mn 1.5 mx, Si 2.0 mx, Cr 18/21, Ni 9/12, Se 0.20/0.35, Mo 1.5 mx, Fe bal.	ASTM A-296 Castings	CF-16 F (3) (5) (13) (19) (42) (43) (44) (46) (52) (58) (60), ESCO 40 F (23), Howmet 303 (40), 17 SLL (15), CAF 303 (69)
AISI CF-16 Fa	C 0.16 mx, Mn 1.5 mx, Si 2.0 mx, P 0.4 mx, S 0.20/0.40, Cr 18/21, Ni 9/12, Mo 0.40/0.80, Fe bal.	ASTM A-296 Castings	CF-16 FA (13) (19) (42) (52)
ACI CF-20	C 0.20 mx, Mn 1.5 mx, Si 2.0 mx, Cr 22/26, Ni 12/15, Fe bal.	ASTM A-296 AMS 5358 MIL-S-17509	CF-20 (3) (11) (13) (19) (30) (42) (43) (44) (46) (52) (58) (60),  CF-20 (37), Howmet 302 (40), 17 (15), CAF 329H (69)
ACI CG-8 M	C 0.08 mx, Mn 1.5 mx, Si 1.5 mx, Ni 18/21, Ni 9/13, Mo 3/4, Fe bal.	ASTM A-296 Castings	CG-8M (5) (13) (19) (30) (43) (44) (46) (52) (58) (60), ESCO 45 M (23),  CG-8M (37), 17 X M (15), CAF 317 (69)

ACI CG-12	C 0.12 mx, Mn 1.5 mx, Si 2.0 mx, Cr 20/23, Ni 10/13, Fe bal.	ASTM A-296 Castings	CG-12 (5) (13) (19) (42) (43) (46) (52)
ACI CH-8	C 0.08 mx, Mn 1.5 mx, Si 1.5 mx, Cr 22/26, Ni 12/15, Fe bal.	ASTM A-351 Castings ASTM A-451 Centrifugally Cast Pipe	CH-8 (5) (13) (19) (43) (46) (52)
ACI CH-10	C 0.10 mx, Mn 1.5 mx, Si 1.75 mx, P 0.04 mx, S 0.04 mx, Cr 23/27, Ni 19/22, Fe bal.	ASTM A-351 Castings ASTM A-451 Centrifugally Cast Pipe	ESCO 43 C (23), CH-10 (5) (13) (19) (43) (52) (58)
ACI CH-20	C 0.2 mx, Mn 1.5 mx, P 0.04 mx, S 0.04 mx, Si 2.0 mx, Cr 22/26, Ni 12/15, Fe bal.	ASTM A-296, A-351 Castings ASTM A-451 Centrifugally Cast Pipe	CH-20 (11) (13) (19) (30) (42) (43) (44) (46) (49) (52) (58), $\textcircled{L}$ CH-20 (37), Howmet 309 (40), 22S (15), ESCO 43C (23)
ACI CK-20	C 0.2 mx, Mn 2.0 mx, Si 2.0 mx, Cr 23/27, Ni 19/22, Fe bal.	ASTM A-296 and A-351 Castings ASTM A-451 Centrifugally Cast Pipe AMS-5366	CK-20 (3) (5) (13) (19) (30) (42) (43) (44) (46) (49) (52) (58), ESCO 53 C (23), $\textcircled{L}$ CK-20 (37), Howmet 310 (40), 25-20S (15), CAF 310 (69)
ACI CN-7 M	C 0.07 mx, Mn 1.5 mx, Si 1.5 mx, Cr 19/22, Ni 27.5/30.5, Mo 2.0/3.0, Cu 3.0/4.0, Fe bal.	ASTM A-296 and A-351 Castings	CN-7 M (3) (5) (17) (19) (30) (42) (44) (46) (52) (58), FA-20 (15), ESCO 20 (23), $\textcircled{L}$ CN-7 M and $\textcircled{L}$ 33 (37), Tuf-Wear 20 (43), Waukesha 20 (60), CAF 620 (69), Glidden 830 (71)
CN-7 M + Cb	C 0.07 mx, Si 1.5 mx, Mn 1.5 mx, Cr 19/22, Ni 35/38, Mo 2/3, Cu 3/4, Cb 1.0, Fe bal.	None	CAF 820 (69), FA-20Cb (15)
CN-7 M Modified	C 0.07 mx, Mn 1.5 mx, Si 1.5 mx, Cr 19/22, Ni 27.5/30.5, Mo 2/3, Cu 3/4, Cb x Ta 0.6/1.0, Fe bal.	None	CAF 720 (69)
ACI CN-20 M	C 0.20 mx, Mn 1.0 mx, Si 1.5 mx, Cr 18/20, Ni 24/26, Mo 2/2.5, Fe bal.	None	21A (15)
ACI CT-10	C .10 mx, Mn 2.0 mx, Si 2.0 mx, Cr 14/17, Ni 33/37, Fe bal.	None	ESCO 52 C (23)
ACI CT-35 H	C .30/.50, Mn 2.0 mx, Si 2.0 mx, Cr 13/17, Ni 33/37, Fe bal.	None	ESCO 52 H (23)
ACI CY-40, Cast Inconel	C 0.40 mx, Mn 1.5 mx, Si 3 mx, Cr 14/17, Fe 11 mx, Ni bal.	ASTM A-296 Castings	CY-40 (3) (5) (13) (19) (43) (60), ESCO 23 (23), Alloy 22 (30), $\textcircled{L}$ INC (37), QINC (44)
ACI CZ-100	C 1.0 mx, Mn 1.5 mx, Si 2.0 mx, Mo 1.25 mx, Fe 3.0 mx, Ni bal.	ASTM A-296 Castings	CZ-100 (5) (13) (19), ESCO 21 (23), Alloy 5 (30), $\textcircled{L}$ NI (37), QNI (44), 31 (15)
ACI HA	C 0.20 mx, Mn 0.35/0.65, Si 1.0 mx, P 0.04 mx, S 0.04 mx, Cr 8/10, Mo 0.90/1.2, Fe bal.	None	HA (19) (58)
ACI HB-100	C 1.0, Cr 20, Ni 3, Fe bal.	None	Thermalloy 20 (1)
ACI HC	C 0.5 mx, Mn 1.0 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 26/30, Ni 4.0 mx, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings	HC (13) (19) (30) (42) (46) (52) (58), ESCO 35 H (23), CAF 78 (69)
ACI HC-30	C 0.30 mx, Mn 1.0 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 26/30, Ni 4.0 mx, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings ASTM A-608 Centrifugally Cast Tube	Thermalloy 28 (1), ESCO 35 C (23), HC-30 (13) (19)

ACI-HD	C 0.5 mx, Mn 1.5 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 26/30, Ni 4/7, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings	HD (13) (19) (30) (42) (43) (46) (52) (56) (58), ESCO 35T (23), 30 (15), CAF 327 (69)
ACI HD-40	C 0.40 mx, Mn 1.5 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 26/30, Ni 4/7, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings	Thermalloy 34 (1), HD (13) (19), ESCO 35 T (23)
ACI HE	C 0.2/0.5, Mn 2.0 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 26/30, Ni 8/11, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings	HE (13) (19) (30) (42) (43) (44) (46) (52) (58), ① HE (37), 29 (15), CAF 379 (69)
HE Modified	C 0.45/0.65, Mn 1.5 mx, Si 1.5 mx, Cr 26/30, Ni 9/12, Mo 1.5/2.5, Fe bal.	None	CAF 380 (69)
ACI HE-35	C 0.35 mx, Mn 2.0 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 26/30, Ni 8/11, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings ASTM A-608 Centrifugally Cast Tube	Thermalloy 38 (1), HE-35 (13) (19), ESCO 51 H (23)
ACI HF	C 0.20/0.40, Mn 2.0 mx, P 0.04 mx, S 0.04 mx, Si 2.0 mx, Cr 18/23, Ni 8/12, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings MIL-S-17509	Thermalloy 30 (1), HF (3) (11) (13) (19) (30) (42) (43) (44) (46) (52) (58), 28 (15), HF-30 (5), ESCO 40 H (23), CAF 602 (69)
ACI HH	C 0.2/0.5, Mn 2.0 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 24/28, Ni 11/14, Mo 0.5 mx, Fe bal.	ASTM A-297, A-447 Castings	HH (11) (13) (19) (30) (42) (43) (44) (46) (52) (58), 22 (15), ① HH (37), CAF 509 (69)
HH Modified	C 0.6/0.8, Mn 1.5 mx, Si 0.20/0.60, Cr 26/30, Ni 10/14, Mo 1/3, Fe bal.	None	CAF 84 (69)
ACI HH-30	C 0.30 mx, Mn 2.0 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 24/28, Ni 11/14, Mo 0.5 mx, Fe bal.	ASTM A-297 and A-447 Castings ASTM A-608 Centrifugally Cast Tube	Thermalloy 40 B (1), N-I (3), HH-30 (13) (17) (19) (42), ESCO 43 H & 43 A (HH-75) (23)
ACI HH-90	C 0.80/1.00, Mn 2.0 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 24/28, Ni 11/14, Mo 0.5 mx, Fe bal.	ASTM A-567 Castings	Thermalloy 40 E (1), HH-90 (13) (19)
ACI HI	C 0.20/0.50, Mn 2.0 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 26/30, Ni 14/18, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings	ESCO 46 (23), HI (13) (19) (30) (42) (43) (46) (52) (58), 27 (15), CAF 609 (69)
ACI HI-50 C	C 0.45/0.55, Mn 2.0 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 26/30, Ni 14/18, Mo 0.5 mx, Cb + Ta 0.75/1.25, N 0.10/0.15, Fe bal.	ASTM A-567 Castings	Thermalloy 40 A 2 (1), HI-50 C (13) (19)
ACI HK	C 0.20/0.60, Mn 2.0 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 24/28, Ni 18/22, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings	ESCO 53 H (23), HK (3) (13) (19) (30) (42) (43) (44) (46) (52) (56) (58), ① HK (37), KNC 3 (15), CAF 85 (69)
ACI HK-30	C 0.25/0.35, Mn 1.5 mx, Si 1.75 mx, P 0.04 mx, S 0.04 mx, Cr 23/27, Ni 19/22, Fe bal.	ASTM A-351 Castings ASTM A-608 Centrifugally Cast Tube	HK-30 (13) (19) (43) (52)
ACI HK-40	C 0.35/0.45, Mn 2.0 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 24/28, Ni 18/22, Mo 0.5 mx, Fe bal.	ASTM A-297, A-351 and A-567 Castings ASTM A-608 Centrifugally Cast Tube AMS 5365	Thermalloy 47 (1), HK (3), HK-40 (5) (13) (19) (30) (42) (43) (46) (52) (58), SPIN 902 (67)
ACI HL	C 0.20/0.60, Mn 2.0 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 28/32, Ni 18/22, Mo 0.50 mx, Fe bal.	ASTM A-297 Castings	ESCO 48 (23), HL (13) (19) (30) (42) (43) (46) (52) (58), 26 (15), CAF 613 (69)

ACI HL-30	C 0.30 mx, Mn 2.0 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 28/32, Ni 18/22, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings ASTM A-608 Centrifugally Cast Tube	Thermalloy 48 (1), HL-30 (13) (19) (56)
ACI HN	C 0.20/0.50, Mn 2.0 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 19/23, Ni 23/27, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings	ESCO 54 (23), HN (13) (19) (30)(42) (43) (46) (52) (58), 25 (15), CAF 311 (69)
ACI HN-30	C 0.30 mx, Mn 2.0 mx, Si 2.0 mx, P 0.04 mx, S 0.04 mx, Cr 19/23, Ni 23/27, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings	Thermalloy 45 (1), HN-30 (13)
ACI HP-40	C 0.40 mx, Cr 26, Ni 35, Fe bal.	None	Thermalloy 63 (1), HP-40 (19)
ACI HT	C 0.35/0.75, Mn 2.0 mx, Si 2.5 mx, P 0.04 mx, S 0.04 mx, Cr 13/17, Ni 33/37, Mo 0.5 mx, Fe bal.	ASTM A-297, A-448 Castings	HT (3) (13) (19) (30) (42) (43) (44) (46) (52) (58), ESCO 52 H (23), ① HT (37), 20 (15), CAF 74 (69)
ACI HT-30	C 0.25/0.35, Mn 2.0 mx, Si 2.5 mx, P 0.04 mx, S 0.04 mx, Cr 13/17, Ni 33/37, Mo 0.5 mx, Fe bal.	ASTM A-297, A-351 Castings	HT-30 (13) (19) (43) (52)
ACI HT-50	C 0.50 mx, Mn 2.0 mx, Si 2.5 mx, P 0.04 mx, S 0.04 mx, Cr 13/17, Ni 33/37, Mo 0.5 mx, Fe bal.	ASTM A-297, A-448 Castings ASTM A-608 Centrifugally Cast Tube	Thermalloy 50 (1), N-5 (3), HT-50 (13) (19) (42), Duraloy HT-50 (19)
ACI HT-50 C	C 0.40/0.60, Mn 2.0 mx, Si 2.5 mx, P 0.04 mx, S 0.04 mx, Cr 13/17, Ni 33/37, Mo 0.5 mx, Cb + Ta 0.75/1.25, Fe bal.	ASTM A-567 Castings	Thermalloy 50 CQ (1), HT-50 C (13) (19)
ACI HU	C 0.35/0.75, Mn 2.0 mx, Si 2.5 mx, P 0.04 mx, S 0.04 mx, Cr 17/21, Ni 37/41, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings	ESCO 55 (23), HU (13) (19) (30) (42) (43) (46) (52) (58), 24 (15), CAF 331 (69)
ACI HU-50	C 0.50 mx, Mn 2.0 mx, Si 2.5 mx, P 0.04 mx, S 0.04 mx, Cr 17/21, Ni 37/41, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings ASTM A-608 Centrifugally Cast Tube	Thermalloy 58 (1), HU-50 (13) (19)
ACI HU-58 Cb	C 0.35/0.40, Mn 2.0 mx, Si 2.5 mx, Cr 17/21, Ni 37/41, Mo 0.5 mx, Cb 0.8/1.2, Fe bal.	None	Thermalloy 58 CQ (1), Alloy 19 (30)
ACI HW	C 0.35/0.75, Mn 2.0 mx, Si 2.5 mx, P 0.04 mx, S 0.04 mx, Cr 10/14, Ni 58/62, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings	ESCO 56 (23), HW (13) (19) (30) (42) (43) (44) (46) (52), CAF 334 (69), 21 (15)
ACI HW-50	C 0.50 mx, Mn 2.0 mx, Si 2.5 mx, P 0.04 mx, S 0.04 mx, Cr 10/14, Ni 58/62, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings ASTM A-608 Centrifugally Cast Tube	Thermalloy 72 (1), HW-50 (13) (19)
ACI HX	C 0.35/0.75, Mn 2.0 mx, Si 2.5 mx, P 0.04 mx, S 0.04 mx, Cr 15/19, Ni 64/68, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings	ESCO 57 (23), HX (3) (13) (19) (30) (42) (43) (46) (52) (58), ① HX (37), CAF 335 (69), 23 (15)
ACI HX-50	C 0.50 mx, Mn 2.0 mx, Si 2.5 mx, P 0.04 mx, S 0.04 mx, Cr 15/19, Ni 64/68, Mo 0.5 mx, Fe bal.	ASTM A-297 Castings ASTM A-608 Centrifugally Cast Tube	Thermalloy 85 (1), N-4 (3), HX-50 (13) (19)
Amsco 1	C 2.5, Cr 29, Ni 3 mx, Fe 3 mx, W 12.5, Co bal.	ASTM A-399 Castings AWS A5.13	Amsco 1 (1) (13)
Amsco 6	C 1.0, Cr 29, Ni 3 mx, Fe 3 mx, W 4.5, Co bal.	ASTM A-399 Castings AWS A5.13	Amsco 6 (1) (13) (Amsco 1 and 6 are available as surfacing filler metal as well as castings.)

Thermalloy Al	C 2.25, Cr 31.0, Ni 1.0, W 13.0, Mo 2.0, Co bal.	²³ None	Thermalloy Al (1)
Thermalloy F-17	C 0.03 mx, Ni 17, Co 10.5, Mo 4.5, + Ti + Al, Fe bal.	None	Thermalloy F-17 (1)
Thermalloy 52	C 0.40, Cr 22, Ni 24, Co 2.0, W 1.2, Cb 0.8, Fe bal.	None	Thermalloy 52 (1)
Thermalloy 63 C	C 0.40, Cr 26, Ni 35, Co 15, Fe bal.	None	Thermalloy 63 C (1)
Thermalloy 63 W	C 0.40, Cr 26, Ni 35, W 5, Fe bal.	None	Thermalloy 63 W (1)
Thermalloy 63 WC, Supertherm	C 0.40, Cr 26, Ni 35, Co 15, W 5, Fe bal.	None	Thermalloy 63 WC (Supertherm) (1)
Thermalloy 85 EX	C 0.50, Cr 17, Ni 68, Mo 2, Fe bal.	None	Thermalloy 85 EX (1)
50 Cr – 50 Ni	C 0.10 mx, Mn 0.30 mx, Si 1.0 mx, P 0.02 mx, S 0.02 mx, Cr 48/52, N 0.30 mx, Fe 1.0 mx, Ti 0.5 mx, Al 0.25 mx, Ni bal.	ASTM A-560 Castings	725 (69), 50 Cr – 50 Ni (13) (19),
60 Cr – 40 Ni	C 0.10 mx, Mn 0.30 mx, Si 1.0 mx, P 0.02 mx, S 0.02 mx, Cr 58/62, N 0.30 mx, Fe 1.0 mx, Ti 0.5 mx, Mo 0.25 mx, Ni bal.	ASTM A-560 Castings	60 Cr – 40 Ni (13) (19), ESCO 54 (23), 60 (15), 728 (69)

GROUP 3**HIGH-MANGANESE ALLOYS**

AISI 201 and 202 – See Group 1

AF-183

Allegheny Stainless Steel 216

Allegheny Stainless Steel 216 L

Armco 18-2 Mn

Armco 21-6-9

Armco 22-4-9

Armco 22-13-5

Croloy 299

Crucible 223

Kromarc 55

Kromarc 58

16-15-6

18 Cr, 15 Mn, Tenelon

18 Cr, 15 Mn, 5 Ni, Cryogenic Tenelon

204

205

Alloy Designation	Composition, Percent Nominal or Range	Applicable Specifications	Producer Designation
AF-183	C 0.30, Mn 18, Si 0.30, Cr 12.5, Mo 3.0, N 0.2, V .08, Fe bal.	None	AF-183 (41)
Allegheny Stainless Steel 216 ^P	C 0.05, Mn 8.3, Si 0.3, Cr 19.8, Ni 6, N 0.35, Fe bal.	ASTM A-240 (XM17) Plate, Sheet & Strip	Allegheny Stainless Steel 216 (2) ^P
Allegheny Stainless Steel 216 L ^P	C 0.03 mx, Mn 8.3, Si 0.3, Cr 19.8, Ni 6, N 0.35, Fe bal.	ASTM A-240 (XM18) Plate, Sheet & Strip	Allegheny Stainless Steel 216 L (2) ^P
Armco 18-2 Mn	C 0.10, Mn 12, Si 0.5, Cr 18, Ni 1.6, N 0.34, Fe bal.	None	Armco 18-2 Mn (7)
Armco 21-6-9 ^P	C 0.4, Mn 9, Si 0.25, Cr 20.5, Ni 6.75, N 0.27, Fe bal.	ASTM A-276 (XM-10, XM-11) Bars & Strips ASTM A-580 (XM-10, XM-11) Wire AMS 5595, 5656 MIL-T-9821	Armco 21-6-9 (7) ^P , Carpenter Pyromet 538 (14), this alloy also made by: (39) (66)
Armco 22-4-9	C 0.55, Mn 8.5, Si 0.15, Cr 20.5, Ni 3.5, N 0.4, Fe bal.	None	ESCO 49K (23), this alloy also made by: (66)
Armco 22-13-5	C 0.06 mx, Mn 4/6, Si 1.0 mx, Cr 20.5/23.5, Ni 11.5/13.5, Mo 1.5/3.0, N 0.2/0.4, Cb 0.1/0.3, V 0.1/0.3, Fe bal.	ASTM (XM-19) AMS 5764	Armco 22-13-5 (7), this alloy also made by: (66)
Croloy 299	C 0.12/0.25, Mn 14/15.5, P 0.03 mx, S 0.03 mx, Si 1.0 mx, Cr 16.5/18, Ni 1.15/1.75, N 0.32/0.40, Fe bal.	None	Croloy 299 (9)
Crucible 223 ^P	C 0.08, Mn 12.0, Si 0.50, Cr 15.5, Ni 0.50 mx, Mo 0.50, Cu 1.0, N 0.25 mn, Fe bal.	None	Crucible 223 (16) ^P
Kromarc 55	C 0.04, Mn 9.5, Si 0.3, Cr 16, Ni 20, Mo 2.25, Fe bal.	None	ESCO 49 (23)
Kromarc 58	C 0.02, Mn 10.0, Si 0.20, Cr 15, Ni 22, Mo 2.25, B 0.008, Zr 0.01, N 0.23, V 0.25, Fe bal.	None	Westinghouse alloy produced by Carpenter Technology Corp. (14)
16-15-6	C 0.07 mx, Mn 7.5, Si 0.5, Cr 16, Ni 15, Mo 6.0, N 0.35, Fe bal.	None	16-15-6 (54)
18 Cr, 15 Mn, Tenelon ^P	C 0.10, Mn 15.0, Si 0.60, Cr 18.0, N 0.40, Fe bal.	None	USS Tenelon (57) ^P
18 Cr, 15 Mn, 5 Ni, Cryogenic Tenelon ^P	C 0.10, Mn 15.10, Si 0.70, Cr 17.5, Ni 5.5, N 0.38, Fe bal.	ASTM A-412 (XM 14) Plate, Sheet & Strip	USS Cryogenic Tenelon (57) ^P
204	C 0.07, Mn 9, Si 0.5, Cr 18, Ni 5, N 0.2, Fe bal.	None	Allegheny Stainless Steel 204 (2)
205	C 0.18, Mn 14.8, Si 0.4, Cr 17.3, Ni 1.4, N 0.35, Fe bal.	None	Allegheny Stainless Steel 205 (2)

GROUP 4**PRECIPITATION HARDENING STAINLESS STEELS
AND HIGH-IRON ALLOYS**

AFC-77
Almar 362
AM 350, AISI 633
AM 355, AISI 634
Armco PH 12-9 Mo
Armco PH 13-8 Mo
Armco PH 14-8 Mo
Armco PH 15-7 Mo, AISI 632
Armco 15-5 PH
Armco 17-4 PH, AISI 630, ACI CB-7 Cu
Armco 17-7 PH, AISI 631
Croloy 16-6 PH
Custom 450
Custom 455
Illium "P"
Illium "PD"
PH-55A
Pyromet X-15
Stainless W, AISI 635
Stainless W-2
17-10P

Alloy Designation	Composition, Percent Nominal or Range	Applicable Specifications	Producer Designations
Crucible AFC-77 ^P	C 0.15, Cr 14.5, Co 13, Mo 5, V 0.4, Fe bal.	AMS 5748	Crucible AFC-77 (16) ^P
Almar 362 ^P	C 0.03, Mn 0.3, Cr 14.5, Ni 6.5, Ti 0.8, Fe bal.	AMS 5739, 5740 (XM-9) MIL-S-46123	Allegheny Stainless Steel Almar 362 (2) ^P . This alloy also made by: (39)
AM 350 ^P , AISI 633	C 0.10, Mn 1.0, Si 0.4, Cr 16.5, Ni 4.25, Mo 2.75, N 0.1, Fe bal.	AMS 5546, 5548, 5554, 5745, 5774, 5775 MIL-S-8840	Allegheny Stainless Steel AM-350 (2) ^P , Pyromet 350 (14), Unitemp 350 (59). This alloy also made by: (39)
AM 355 ^P , AISI 634	C 0.15, Mn 1.0, Si 0.4, Cr 15.5, Ni 4.25, Mo 2.75, N 0.1, Fe bal.	ASTM A-461, A-564 Bars, Forgings, Shapes AMS 5359, 5368, 5547, 5549, 5594, 5743, 5744, 5780, 5781 MIL-S-8840	Allegheny Stainless Steel AM 355 (2) ^P Pyromet 355 (14), Ohioloy C-355 (42), Unitemp 355 (59). This alloy also made by: (13)
Armco PH 12-9 Mo	C 0.035, Mn 0.02, Si 0.03, Cr 11.85, Ni 8.65, Mo 1.5, Al 1.65, N 0.005, Fe bal.	None	Armco PH 12-9 Mo (7)
Armco PH 13-8 Mo	C 0.035, Mn 0.02, Si 0.03, Cr 12.75, Ni 8.2, Mo 2.15, Al 1.1, N 0.005, Fe bal.	(XM-13) AMS-5629	Armco PH 13-8 Mo (7) This alloy also made by: (78)
Armco PH 14-8 Mo	C 0.03, Mn 0.5, Si 0.3, Cr 14.4, Ni 8.2, Mo 2.25, Al 1.17, Fe bal.	AMS-5601, 5603	Armco PH 14-8 Mo (7)
Armco PH 15-7 Mo ^P , AISI 632	C 0.07, Mn 0.5, Si 0.3, Cr 15.1, Ni 7.1, Mo 2.25, Al 1.17, Fe bal.	ASTM A-564 Bars & Shapes AMS-5520, 5657, 5812, 5813 MIL-S-8955	Armco PH 15-7 Mo (7) ^P , 15-7 Mo (34). This alloy also made by: (39) (66) (78)
Armco 15-5 PH ^P	C 0.04, Mn 0.28, Si 0.6, Cr 15, Ni 4.6, Cb + Ta 0.27, Cu 3.3, Fe bal.	(XM-12) AMS-5658, 5659	Armco 15-5 PH (7) ^P . This alloy also made by: (28) (34) (53) (60) (66) (78)
Armco 17-4 PH ^P , AISI 630, ACI CB-7 Cu	C 0.04, Mn 0.28, Si 0.6, Cr 16, Ni 4.25, Cb + Ta 0.27, Cu 3.3, Fe bal.	ASTM A-461 Bars, Forgings & Forging Stock; A-564 Bars & Shapes AMS 5342, 5343, 5344, 5355, 5398, 5604, 5643, 5825, 5827, 7474 ASME Case Nos. 1227, 1335, 1384, 1388 Military Mil-C-24111 MIL-S-22216, 81506	Armco 17-4 PH (7) ^P , Allegheny Stainless Steel AL 630 (2), Carpenter Custom 630 (14), 17 Cr-4Ni (16), SPIN 803 PH (67), CAPI-803 PH (68), CAF 322 (69), ESCO 36 PH (23), Alloy 4 (30), ① 17-4 (37), Ohioloy CB-7 Cu (42), Haynes Alloy No. 474 (56). This alloy also made by: (13) (15) (28) (34) (44) (52) (53) (58) (60) (66) (78)
Armco 17-7 PH ^P , AISI 631	C 0.07, Mn 0.5, Si 0.3, Cr 17, Ni 7, Al 1.17, Fe bal.	ASTM A-564 Bars & Shapes ASTM A-313 Spring Wire AMS-5528, 5529, 5568, 5644, 5673 MIL-S-25043, MIL-W-46078	Armco 17-7 PH (7) ^P , Allegheny Stainless Steel AL 631 (2). This alloy also made by: (27) (34) (39) (58) (66) (78)
Croloy 16-6 PH	C 0.03/0.06, Mn 0.55/0.75, P 0.025 mx, S 0.025 mx, Si 0.50 mx, Cr 14.75/15.75, Ni 6.25/7.25, Ti 0.70/0.90, Al 0.35/0.45, Fe bal.	None	Croloy 16-6 PH (9)
Custom 450 ^P	C 0.05 mx, Mn 0.50 mx, Si 0.50 mx, Cr 14.5/16.5, Ni 5.5/7.0, Mo 0.5/1.0, Cu 1.25/1.75, Cb 8 X C min, Fe bal.	To be added to ASTM A-564 as XM-25	Carpenter Custom 450 (14) ^P
Custom 455 ^P	C 0.03, Mn 0.25, Si 0.25, Cr 11.75, Ni 8.5, Ti 1.2, Cb 0.30, Cu 2.25, Fe bal.	ASTM A-564 Bars, Forgings & Shapes; A-313 (XM-16) Spring Wire AMS 5578, 5617, 5672, 5860	Almar 455 (2), Carpenter Custom 455 (14) ^P . This alloy also made by: (39)

Illium "P"	C 0.25, Cr 28, Ni 8, Mo 2.0, Cu 3.5, Fe bal.	None	Illium "P" (52)
Illium "PD" ^P	C 0.08, Cr 25.5, Ni 5, Co 6, Mo 2.5, Cu free, Fe bal.	None	Illium "PD" (52) ^P
PH-55A ^P	C 0.04, Mn 0.5, Si 3.0, Cr 20, Ni 8.8, Mo 4, Fe bal.	None	PH-55A (15) ^P
Pyromet X-15	C 0.03, Mn 0.10, Si 0.10, Cr 15, Ni 0.20, Co 20, Mo 2.9, Fe bal.	AMS 5761	Almar X-15 (2), Pyromet X-15 (14)
Stainless W ^P , AISI 635	C 0.05, Mn 0.50, Si 0.60, Cr 16.5, Ni 6.75, Al 0.20, Ti 0.90, Fe bal.	ASTM A-564 Bar	Carpenter Stainless W (14), USS Stainless W (57) ^P
Stainless W-2	C 0.03, Mn 0.22, Cr 11.6, Ni 4.7, Al 0.08, Ti 0.40, Fe bal.	None	Stainless W-2 (57)
17-10P	C 0.125, Mn 0.76, P 0.27, S 0.025, Si 0.55, Cr 16.70, Ni 10.20, Fe bal.	None	Armco 17-10P (7), 17-10P (34)

GROUP 5

HIGH-IRON SUPERALLOYS

Armco 20-45-5	Incoloy Alloy 901, AISI 681, 682
A-286, AISI-660	Kanthal A-1
Alkrothal	Kanthal A
Croloy 15-15 N	Kanthal D
Crucible CG-27	Kanthal DS
Crucible HNM	Lapelloy, AISI 619
Crucible 422, AISI 616	Lapelloy C
Discaloy, AISI 662	Lescalloy BG-42
Duraloy HOM	Moly Ascoloy, Jethete M 152
Duraloy HOM-1	N-155, Multimet, AISI 661
Duraloy HOM-3	S-590
Duraloy HOM-5	TPA
Duraloy HOM-6	Unimar CR 1
EME	Unimar CR 2
Gannaloy	Unitemp 212
Greek Ascoloy, AISI 615	V-57, AISI 663
H-46	W-545, AISI 665
Incoloy Alloy 800	16-25-6, AISI 650
Incoloy Alloy 801	17-14 Cu Mo, AISI 653
Incoloy Alloy 802	19-9 DL, AISI 651
Incoloy Alloy 804	19-9 DX, AISI 652
Incoloy Alloy 825	19-9 WX

Alloy Designation	Composition, Percent Nominal or Range	Applicable Specifications	Producer Designations
Armco 20-45-5	C 0.05, Mn 5, Si 0.4, Cr 20, Ni 45, Mo 2.25, Cb 0.15, Fe bal.	ASTM Specifications to be issued	Armco 20-45-5 (7), this alloy also made by: (66)
A-286, AISI 660	C 0.05, Mn 1.4, Si 0.4, Cr 15, Ni 26, Mo 1.25, Ti 2.15, Al 0.2, B 0.003, V 0.3, Fe bal.	ASTM A-638 Bar, Forgings & Forging Stock ASTM A-453 Bolting AMS 5525, 5731, 5732, 5734, 5735, 5736, 5737, 5804, 5805, 7235, 7478, 7479, 7481	Altemp A-286 (2), Nickelvax A-286 (4), Armco A-286 (7), Austental 286 (8), Braevac A-286 (12), A-286 (13) (27) (39) (53) (62) (78), Carpenter A-286 (14), Crucible A-286 (16), Eastern Alloy No. 286 (21), Escalloy A-286 E (23), 61 C (28), Lescalloy A-286 Vac Arc (36), Midvac A-286 (41), Udimet A-286 (51), Unitemp A-286 (59), Simalloy A-286 (50)
Alkrothal	Al 4.0, Cr 14.5, Co 0.5, Fe bal.	None	Alkrothal (35)
Croloy 15-15 N	C 0.15 mx, Mn 2.0 mx, P 0.03 mx, S 0.045 mx, Si 0.75 mx, Cr 14.75/18, Ni 13.5/16.5, Mo 1.25/1.85, W 1.0/1.85, Cb + Ta 0.8/1.3, N 0.15 mx, Fe bal.	None	Croloy 15-15 N (9)
Crucible CG-27	C 0.05, Mn 0.10, Si 0.10, Cr 13, Ni 38, Mo 5.5, Cb 0.6, Ti 2.5, Al 1.5, B 0.01, Fe bal.	None	Crucible CG-27 (16)
Crucible HNM	C 0.30, Mn 3.5, Si 0.5, Cr 18.5, Ni 9.5, P 0.23, Fe bal.	MIL-S-17759	Crucible HNM (16)
Crucible 422 ^P , AISI 616	C 0.22, Mn 0.65, Si 0.36, Cr 12.0, Ni 0.70, Mo 1.0, W 1.0, V 0.25, Fe bal.	ASTM A-565 Bar & Forgings ASTM A-579 Forgings ASTM A-437 Bolting AMS 5655	Allegheny Stainless Steel 422 (2), Crucible 422 (16) ^P , Carpenter 636 (14), 422 (29) (53), Lescalloy 422 (36), ① 422 (37), Midvac 422 (41), Unitemp 1420 WM (59)
Discaloy ^P , AISI 662	C 0.04, Mn 0.9, Si 0.8, Cr 13.5, Ni 26, Mo 2.75, Ti 1.75, Al 0.10, B 0.005, Fe bal.	ASTM A-638 Bar, Forgings & Forging Stock ASTM A-453 Bolting AMS 5733	Discaloy (61) ^P . This alloy also made by: (2)
Duraloy HOM ^P	C 0.45, Mn 1.0, Si 1.2, Cr 26, Ni 35, Fe bal.	None	Duraloy HOM (19) ^P
Duraloy HOM-1	C 0.45, Mn 1.0 mx, Si 2.0 mx, Cr 26, Ni 34.5, W 1.5, Fe bal.	None	Duraloy HOM-1 (19)
Duraloy HOM-3	C 0.45, Mn 1.0, Si 1.2, Cr 26, Ni 45, + Mo 3.0, Co 3.0 & W 3.0, Fe bal.	None	Duraloy HOM-3 (19)
Duraloy HOM-5	C 0.50, Mn 1.0, Si 1.3, Cr 28, Ni 48, + W 5.0, Fe bal.	None	Duraloy HOM-5 (19)
Duraloy HOM-6	C 0.30, Mn 0.8, Si 0.8, Cr 24, Ni 24, + Cb 1.5, Fe bal.	None	Duraloy HOM-6 (19)
EME	C 0.10, Mn 0.5, Si 0.7, Cr 19, Ni 12, W 3.2, Cb 1.2, N 0.15, Fe bal.	None	EME (41) (59)
Gannaloy	C 0.03, Mn 1.4, Si 0.40, Cr 5.5, Ni 24.5, Ti 2.25, Al 0.65, B 0.003, Fe bal.	None	Gannaloy (53)

Greek Ascoloy, AISI 615	C 0.12, Mn 0.4, Si 0.3, Cr 13, Ni 2, W 3, Fe bal.	31 ASTM A-565 Bar & Forgings AMS 5354, 5508, 5616, 5817, 7470	Allegheny Stainless Steel Type 418 Special (2), Croloy 12-3W (9), Braeburn Greek Ascoloy (12), Carpenter Greek Ascoloy (14), 42 K (28), 12-2 W (34) (74), Lescalloy 5616 (36), Howmet 436 (40), Greek Ascoloy (13) (53) (54), Alloy No. 454 (56), Unitemp 1415 NW (59), Simalloy 5616 (50)
H-46	C 0.16, Mn 0.60, Si 0.40, Cr 11.5, Ni 0.6, Mo 0.65, Cb 0.25, V 0.3, Fe bal.	None	Carpenter H-46 (14), Midvac H-46 (41)
Incoloy Alloy 800 ^P	C 0.05, Mn 0.75, S 0.008, Si 0.50, Cr 21, Ni 32.5, Ti 0.38, Al 0.38, Cu 0.38, Fe 46,	ASTM B-409 Plate, Sheet & Strip ASTM B-408 Rod & Bar ASTM B-163 & B-407 Pipe & Tube	Armco 800 (7), Croloy 20-30 (9), Pyromet 800 (14), Crucible 800 (16), Esco 800 E (23) Incoloy Alloy 800 (32) ^P , Sanicro 31 (47), Uniloy 800 (59), Carlson 800 (66). This alloy also made by: (27) (28) (39) (53)
Incoloy Alloy 801	C 0.05, Mn 0.75, S 0.008, Si 0.50, Cr 20.5, Ni 32, Ti 1.13, Cu 0.25, Fe 44.5	AMS 5552, 5742	Altemp Alloy Steel 801 (2), Eastern Alloy No. 801 (21), Incoloy Alloy 801 (32)
Incoloy Alloy 802 ^P	C 0.35, Mn 0.75, Si 0.38, S 0.008, Cr 21, Ni 32.5, Al 0.58, Ti 0.75, Fe 46.0	None	Esco 802 E (23), Incoloy Alloy 802 (32) ^P
Incoloy Alloy 804 ^P	C 0.05, Mn 0.75, Si 0.38, S 0.008, Cr 29.5, Ni 41.0, Ti 0.60, Al 0.30, Cu 0.25, Fe 25.4	None	Incoloy Alloy 804 (32) ^P
Incoloy Alloy 825 ^P	C 0.03, Mn 0.50, S 0.015, Si 0.25, Cr 21.5, Ni 42.0, Mo 3, Ti 0.9, Al 0.10, Cu 2.25, Fe 30.0	ASTM B-424 Plate, Sheet & Strip ASTM B-425 Rod & Bar ASTM B-423 Pipe	ASTM B-425 (6), Incoloy Alloy 825 (32) ^P , Carlson 825 (66). This alloy also made by: (27) (39)
Incoloy Alloy 901 ^P , AISI 681, 682	C 0.05, Mn 0.45, Si 0.4, Cr 12.5, Ni 42.5, Mo 5.7, Ti 2.8, Al 0.2, Cu 0.1, Fe bal.	AMS 5660, 5661	Altemp AL 901 (2), Nickelvac 901 (4), Austenal 1003 (8), Pyromet 901 (14), Crucible 901 (16) 22 F (28), Lescalloy 901 Vac Arc (36), 901 (41), Udimet 901 (51), Unitemp 901 (59), INCO 901 (63). This alloy also made by: (53)
Kanthal A-1	Al 5.5, Cr 22, Co 0.5, Fe bal.	None	Kanthal A-1 (35)
Kanthal A	Al 5.0, Cr 22, Co 0.5, Fe bal.	None	Kanthal A (35)
Kanthal D	Al 4.5, Cr 22, Co 0.5, Fe bal.	None	Kanthal D (35)
Kanthal DS	Al 4.5, Cr 22, Co 0.5, Ta 1.0 Fe bal.	None	Kanthal DS (35)
Lapelloy, AISI 619	C 0.30, Mn 1.0, Si 0.25, Cr 12.0, Ni 0.30, Mo 2.75, V 0.25, Fe bal.	ASTM A-565 Bar & Forgings	Allegheny Stainless Steel Lapelloy (2), Carpenter Lapelloy (14), Linco (36), Lapelloy (54)
Lapelloy C	C 0.22, Mn 0.80, Si 0.25, Cr 11.5, Ni 0.30, Mo 2.75, Cu 2.0, N 0.08, Fe bal.	None	Carpenter Lapelloy C (14)
Lescalloy BG-42 ^P	C 1.15, Mn 0.5, Si 0.3, Cr 14.5, Mo 4, V 1.2, Fe bal.	None	Lescalloy BG-42 (36) ^P

Moly Ascoloy, Jethete M 152	C 0.10, Cr 12, Mo 1.8, Ni 2.4, V 0.35, Fe bal.	None	Allegheny Stainless Steel 415 (2), Carpenter Moly Ascoloy (14), Jethete M 152 Vac Arc (36), Jethete M 152 (59)
N-155, Multimet ^P , AISI 661	C 0.15, Mn 1.5, Si 0.5, Cr 21, Ni 20, Co 20, Mo 3, W 2.5, Cb 1.0, N 0.15, Fe bal.	ASTM A-639 Bar, Forgings & Forging Stock ASTM A-567 Castings AMS 5376, 5531, 5532, 5585, 5768, 5769, 5794, 5795	Altemp N-155 (2), Nickelvax N-155 (4), Austenal N-155 (8), Braeburn N-155 (12), N-155 (13) (39) (62), Carpenter N-155 (14), Eastern Alloy No. 155 (21), ESCO 70 & N-155 E (23), Udimet 155 (51), Multimet Alloy (56) ^P , Unitemp N-155 (59), Simalloy N-155 (50)
S-590	C 0.45, Mn 1.25, Si 0.4, Cr 20.5, Ni 20, Co 20, Mo 4, W 4, Cb 4, Fe bal.	AMS 5533, 5770	Altemp S-590 (2), S-590 (14)
TPA	Cr 14, Ni 14, Mo 0.4, W 2.4, Fe bal.	AMS 5700	AMS 5700 (14)
Unimar CR 1	C 0.02, Cr 11.5, Ni 10.25, Ti 0.30, Al 1.20, Fe bal.	None	Unimar CR 1 (59)
Unimar CR 2	C 0.02, Cr 11.50, Ni 10.25, Ti 0.30, Al 0.70, Fe bal.	None	Unimar CR 2 (59)
Unitemp 212 ^P	C 0.08, Mn 0.05, Si 0.15, Cr 16, Ni 25, Cb 0.5, Ti 4.0, Al 0.15, B 0.06, Zr 0.05, Fe bal.	None	Unitemp 212 (59) ^P
V-57 ^P , AISI 663	C 0.08 mx, Mn 0.35 mx, Si 0.75 mx, Cr 14.8, Ni 27, Mo 1.25, Ti 3.0, Al 0.25, B 0.01, V 0.5 mx, Fe bal.	None	Altemp V-57 (2) ^P , Nickelvax V-57 (4), Braevac V-57 (12), Carpenter V-57 (14), Lescalloy V-57 Vac Arc (36), Midvac 57 (41), Udimet V-57 (51)
W-545 ^P , AISI 665	C 0.08, Mn 1.5, Si 0.4, Cr 13.5, Ni 26, Mo 1.5, Ti 2.85, Al 0.20, B 0.05, Fe bal.	ASTM A-453 Bolting AMS 5543, 5741	W-545 (41) (61) ^P
16-25-6 ^P , AISI 650	C 0.08 mx, Mn 1.35, Si 0.7, Cr 16, Ni 25, Mo 6, N 0.15, Fe bal.	ASTM A-457 Plate, Sheet & Strip ASTM A-458 Bar ASTM A-477 Forgings & Forging Billets AMS 5725, 5727, 5728	Altemp 25 (2), Nickelvax 16-25-6 (4), 16-25-6 (54) ^P
17-14 Cu Mo, AISI 653	C 0.12, Mn 0.75, Si 0.50, Cr 15.9, Ni 14.1, Mo 2.5, Cb 0.45, Ti 0.25, Cu 3.0, Fe bal.	None	Armco 17-14 Cu Mo (7), 17-14 Cu Mo (54)
19-9 DL ^P , AISI 651	C 0.3, Mn 1.1, Si 0.6, Cr 19, Ni 9, Mo 1.25, W 1.2, Cb 0.4, Ti 0.3, Fe bal.	ASTM A-457 Plate, Sheet & Strip ASTM A-458 Bar ASTM A-477 Forgings & Forging Billets ASTM A-453 Bolting AMS 5369, 5526, 5527, 5579, 5720, 5721, 5722 MIL-S-46042	Altemp 19-9 DL (2), Armco 19-9 DL (7), Carpenter 19-9 DL (14), Crucible 19-9 DL (16), Eastern Alloy No. 19-9 (21), 62A (28) 19-9 DL (34) (39) (41), Unitemp 19-9 DL (59) ^P
19-9 DX ^P , AISI 652	C 0.3, Mn 1.0, Si 0.55, Cr 19.2, Ni 9, Mo 1.5, W 1.2, Ti 0.55, Fe bal.	ASTM A-457 Plate, Sheet & Strip ASTM A-458 Bar ASTM A-477 Forgings & Forging Billets AMS 5538, 5539, 5723, 5724, 5729	Altemp 19-9 DX (2), Carpenter 19-9 DX (14), Crucible 19-9 DX (16), 19-9 DX (34) (39) (41), Uniloy 19-9 DX (59) ^P

19-9 WX	C 0.11, Cr 20.5, Ni 8.5, Mo 0.5, W 1.55, Cb 1.3, Ti 0.2, Fe bal.	33 AMS 5782, 5783	Altemp 19-9 WX (2), Unitemp 19-9 WX (59)
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GROUP 6

NICKEL-BASE SUPERALLOYS AND RELATED ALLOYS

Alloy 713 C	MAR-M Alloy 421
Alloy 713 LC	MAR-M Alloy 432
Allvac M-252, J-1500, AISI 689	MM 002
Allvac Rene' 41, AISI 683	MM 004
Astroloy	MM 007
B-1900	MM 008
B-1910	MP 35 N, Multiphase
Chromel-AA	Nichrome V-245
Chromel-R	Nicrfe
D-979, AISI 664	Nicrmo
GMR 235, AISI 686	Nicrotung
GMR 235 D	Nimonic 75
Harper 600 Mod.	Nimonic 80 A
Hastelloy Alloy B, ACI N-12-M	Nimonic 90
Hastelloy Alloy C, ACI CW-12-M	Nimonic 105
Hastelloy Alloy C-276	Nimonic 115
Hastelloy Alloy D	Ohioley 2300
Hastelloy Alloy F	Pyromet 860
Hastelloy Alloy G	RA 333
Hastelloy Alloy N	Refractaloy 26, AISI 690
Hastelloy Alloy R-235	Rene' 77
Hastelloy Alloy W	Rene' 80
Hastelloy Alloy X, AISI 680	Rene' 95
Illium "B"	SEL
Illium "G"	SEL 15
Illium "98"	SM 200 - See MAR-M Alloy 200
IN-100	TD Nickel
IN-102	TD Nickel - Chromium
IN-162	TRW 1800
IN-738	TRW 1900
IN-792	TRW Mod 1900, TRW 2278
Inconel Alloy 600, ACI CY-40	Udimet 115
Inconel Alloy 601	Udimet 400
Inconel Alloy 604	Udimet 500, AISI 684
Inconel Alloy 625	Udimet 520
Inconel Alloy 700	Udimet 630
Inconel Alloy 702	Udimet 700, AISI 687
Inconel Alloy 705	Udimet 710
Inconel Alloy 706	Unitemp AF 2 - 1DA
Inconel Alloy 718	Waspaloy, AISI 685
Inconel Alloy 721	Waspaloy Modified
Inconel Alloy 722	80Ni, 20Cr Alloy
Inconel Alloy X-750, AISI 688	78Ni, 20Cr, 1Cb Alloy
Inconel Alloy 751	60Ni, 16Cr Alloy
MAR-M Alloy 200	35Ni, 20Cr Alloy
MAR-M Alloy 211	35Ni, 20Cr, 1Cb Alloy
MAR-M Alloy 246	35Ni, 30Cr Alloy
MAR-M Alloy 247	70Ni, 30Cr Alloy

Alloy Designation	Composition, Percent Nominal or Range	Applicable Specifications	Producer Designations
Alloy 713 C	C 0.12, Cr 12.5, Mo 4.2, Cb 2.0, Ti 0.8, Al 6.1, B 0.012, Zr 0.10, Ni bal.	ASTM A-567 Castings AMS 5391	Allvac 713 (4), Austenal 655 (8), Alloy 713 C (13) (55) (80 powder), Esco 713 C-E (23), CAPI-371 (68), Udimet 713 C (51), Haynes Alloy No. 713 C (56), Vertx 713 C (70 powder)
Alloy 713 LC	C 0.05, Cr 12, Mo 4.5, Cb 2.0, Ti 0.6, Al 5.9, B 0.01, Zr 0.10, Ni bal.	None	Allvac 713 LC (4), Austenal 579 M (8), Alloy 713 LC (13), Haynes Alloy No. 713 C (low carbon) (56)
Allvac M-252 ^P , J-1500, AISI 689	C 0.15, Mn 0.5 mx, Si 0.5 mx, Cr 19, Co 10, Mo 10, Ti 2.6, Al 1.0, B 0.005, Ni bal.	ASTM A-637 Bar, Forgings & Forging Stock AMS 5551, 5756, 5757	Allvac M-252 (4) ^P , Austenal 252 (8), Braevac M-252 (12), Carpenter M-252 (14), Crucible M-252 (16), Udimet M-252 (51), Unitemp M-252 (59)
Allvac Rene' 41 ^P , AISI 683	C 0.09, Cr 19, Co 11, Mo 10, Ti 3.1, Al 1.5, B 0.010 mx, Ni bal.	AMS 5399, 5545, 5712, 5713, 5800, 7469	Allvac Rene' 41 (4) ^P , Austenal 41 (8), Braevac 41 (12), Carpenter 41 (14), Eastern Alloy No. 41 (21), Esco R41E (23), Simalloy R41 (50), Udimet 41 (51), Haynes Alloy No. R-41 (56), Unitemp 41 (59), This alloy also made by: (13) (39) (62) (63) (80 powder)
Astroloy	C 0.06, Cr 15, Co 15, Mo 5.25, Ti 3.5, Al 4.4, B 0.030, Zr 0.06, Ni bal.	None	Allvac Astroloy (4), Carpenter Astroloy (14), Astroloy (63) (80 powder), Vertx Astroloy (70)
B-1900 ^P	C 0.10, Mn 0.2 mx, Si 0.25 mx, Cr 8, Co 10, Mo 6, W 0.1 mx, Cb 0.1 mx, Ti 1.0, Al 6, B 0.015, Zr 0.08, Ta 4.3, S 0.015 mx, Fe 0.35 mx, Ni bal.	None	Austenal B-1900 (8), B1900 (13), Udimet B-1900 (51), B-1900 (55)
B-1910 ^P	C 0.10, Cr 10, Co 10, Mo 3, Ti 1.0, Al 6.0, Ta 7.0, B 0.015, Zr 0.10, Ni bal.	None	B-1910 (80 powder)
Chromel-AA	C 0.05, Si 2, Cr 19, Fe 8, Co 1, Ni bal.	None	Chromel-AA (31)
Chromel-R	C 0.05, Cr 20, Al 3, Fe 3, Ni bal.	None	Chromel-R (31)
D-979, AISI 664	C 0.05, Mn 0.75 mx, Si 0.75 mx, Cr 15, Mo 4, W 4, Ti 3, Al 1.0, B 0.01, Fe 27, Ni bal.	AMS 5509, 5746	Altemp D-979 (2), Lescalloy D-979 Vac Arc (36), Udimet D-979 (51), D-979 (63)
GMR 235, AISI 686	C 0.15, Mn 0.25 mx, Si 0.6 mx, Cr 15.5, Mo 5.25, Ti 2.0, Al 3.0, B 0.06, Fe 10, Ni bal.	ASTM A-567 Castings	GMR 235 (13), (56), Udimet GMR-235 (51)
GMR 235 D	C 0.15, Mn 0.10 mx, Si 0.30 mx, Cr 15.5, Mo 5.0, Ti 2.5, Al 3.5, B 0.05, Fe 4.5, Ni bal.	None	GMR 235 D (13)
Harper 600 Mod.	C 0.08 mx, Mn 1.0 mx, S 0.015 mx, Si 0.5 mx, Cr 14/17, Co 0.1 mx, Fe 6/10, Cu 0.5 mx, Ni bal.	None	Harper 600 Mod. (28)
Hastelloy Alloy B ^P , ACI N-12-M	C 0.12 mx, Mn 1.0 mx, Si 1.0 mx, Cr 1.0 mx, Co 2.5 mx, Mo 26/33, Fe 6.0 mx, V 0.6 mx, Ni bal.	ASTM B-333 Plate & Sheet; B-335 Rod; A-296, A-494 Castings AMS 5396	Carpenter Alloy B (14), ESCO 26 (23), Alloy 1 (30),  HAB (37), Ohioloy B (42), 51 (15), QHB (44), Illium "M" (52), Hastelloy Alloy B (56) ^P , Waukesha B (60), N-12-M

Hastelloy Alloy B ^P , ACI N- 12-M (Continued)			(3) (5) (13) (19) (58), WBD HB (62), 711 (69). This alloy also made by: (39) (43)
Hastelloy Alloy C ^P , ACI CW- 12-M	C 0.08 mx, Mn 1.0 mx, Si 1.0 mx, Cr 14.5/ 16.5, Co 2.5 mx, Mo 15/17, W 3.0/4.5, Fe 4/7, Ni bal.	ASTM A-296, A-494, A-567 Castings; B-334 Plate & Sheet B-336 Rod; B-295, B-304 Welding Rod Electrodes AMS 5388, 5389, 5530, 5750	CW-12 M (3) (5) (19) (43) (58), Car- penter Alloy C (14), Eastern Alloy No. 530 (21), ESCO 27 (23), Alloy 2 (30),  HAC (37), Ohioloy C (42), QHC (44), Illium "W" (52), Hastelloy Alloy C (56) ^P , Uniloy HC (59), Waukesha C (60), 50 (15), 712 (69). This alloy also made by: (13) (27) (39)
Hastelloy Alloy C-276 ^P	C 0.02 mx, Mn 1.0 mx, Si 0.05 mx, Cr 14.5/ 16.5, Co 2.5, Mo 15/17, W 3.0/4.5, Fe 4/ 7, Zr 0.35 mx, Ni bal.	None	23 C (28), Hastelloy Alloy C-276 (56) ^P , This alloy also made by: (27) (62)
Hastelloy Alloy D ^P	C 0.12, Mn 1.0, Si 9.0, Cr 1.0 mx, Co 2.5 mx, Cu 3.0, Fe 1.0, Ni bal.	None	ESCO 28 (23), Alloy 3 (30), 52 (15), 713 (69), Illium "S" (52). This alloy also made by: (13) (43)
Hastelloy Alloy F ^P	C 0.05 mx, Mn 1.0/2.0, Si 1.0, Mn 1.0- 2.0, Cr 22, Mo 6.5, W 1.0 mx, Co 2.5 mx, Cb + Ta 2.0, Fe 21, Ni bal.	ASTM B-436 Sheet	ESCO 25 (23), This alloy made by: (13) (43)
Hastelloy Alloy G ^P	C 0.05 mx, Mn 1.0/2.0, Si 1.0 mx, Cr 21/23.5, Co 2.5 mx, Mo 5.5/7.5, W 1.0 mx, Cu 1.5/2.5, Cb 1.75/2.50, Fe 18/21, Ni bal.	None	Hastelloy Alloy G (56) ^P
Hastelloy Alloy N ^P	C 0.04, Mn 0.8 mx, Si 0.5 mx, Cr 7, Co 0.2 mx, Mo 16.5, B 0.010 mx, Fe 5 mx, Ni bal.	ASTM B-434 Plate & Sheet	Nickelvac N (4), Carpenter Alloy N (14), Hastelloy Alloy N (56) ^P , This alloy also made by: (13) (39)
Hastelloy Alloy R-235	C 0.15, Cr 15.5, Co 2.5 mx, Mo 5.5, Ti 2.5, Al 2.0, Fe 10, Ni bal.	None	Allvac R-235 (4), This alloy also made by: (39)
Hastelloy Alloy W ^P	C 0.12 mx, Mn 1.0 mx, Si 1.0 mx, Cr 5, Co 2.5 mx, Mo 24.5, Fe 5.5, V 0.6, Ni bal.	AMS 5755, 5786, 5787	Nickelvac H-W (4), Carpenter Alloy W (14), Udimet HW (51), Hastelloy Alloy W (56) ^P , WBD HW (62), This alloy also made by: (27)
Hastelloy Alloy X ^P , AISI 680	C 0.10, Mn 0.5, Si 0.5, Cr 22, Co 1.5, Mo 9, W 0.6, Fe 18.5, Ni bal.	ASTM B-435 Sheet & Plate; A-567 Castings AMS 5390, 5536, 5587, 5588, 5754, 5798, 5799, 7237	Altemp HX (2), Nickelvac HX (4), Austenal HX (8), Pyromet 680 (14), Udimet HX (51), SPIN 309X (67), CAPI-309-X (68), 717 (69), Eastern Alloy No. 536 (21), ESCO 29 (23), Hastelloy Alloy X (56) ^P , Unitemp HX (59), WBD HX (62), This alloy also made by: (13) (27) (39)
Illium "B"	C 0.05, Si 4.0, Cr 28, Mo 8.5, Fe 2.0, Cu 5.5, Ni bal.	None	Illium "B" (52)
Illium "G"	C 0.20, Cr 22.5, Mo 6.4, Fe 6.5, Cu 6.5, Ni bal.	None	Illium "G" (52)
Illium "98"	C 0.05, Cr 28, Mo 8.5, Fe 1.0, Cu 5.5, Ni bal.	None	Illium "98" (52)
IN-100	C 0.15, Cr 10, Co 15, Mo 3, Ti 4.7, Al 5.5, B 0.015, Zr 0.06, V 1.0, Ni bal.	AMS 5397	Allvac IN-100 (4), Austenal 100 (8), IN-100 (13) (55), Udimet 100 (51), Haynes Alloy IN-100 (56), Vertx IN-100 (70)
IN-102	C 0.06, Mn 0.75 mx, Si 0.4 mx, Cr 15, Mo 2.9, W 3.0, Cb 2.9, Ti 0.5, Al 0.5, B 0.005, Zr 0.03, Fe 7, Mg 0.02, Ni bal.		Pyromet 102 (14), IN-102 (39), Udimet 102 (51)

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IN-162	C 0.12, Mn 0.10 mx, Si 0.20 mx, Cr 10, Mo 4, W 2.0, Cb 1.0, Ti 1.0, Al 6.5, B 0.020, Zr 0.10, Fe 0.5 mx, V 1.0, Mg 0.02, Ta 2.0, Ni bal.	None	IN 162 (13)
IN-738	C 0.17, Cr 16, Co 8.5, Mo 1.75, W 2.6, Cb 0.9, Ti 3.4, Al 3.4, B 0.01, Zr 0.10, Ta 1.75, Ni bal.	None	Allvac I-738 (4), Austenal 738X (8), Udimet 738 (51)
IN-792	C 0.21, Cr 12.7, Co 9.0, Mo 2.0, W 3.9, Ti 4.2, Al 3.2, B 0.02, Zr 0.10, Ta 3.9, Ni bal.	None	Allvac 792 (4)
Inconel Alloy 600 ^P , ACI CY-40	C 0.08, Mn 0.5, S 0.008, Si 0.25, Cr 15.5, Fe 8.0, Cu 0.25, Ni 76.	ASTM B-168, Plate, Sheet & Strip; B-166, Rod & Bar; B-163, B-167 Pipe & Tube AMS 5540, 5580, 5665, 5683, 5687 MIL-N-6710, 6840, 23228, 23229 QQ-W-390 MIL-T-7840	Altemp AL 600 (2), Nickelvax 600 (4), Ampcoloy 531 (6), Armco 600 (7), Croloy 14-72 (9), Pyromet 600 (14), Esco 600 E (23), Harper 600 (28), Hoskins Alloy 843 (31), Inconel Alloy 600 (32) ^P , Lescalloy 600 (36), Carlson 600 (66), QINC (44), Sanicro 71 (47), Simalloy 600 (50), Uniloy 600 (59), Haynes Alloy No. 600 (56), HN-1 (71 powder), Ancor 600 (72), This alloy also made by: (13) (27) (39) (53) (61) (62)
Inconel Alloy 601 ^P	C 0.05, Mn 0.5, S 0.007, Si 0.25, Cr 23, Al 1.35, Cu 0.50, Fe 14.1, Ni 60.5	AMS 5715, 5870	Inconel Alloy 601 (32) ^P , Pyromet 601 (14), This alloy also made by: (27) (39)
Inconel Alloy 604 ^P	C 0.02, Mn 0.10, S 0.005, Si 0.10, Cr 16.0, Cb 2.25, Fe 7.5, Cu 0.03, Ni 74.	None	Pyromet 604 (14), Inconel alloy 604 (32) ^P
Inconel Alloy 625 ^P	C 0.05, Mn 0.25, S 0.008, Si 0.25, Cr 21.5, Mo 9.0, Cb 3.6, Ti 0.2, Al 0.2, Fe 2.5, Ni 61.	ASTM B-443 Plate, Sheet & Strip; B-446 Rod & Bar; B-444 Pipe & Tube AMS 5599, 5666, 5837	Altemp AL 625 (2), Nickelvax 625 (4), Braevac 625 (12), Pyromet 625 (14), CAPI-320 (68), Eastern Alloy No. 625 (21), Esco 625 E (23), Inconel Alloy 625 (32) ^P , Lescalloy 625 (36), Udimet 625 (51), Simalloy 625 (50), Unitemp 625 (59), Haynes Alloy No. 625 (56), This alloy also made by: (27) (39) (53) (62)
Inconel Alloy 700 ^P	C 0.12, Mn 0.10, Si 0.30, Cr 15, Co 28.5, Mo 3.75, Ti 2.2, Al 3.0, Fe 0.7, Cu 0.5 mx, Ni bal.	None	Allvac I-700 (4), Udimet IN-700 (51), This alloy also made by: (13)
Inconel Alloy 702 ^P	C 0.05, Mn 0.50, S 0.005, Si 0.35, Cr 15.5, Ti 0.63, Al 3.25, Fe 1.0, Cu 0.25, Ni 79.5.	AMS 5550	Eastern Alloy No. 702 (21), Inconel Alloy 702 (32) ^P
Inconel Alloy 705 ^P	C 0.10/0.40, Mn 1.5 mx, Si 5.0/6.0, Cr 14/17, Cu 1.25 mx, Fe 11 mx, Ni bal.	None	This alloy made by: (13)
Inconel Alloy 706 ^P	C 0.03, Mn 0.18, S 0.008, Si 0.18, Cr 16.0, Cb + Ta 2.9, Ti 1.75, Al 0.20, Cu 0.15, Fe 40.0, Ni 41.5.	AMS 5605, 5606, 5701, 5702, 5703	Allvac I-706 (4), Inconel Alloy 706 (32) ^P , Simalloy 706 (50), This alloy also made by: (53)
Inconel Alloy 718 ^P	C 0.04, Mn 0.18, S 0.008, Si 0.18, Cr 19, Mo 3.05, Cb 5.13, Ti 0.9, Al 0.5, Fe 18.5, Cu 0.15, Ni 52.5	ASTM A-637 Bars, Forgings & Forging Stock AMS 5383, 5589, 5590, 5596, 5597, 5662, 5663, 5664, 5832	Altemp AL 718 (2), Allvac 718 (4), Armco 718 (7), Austenal 718 (8), CAPI-326 (68), Braevac 718 (12), AMS 5383 718 C (13), Pyromet 718 (14), Crucible 718 (16), Eastern

Inconel Alloy 718 ^P (Continued)			Alloy No. 718 (21), Esco 718 C-E (23), Inconel Alloy 718 (32) ^P , Lescalloy 718 Vac Arc (36), Udimct 718 (51), Simalloy 718 (50), Haynes Alloy No. 718 (56), Unitemp 718 (59), INCO 718 (63), Vertx 718 (70), This alloy also made by: (27) (39) (53) (61) (62)
Inconel Alloy 721 ^P	C 0.04, Mn 2.25, S 0.005, Si 0.08, Cr 16, Ti 3.05, Fe 6.5, Cu 0.10, Ni 71.	None	Nickelvac 721 (4), Pyromet 88 (14), Inconel Alloy 721 (32) ^P
Inconel Alloy 722 ^P	C 0.04, Mn 0.50, S 0.005, Si 0.35, Cr 15.5, Ti 2.38, Al 0.70, Cu 0.25, Fe 7.0, Ni 75.	AMS 5541	Nickelvac W-722 (4), Austenal W (8), Inconel Alloy 722 (32) ^P , This alloy also made by: (13) (53)
Inconel Alloy X-750 ^P , AISI 688	C 0.04, Mn 0.50, S 0.005, Si 0.25, Cr 15.5, Cb 0.95, Ti 2.5, Al 0.7, Fe 7.0, Cu 0.25, Ni 73.	ASTM A-637 Bar, Forgings & Forging Stock AMS 5542, 5582, 5598, 5667 ⁺ , 5668, 5671, 5698, 5699, 5779, ⁺ Non-current MIL-N-7786, 8550, 24114 MIL-S-21977, 23192 ASME Case 1344-1	Altemp AL X-750 (2), Nickelvac X-750 (4), Austenal X-750 (8), Braevac X-750 (12), Pyromet X-750 (14), Crucible X-750 (16), D-H X-750 (18), Eastern Alloy No. 750 (21), Inconel Alloy X-750 (32) ^P , Lescalloy X-750 Vac Arc (36), Sanicro 75 (47), Simalloy X750 (50), Udimet X-750 (51), Unitemp 750 (59), Haynes Alloy No. 750 (56), This alloy also made by: (13) (27) (39) (53) (62) (63)
Inconel Alloy 751 ^P	C 0.05, Mn 0.5, S 0.005, Si 0.25, Cr 15.5, Cb 0.95, Ti 2.3, Cu 0.25, Al 1.2, Fe 7.0, Ni 72.5.	None	Nickelvac X-751 (4), Pyromet X-751 (14), Inconel Alloy 751 (32) ^P
MAR-M Alloy 200 ^P	C 0.15, Cr 9, Co 10, W 12.5, Cb 1.0, Al 5, Ti 2, B 0.015, Fe 1.5 mx, Zr 0.05, Ni bal.	None	MAR-M Alloy 200 (38) ^P , Haynes alloy No. 200 (56), Vertx MAR-M-200 (70 powder), SM-200 (80 powder), This alloy also made by: (55)
MAR-M Alloy 211 ^P	C 0.15, Cr 9, Co 10, Mo 2.5, W 5.5, Cb 2.7, Ti 2, Al 5, B 0.015, Zr 0.05, Ni bal.	None	MAR-M Alloy 211 (38) ^P
MAR-M Alloy 246 ^P	C 0.15, Cr 9, Co 10, W 10, Mo 2.5, Ta 1.5, Al 5.5, Ti 1.5, Fe 1.0 mx, B 0.015, Zr 0.05, Ni bal.	None	MAR-M Alloy 246 (38) ^P , Vertx MAR-M-246 (70)
MAR-M Alloy 247 ^P	C 0.16, Cr 8.25, Co 10, Mo 0.6, W 10, Ta 3, Ti 1.0, Al 5.5, B 0.020, Zr 0.09, Hf 1.30, Ni bal.	None	MAR-M Alloy 247 (38) ^P
MAR-M Alloy 421 ^P	C 0.15, Cr 15.8, Co 9.5, W 3.8, Mo 2, Cb 2, Al 4.3, Ti 1.8, Fe 1.0 mx, B 0.015, Zr 0.05, Ni bal.	None	MAR-M Alloy 421 (38) ^P
MAR-M Alloy 432 ^P	C 0.15, Cr 15.5, Co 20, W 3, Cb 2, Ta 2, Ti 4.3, Al 2.8, B 0.015, Zr 0.05, Fe 0.5 mx, Ni bal.	None	MAR-M Alloy 432 (38) ^P
MM 002 ^P	C 0.15, Cr 9, Co 10, W 10, Ta 2.5, Ti 1.5, Al 5.5, B 0.015, Zr 0.05, Hf 1.5, Fe 1.0, Ni bal.	None	MM002 (38) ^P
MM 004, Modified Alloy 713LC	C 0.05, Cr 12, Mo 4.5, Cb 2, Ti 0.6, Al 5.9, B 0.010, Zr 0.10, Hf 1.3, Ni bal.	None	MM 004 (38)
MM 007 ^P , Modified B1900	C 0.10, Cr 8, Co 10, Mo 6, W 0.10 mx, Cb 0.10, mx, Ta 4.25, Ti 1.0, Al 6, B 0.015, Zr 0.075, Hf 1.3, Ni bal.	None	MM 007 (38)

MM 008 ^P	C 0.07, Cr 14.63, Co 15.25, Mo 4.4, Ti 3.35, Al 4.3, B 0.015, Zr 0.03, Hf 1.3, Ni bal.	39 None	MM 008 (38) ^P
MP 35 N, Multiphase ^P	Ni 35, Co 35, Cr 20, Mo 10	AMS 5758	MP 35 N Multiphase (36) ^P
Nichrome V-245	C 0.04, Si 1.0, Cr 20, Ni 75, Al 4.	None	245 Alloy (18)
Nicrfe (similar to Inconel Alloy 604)	C 0.06/0.10, Mn 0.50/0.75, P 0.015 mx, Si 0.50/0.75, Cr 14/19, Cb 2.0 mx, Cu 0.5 mx, Fe 6/10, Ni bal.	None	Nicrfe (49)
Nicrmo	C 0.7 mx, Si 0.75/1.5, Cr 16.5/19.5, Ni 59.5/61.5, Mo 17.5/19.5, Fe 2.5/5.0	None	Nicromo (49)
Nicrotung ^P	C 0.10, Cr 12, Co 10, W 8, Ti 4, Al 4, B 0.05, Zr 0.05, Ni bal.	None	This alloy made by: (13)
Nimonic 75 ^P	C 0.12, Mn 0.5, Si 0.5, Cr 19.5, Ti 0.4, Al 0.15, Cu 0.25, Fe 2.5, Ni bal.	None	Eastern Alloy No. 75 (21), Nimonic Alloy 75 (32), Udimet 75 (51)
Nimonic 80A ^P	C 0.05, Mn 0.5, S 0.008, Si 0.5, Cr 19.5, Co 1.0, Cu 0.1, Ti 2.25, Al 1.4, Fe 1.5, Ni bal.	ASTM A-637 Bars, Forgings & Forging Stock	Pyromet 80 A (14), Nimonic Alloy 80A (32), Udimet 80A (51), Unitemp 80 A (59)
Nimonic 90 ^P	C 0.06, Mn 0.5, Si 0.75, Cr 19.5, Co 18.0, Ti 2.4, Al 1.4, Fe 1.5, Ni bal.	None	Pyromet 90 (14), Nimonic Alloy 90 (32), Udimet 90 (51)
Nimonic 105 ^P	C 0.08, Cr 15, Co 20, Mo 5, Ti 1.2, Al 4.7, B 0.005, Ni bal.	None	Udimet 105 (51)
Nimonic 115 ^P	C 0.20, Mn 1.0, Si 1.0, Cr 15, Co 15, Mo 4, Ti 4, Al 5, Fe 1.0, Ni bal.	None	Udimet 115 (51)
Ohioloy 2300	C 0.50, Mn 1.5, Si 1.5, Cr 25, Ni 45, Fe bal.	None	Ohioloy 2300 (42)
Pyromet 860 ^P	C 0.05, Mn 0.25, Si 0.10, Cr 13, Ni 44, Co 4, Mo 6, Ti 3, Al 1.0, B 0.01, Fe bal.	None	Pyromet 860 (14) ^P
RA 333 ^P	C 0.05, Mn 1.5, Si 1.25, Cr 25, Ni 45, Mo 3, W 3, Co 3, Fe 18.	AMS 5593, 5717	RA 333 (45) (50) ^P
Refractaloy 26 ^P , AISI 690	C 0.03, Mn 0.8, Si 1.0, Cr 18, Ni 38, Co 20, Mo 3.2, Ti 2.6, Al 0.2, B 0.015, Fe bal.	None	Refractaloy 26 Vac Arc (36), Refractaloy 26 (61) ^P
Rene' 77	C 0.05/0.09, Mn 0.15 mx, Si 0.20 mx, Cr 14/15.25, Mo 3.9/4.5, Co 14.25/15.75, Ti 3.0/3.7, Al 4.0/4.6, B 0.012/0.02, Zr 0.04 mx, Ni bal.	None	Allvac René 77 (4), CAPI-390 (68), Vertx 77 (70), This alloy also made by: (13)
Rene' 80 ^P	C 0.18, Cr 14.0, Co 9.5, Mo 4.0, W 4.0, Ti 5.0, Al 3.0, B 0.015, Zr 0.04, Ni bal.	None	Allvac René' 80 (4), Udimet R-80 (51)
Rene' 95 ^P	C 0.16, Cr 14.0, Co 8.0, Mo 3.5, W 3.5, Cb 3.5, Ti 2.5, Al 3.5, B 0.010, Zr 0.05, Ni bal.	None	Allvac René' 95 (4), Pyromet 95 (14), Lescalloy 95 (36), Udimet R-95 (51)
SEL	C 0.08, Mn 0.3 mx, Si 0.5 mx, Cr 15, Co 26, Mo 4.5, Ti 2.4, Al 4.4, B 0.015, Fe 1.0 mx, Ni bal.	None	Austenal SEL 1 (8), Udimet SEL-1 (51), This alloy also made by: (13) (56)
SEL 15	C 0.07, Mn 0.3 mx, Si 0.5 mx, Cr 11, Co 14.5, Mo 6.5, W 1.5, Cb 0.5, Ti 2.5, Al 5.4, B 0.015, Fe 0.5 mx, Ni bal.	None	Austenal SEL 15 (8), Udimet SEL-15 (51), This alloy also made by: (13) (56)
TD Nickel	C 0.02 mx, S 0.02 mx, ThO ₂ 2.0, Ni bal.	AMD-56 DH, 55 DG	TD Nickel (24)

TD Nickel - Chromium	C 0.05 mx, S 0.02 mx, ThO ₂ 2.0, Cr 20, Ni bal.	None	TD Nickel - Chromium (24)
TRW 1800 ^P	C 0.13, Cr 13.0, W 9, Ti 0.6, Al 6.0, Cb 1.5, B 0.07, Zr 0.07, Ni bal.	None	TRW 1800 (55) ^P
TRW 1900 ^P	C 0.11, Cr 10.3, Co 10, W 9, Ti 1.0, Al 6.3, Cb 1.5, B 0.03, Zr 0.10, Ni bal.	None	TRW 1900 (55) ^P
TRW Mod 1900, TRW 2278	C 0.13, Cr 10.3, Co 10, W 9, Ti 1.0, Al 6.3, Cb 1.5, B 0.03, Zr 0.10, Hf 0.5, Ta 0.5, V 0.5, Ni bal.	None	TRW Mod 1900 (55)
Udimet 115	C 0.15, Cr 15, Co 15, Mo 3.5, Ti 4, Al 5, B 0.018, Zr 0.05, Ni bal.	None	Udimet 115 (51)
Udimet 400 ^P	C 0.06, Cr 17.5, Co 14, Mo 4, Ti 2.5, Al 1.5, Cb 0.5, B 0.008, Zr 0.07, Ni bal.	None	Udimet 400 (51) ^P
Udimet 500 ^P , AISI 684	C 0.08, Mn 0.75 mx, Si 0.75 mx, Cr 19, Co 19, Mo 4, Ti 3, Al 3, B 0.005, Fe 4 mx, Ni bal.	ASTM A-637 Bar, Forgings & Forging Stock; A-567 Castings AMS 5384, 5751, 5753	Allvac 500 ZB (4), Austenal 500 (8), 62 G (28), Udimet 500 (51) ^P , Hastelloy Alloy 500 (56), This alloy also made by: (13)
Udimet 520 ^P	C 0.08, Cr 19, Co 12, Mo 6, W 1, Ti 3, Al 2, B 0.005, Ni bal.	None	Udimet 520 (51) ^P
Udimet 630 ^P	C 0.04, Cr 17, Mo 3, W 3, Cb 6.5, Ti 1, Al 0.7, B 0.004, Fe 18, Ni bal.	None	Udimet 630 (51) ^P
Udimet 700 ^P , AISI 687	C 0.07, Mn 0.15, Si 0.20, Cr 15, Co 18.5, Mo 5, Ti 3.4, Al 4.3, B 0.030, Ni bal.	None	Allvac 700 (4), Austenal 700 (8), Esco 700 E (23), Udimet 700 (51) ^P , Hi Vac 700 (55), Vertx 700 (70), This alloy also made by: (13)
Udimet 710 ^P	C 0.07, Cr 18, Co 14.8, Mo 3, W 1.5, Ti 5, Al 2.5, B 0.010, Ni bal.	None	Udimet 710 (51) ^P , Allvac U-710 (4)
Unitemp AF 2-1 DAP ^P	C 0.35, Cr 12.0, W 6.0, Mo 3.0, Co 10, Ti 3.0, Al 4.6, B 0.015, Zr 0.10, Ta 1.5, Ni bal.	None	Unitemp AF 2-1 DA (59) ^P , Vertx AF-2ID (70)
Waspaloy, AISI 685	C 0.07, Mn 0.5 mx, Si 0.5 mx, Cr 19.5, Co 13.5, Mo 4.3, Ti 3, Al 1.4, B 0.006, Zr 0.09, Fe 2 mx, Ni bal.	ASTM A-637 Bar, Forgings & Forging Stock AMS 5544, 5586, 5704, 5706, 5707, 5708, 5709, 5828, 7471	Altemp Waspaloy (2), Allvac Waspaloy (4), Austenal Waspaloy (8), Braevac Waspaloy (12), Carpenter Waspaloy (14), Crucible Waspaloy (16), Eastern Alloy No. 1030 (21), 62 F (28), Lescalloy Waspaloy Vac Arc (36), Waspaloy (13) (39) (53) (56) (62) (63), Udimet Waspaloy (51), Hi Vac Waspaloy (55), Unitemp Waspaloy (59), Vertx Waspaloy (70)
Waspaloy Modified	C 0.05/0.10, Mn 0.10 mx, Si 0.15 mx, Cr 18/20, Co 12/15, Mo 3.5/5.0, Ti 2.75/3.25, Al 1.2/1.6, Fe 2.0 mx, B 0.003/0.010, Zr 0.02/0.08, Ni bal.	None	"Waspaloy" (Modified) (56)
80Ni, 20Cr Alloy	C 0.15 mx, Mn 2.5 mx, Si 0.75/1.5, S 0.01 mx, Cr 19/21, Fe 1.0 mx, Ni bal.	ASTM B-344 Drawn or Rolled Heating Elements AMS 5676, 5677, 5682	Nichrome V (18), Pyromet 80B (14), Chromic A (27), Chromel-A (31), Tophet A Alloy (62), HN-4 Powder (71), Ancor 80Ni:20Cr Powder (72), This alloy also made by: (13)
78Ni, 20 Cr, 1Cb Alloy	C 0.03, Si 1.2, Cr 20, Cb 1.0, Ni bal.	None	Nichrome V-242 (18), Tophet A-Cb Alloy (62)

60Ni, 16Cr Alloy	O 0.15 mx, Mn 1.0 mx, Si 0.75/1.5, S 0.01 mx, Cr 14/18, Ni 57 mn, Fe bal.	ASTM B-344 Drawn or Rolled Heating Elements	Nichrome (18), Chromic C (27), Chromel-C (31), Tophet C (62)
35Ni, 20Cr Alloy	C 0.15 mx, Mn 1.0 mx, Si 1.0/3.0, S 0.01 mx, Cr 18/21, Ni 34/37, Fe bal.	ASTM B-344 Drawn or Rolled Heating Elements	Chromax (18), Chromel-D (31), Chromel-D Special (31), Tophet D Alloy (62)
35Ni, 20 Cr, 1Cb Alloy	C 0.02, Si 1.5, Cr 20, Ni 35, Cb 1.0, Fe bal.	None	Tophet D-Cb Alloy (62)
35Ni, 30Cr Alloy	C 0.05, Si 1.5, Cr 30, Ni 35.5, Fe bal.	None	Hoskins 35/30 Alloy (31), Tophet H Alloy (62)
70Ni, 30Cr Alloy	C 0.05, Si 1.4, Cr 30, Ni bal.	None	Tophet 30 Alloy (62)

GROUP 7**COBALT-BASE SUPERALLOYS AND RELATED ALLOYS**

Crucible WF-11, L-605, AISI 670
Elgiloy
Havar
Haynes Alloy No. 150
Haynes Alloy No. 151
Haynes Alloy No. 188
Haynes Stellite Alloy No. 21
Haynes Stellite Alloy No. 23
Haynes Stellite Alloy No. 27
Haynes Stellite Alloy No. 30
Haynes Stellite Alloy No. 36
Ilium "X"
MAR-M Alloy 302
MAR-M Alloy 322
MAR-M Alloy 509
MAR-M Alloy 918
MP 35 N, Multiphase – See Group 6
Nivco
S-816, AISI 671
UMCO 50
UMCO 51
WI-52
X-40, HS-31

Alloy Designation	Composition, Percent Nominal or Range	Applicable Specifications	Producer Designation
Crucible WF-11 ^P , L-605, AISI 670	C 0.10, Mn 1.5, Si 0.5, Cr 20, Ni 10, W 15, Co bal.	ASTM F-90 Surgical Implants AMS 5537, 5759, 5796, 5797, 7236	Altemp L-605 (2), Nickelvac L-605 (4), Austenal L-605 (8), Pyromet 605 (14), Braeburn L-605 (12), Crucible WF-11 (16) ^P , Eastern Alloy No. 605 (21), L-605 (13) (27) (39) (62), 62 C (28), Lescalloy L-605 Vac Arc (36), Udimet L-605 (51), Unitemp L-605 (59), Haynes Alloy No. 25 (56), Simalloy L-605 (50)
Elgiloy ^P	C 0.05, Mn 2.0, Cr 20, Ni 15, Mo 7, Be 0.04, Fe bal., Co 40	MIL-C-45662	Elgiloy (22) ^P
Havar ^P	C 0.20, Mn 1.6, Cr 20, Ni 13, Co 42.5, Mo 2.0, W 2.8, Be 0.04, Fe bal.	None	Havar (26) ^P
Haynes Alloy No. 150	C 0.05/0.15, Mn 0.3/1.0, Si 1.0 mx, Cr 25/30, Ni 3 mx, Mo 1.5, Fe 18/22, Co bal.	None	Haynes Alloy No. 150 (56)
Haynes Alloy No. 151	C 0.50, Mn 1.0 mx, Si 1.0 mx, Cr 20, Ni 1.0 mx, W 12.7, B 0.05, Fe 2.0 mx, Co bal.	None	Haynes Alloy No. 151 (56)
Haynes Alloy No. 188 ^P	C 0.05/0.15, Mn 1.25 mx, Si 0.20/0.50, Cr 20/24, Ni 20/24, W 13/16, Fe 3.0 mx, La 0.03/0.15, Co bal.	AMS 5608, 5772, 5801	Haynes Alloy No. 188 (56) ^P
Haynes Stellite Alloy No. 21	C 0.25, Mn 0.6, Si 0.6, Cr 27, Ni 3, Mo 5, Fe 1.0, B 0.007 mx, Co bal.	ASTM A-567 Castings; F-75 Surgical Implants AMS 5385	Haynes Stellite Alloy No. 21 (56), This alloy also made by: (13)
Haynes Stellite Alloy No. 23	C 0.40, Mn 0.3, Si 0.6, Cr 24, Ni 2, W 5, Fe 1.0, Co bal.	AMS 5375	This alloy made by: (13)
Haynes Stellite Alloy No. 27	C 0.40, Mn 0.3, Si 0.6, Cr 25, Ni 32, Mo 5.5, Fe 1.0, Co bal.	AMS 5378	This alloy made by: (13)
Haynes Stellite Alloy No. 30	C 0.45, Mn 0.6, Si 0.6, Cr 26, Ni 15, Mo 6, Fe 1.0, Co bal.	AMS 5380	This alloy made by: (13)
Haynes Stellite Alloy No. 36	C 0.40, Mn 1.2, Si 0.5, Cr 19, Ni 10, W 15, B 0.03, Fe 1.0, Co bal.	None	This alloy also made by: (13)
Illium "X"	C 0.75, Cr 30, W 14, Co bal.	None	Illium "X" (52)
MAR-M Alloy 302 ^P	C 0.85, Cr 21.5, W 10, Ta 9, B 0.01 mx, Zr 0.2, Fe 1.0 mx, Co bal.	None	MAR-M Alloy 302 (38) ^P (80 Powder)
MAR-M Alloy 322 ^P	C 1.0, Cr 21.5, W 9, Ta 4.5, Ti 0.75, Zr 2.25, Fe 0.75, Co bal.	None	MAR-M Alloy 322 (38) ^P
MAR-M Alloy 509 ^P	C 0.60, Cr 23.5, W 7, Ta 3.5, Ti 0.2, Zr 0.5, Ni 10, B 0.01 mx, Fe 1.5 mx, Co bal.	None	MAR-M Alloy 509 (38) ^P , Udimet M-509 (51)
MAR-M Alloy 918 ^P	C 0.05, Cr 20, Ni 20, Ta 7.5, Zr 0.10, Fe 0.5 mx, Cu 0.20 mx, Co bal.	None	MAR-M 918 (38) ^P
Nivco	C 0.02, Mn 0.30, Si 0.20, Ni 23, Ti 1.8, Al 0.20, Zr 1.0, Fe 0.20, Co bal.	None	Nivco (61)

S-816, AISI 671	C 0.38, Mn 1.2, Si 0.4, Cr 20, Ni 20, Mo 4, W 4, Cb 4, Fe 4, Co bal.	ASTM A-639 Bar, Forgings & Forging Stock AMS 5534, 5765	Altemp S-816 (2), Pyromet 816 (14), S-816 (39), Udimet S-816 (51), Unitemp S-816 (59)
UMCO 50 ^P	C 0.12 mx, Mn 0.6, Si 0.7, Cr 28, Fe 21, Co bal.	None	Duraloy 50 (19), ESCO 72 (23), 839 (69), Haynes Alloy No. 150 (56), This alloy also made by: (58)
UMCO 51 ^P	C 0.27, Mn 0.6, Si 0.7, Cr 28, Cb 2.1, Fe 19, Co bal.	None	Duraloy 51 (19), This alloy also made by: (58)
WI-52 ^P	C 0.45, Mn 0.5 mx, Si 0.5 mx, Cr 21, Ni 1.0 mx, W 11, Cb 2.0, Fe 2.0, Co bal.	None	Nickelvac WI-52 (4), WI-52 (13), Haynes Alloy No. 152 (56), CAP1-205-W1 (68)
X-40, HS-31	C 0.5, Mn 0.5, Si 0.5, Cr 22, Ni 10, W 7.5, Fe 1.5, Co bal.	ASTM A-567 Castings AMS 5382	Nickelvac X-40 (4), Austenal 31 (8), X-40 (13), Duraloy X-40 (19), Udimet X-40 (51), Haynes Stellite Alloy No. 31 (56)

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The Specification Index is intended primarily for the proprietary alloys, therefore, only Groups 3-7 are included.

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A-565 Bar, Forgings, & Forging Stock	Stainless W, AISI 635, AM 355, AISI 634, Custom 455, Armco 17-4 PH, AISI 630, ACI CB-7 Cu, Armco 17-7 PH, AISI 631, Custom 450, Armco PH 15-7 Mo, AISI 632	27 & 28
A-567 Castings	Crucible 422, AISI 616, Greek Ascoloy, AISI 615, Lapelloy, AISI 619	30
A-579 Forgings	N-155, Multimet, AISI 661, Alloy 713 C, GMR 235, AISI 686, Hastelloy Alloy C, ACI CW-12-M, Hastelloy Alloy X, AISI 680, Udimet 500, AISI 684, Haynes Stellite Alloy No. 21, X-40, HS-31	31, 35, 36, 40, 43 & 44
A-580 Wire	Crucible 422, AISI 616	30
A-637 Bars, Forgings & Forging Stock	Armco 21-6-9	25
A-638 Bars, Forgings, & Forging Stock	Allvac M-252, J-1500, AISI 689, Inconel Alloy 718, Inconel Alloy X-750, AISI 688, Nimonic 80A, Udimet 500, AISI 684, Waspaloy, AISI 685	35, 38, 39, 40
A-639 Bars, Forgings & Forging Stock	A-286, AISI 660, Discaloy, AISI 662	30
Spec. to be issued	N-155, Multimet, AISI 661, S-816, AISI 671	32 & 44
B-163 Tubes	Armco 20-45-5	30
B-166 Rod & Bars	Incoloy Alloy 800, Inconel Alloy 600, ACI CY-40	31 & 37
B-167 Pipe & Tubes	Inconel Alloy 600, ACI CY-40	37
B-168 Plate, Sheet & Strip	Inconel Alloy 600, ACI CY-40	37

B-295 Welding Electrodes	Hastelloy Alloy C, ACI CW-12-M	36
B-304 Welding Rods & Electrodes	Hastelloy Alloy C, ACI CW-12-M	36
B-333 Plate & Sheet	Hastelloy Alloy B, ACI N-12-M	35
B-334 Plate & Sheet	Hastelloy Alloy C, ACI CW-12-M	36
B-335 Rod	Hastelloy Alloy B, ACI N-12-M	35
B-336 Rod	Hastelloy Alloy C, ACI CW-12-M	36
B-344 Drawn or Rolled Heating Elements	80Ni, 20Cr	40
B-407 Pipe & Tube	Incoloy Alloy 800	31
B-408 Rod & Bars	Incoloy Alloy 800	31
B-409 Plate, Sheet, & Strip	Incoloy Alloy 800	31
B-423 Pipe & Tube	Incoloy Alloy 825	31
B-424 Plate, Sheet & Strip	Incoloy Alloy 825	31
B-425 Rod & Bars	Incoloy Alloy 825	31
B-434 Sheet & Plate	Hastelloy Alloy N	36
B-435 Sheet & Plate	Hastelloy Alloy X, AISI 680	36
B-436 Sheet & Plate	Hastelloy Alloy F	36
B-443 Plate, Sheet & Strip	Inconel Alloy 625	37
B-444 Pipe & Tube	Inconel Alloy 625	37
B-446 Rod & Bars	Inconel Alloy 625	37
F-75 Surgical Implants	Haynes Stellite Alloy No. 21	43
F-90 Surgical Implants	Crucible WF-11, L-605, AISI 670	43

AMS SPECIFICATIONS

5342	Armco 17-4 PH, AISI 630, ACI CB-7 Cu	27
5343	Armco 17-4 PH, AISI 630, ACI CB-7 Cu	27
5344	Armco 17-4 PH, AISI 630, ACI CB-7 Cu	27
5354	Greek Ascoloy, AISI 615	31
5355	Armco 17-4 PH, AISI 630, ACI CB-7 Cu	27
5359	AM 355, AISI 634	27
5368	AM 355, AISI 634	27
5369	19-9 DL, AISI 651	32
5375	Haynes Stellite Alloy No. 23	43
5376	N-155, Multimet, AISI 661	32
5378	Haynes Stellite Alloy No. 27	43
5380	Haynes Stellite Alloy No. 30	43
5382	X-40, HS-31	44
5383	Inconel Alloy 718	37
5384	Udimet 500, AISI 684	40
5385	Haynes Stellite Alloy No. 21	43
5388	Hastelloy Alloy C, ACI CW-12-M	36

5389	Hastelloy Alloy C, ACI CW-12-M	36	5601	Armco PH 14-8 Mo	27
5390	Hastelloy Alloy X, AISI 680	36	5603	Armco PH 14-8 Mo	27
5391	Alloy 713 C	35	5604	Armco 17-4 PH, AISI 630, ACI CB-7 Cu	27
5396	Hastelloy Alloy B, ACI N-12-M	35	5605	Inconel Alloy 706	37
5397	IN-100	36	5606	Inconel Alloy 706	37
5398	Armco 17-4 PH, AISI 630, ACI CB-7 Cu	27	5608	Haynes Alloy No. 188	43
5399	Allvac René 41, AISI 683	35	5616	Greek Ascology, AISI 615	31
5508	Greek Ascology, AISI 615	31	5617	Custom 455	27
5509	D-979, AISI 664	35	5629	Armco PH 13-8 Mo	27
5520	Armco PH 15-7 Mo, AISI 632	27	5643	Armco 17-4 PH, AISI 630, ACI CB-7 Cu	27
5525	A-286, AISI 660	30	5644	Armco 17-7 PH, AISI 631	27
5526	19-9 DL, AISI 651	32	5655	Crucible 422, AISI 616	30
5527	19-9 DL, AISI 651	32	5656	Armco 21-6-9	25
5528	Armco 17-7 PH, AISI 631	27	5657	Armco PH 15-7 Mo, AISI 632	27
5529	Armco 17-7 PH, AISI 631	27	5658	Armco 15-5 PH	27
5530	Hastelloy Alloy C, ACI CW-12-M	36	5659	Armco 15-5 PH	27
5531	N-155, Multimet, AISI 661	32	5660	Incoloy Alloy 901, AISI 681, AISI 682	31
5532	N-155, Multimet, AISI 661	32	5661	Incoloy Alloy 901, AISI 681, AISI 682	31
5533	S-590	32	5662	Inconel Alloy 718	37
5534	S-816, AISI 671	44	5663	Inconel Alloy 718	37
5536	Hastelloy Alloy X, AISI 680	36	5564	Inconel Alloy 718	37
5537	Crucible WF-11, L-605, AISI 670	43	5665	Inconel Alloy 600, ACI CY-40	37
5538	19-9 DX, AISI 652	32	5666	Inconel Alloy 625	37
5539	19-9 DX, AISI 652	32	5667*	Inconel Alloy X-750, AISI 688	38
5540	Inconel Alloy 600, ACI CY-40	37	5668	Inconel Alloy X-750, AISI 688	37
5541	Inconel Alloy 722	38	5671	Inconel Alloy X-750, AISI 688	38
5542	Inconel Alloy X-750, AISI 688	38	5672	Custom 455	27
5543	W-545, AISI 665	32	5673	Armco 17-7 PH, AISI 631	27
5544	Waspaloy, AISI 685	39	5676	80Ni, 20Cr Alloy	40
5545	Allvac René 41, AISI 683	35	5677	80Ni, 20Cr Alloy	40
5546	AM 350, AISI 633	27	5682	80Ni, 20Cr Alloy	40
5547	AM 355, AISI 634	27	5683	Inconel Alloy 600, ACI CY-40	37
5548	AM 350, AISI 633	27	5687	Inconel Alloy 600, ACI CY-40	37
5549	AM 355, AISI 634	27	5698	Inconel Alloy X-750, AISI 688	38
5550	Inconel Alloy 702	36	5699	Inconel Alloy X-750, AISI 688	38
5551	Allvac M-252, J-1500, AISI 689	35	5700	TPA	32
5552	Incoloy Alloy 801	31	5701	Inconel Alloy 706	37
5554	AM 350, AISI 633	27	5702	Inconel Alloy 706	37
5568	Armco 17-7 PH, AISI 631	27	5703	Inconel Alloy 706	37
5578	Custom 455	27	5704	Waspaloy, AISI 685	40
5579	19-9 DL, AISI 651	32	5706	Waspaloy, AISI 685	40
5580	Inconel Alloy 600, ACI CY-40	37	5707	Waspaloy, AISI 685	40
5582	Inconel Alloy X-750, AISI 688	38	5708	Waspaloy, AISI 685	40
5585	N-155, Multimet, AISI 661	32	5709	Waspaloy, AISI 685	40
5586	Waspaloy, AISI 685	40	5712	Allvac René 41, AISI 683	35
5587	Hastelloy Alloy X, AISI 680	36	5713	Allvac René 41, AISI 683	35
5588	Hastelloy Alloy X, AISI 680	36	5715	Inconel Alloy 601	37
5589	Inconel Alloy 718	37	5717	RA 333	39
5590	Inconel Alloy 718	37	5720	19-9 DL, AISI 651	32
5593	RA 333	39	5721	19-9 DL, AISI 651	32
5594	AM 355, AISI 634	27	5722	19-9 DL, AISI 651	32
5595	Armco 21-6-9	25	5723	19-9 DX, AISI 652	32
5596	Inconel Alloy 718	37	5724	19-9 DX, AISI 652	32
5597	Inconel Alloy 718	37	5725	16-25-6, AISI 650	32
5598	Inconel Alloy X-750, AISI 688	38	5727	16-25-6, AISI 650	32
5599	Inconel Alloy 625	37	5728	16-25-6, AISI 650	32

*Non-current.

5729 19-9 DX, AISI 652
 5731 A-286, AISI 660
 5732 A-286, AISI 660
 5733 Discaloy, AISI 662
 5734 A-286, AISI 660
 5735 A-286, AISI 660
 5736 A-286, AISI 660
 5737 A-286, AISI 660
 5739 Almar 362
 5740 Almar 362
 5741 W-545, AISI 665
 5742 Incoloy Alloy 801
 5743 AM 355, AISI 634
 5744 AM 355, AISI 634
 5745 AM 350, AISI 633
 5746 D-979, AISI 664
 5748 Crucible AFC-77
 5750 Hastelloy Alloy C, ACI CW-12-M
 5751 Udimet 500, AISI 684
 5753 Udimet 500, AISI 684
 5754 Hastelloy X, AISI 680
 5755 Hastelloy Alloy W
 5756 Allvac M-252, J-1500, AISI 689
 5757 Allvac M-252, J-1500, AISI 689
 5758 MP 35 N, Multiphase
 5759 Crucible WF-11, L-605, AISI 670
 5761 Pyromet X-15
 5764 Armco 22-13-5
 5765 S-816, AISI 671
 5768 N-155, Multimet, AISI 661
 5769 N-155, Multimet, AISI 661
 5770 S-590
 5772 Haynes Alloy No. 188
 5774 AM 350, AISI 633
 5775 AM 350, AISI 633
 5779 Inconel Alloy X-750, AISI 688
 5780 AM 355, AISI 634
 5781 AM 355, AISI 634
 5782 19-9 WX
 5783 19-9 WX
 5786 Hastelloy Alloy W
 5787 Hastelloy Alloy W
 5794 N-155, Multimet, AISI 661
 5795 N-155, Multimet, AISI 661
 5796 Crucible WF-11, L-605, AISI 670
 5797 Crucible WF-11, L-605, AISI 670
 5798 Hastelloy Alloy X, AISI 680
 5799 Hastelloy Alloy X, AISI 680
 5800 Allvac René 41, AISI 683

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32	5801	Haynes Alloy No. 188	43
30	5804	A-286, AISI 660	30
30	5805	A-286, AISI 660	30
30	5812	Armco PH 15-7 Mo, AISI 632	27
30	5813	Armco PH 15-7 Mo, AISI 632	27
30	5817	Greek Ascology, AISI 615	31
30	5825	Armco 17-4 PH, AISI 630, ACI CB-7 Cu	27
30	5827	Armco 17-4 PH, AISI 630, ACI CB-7 Cu	27
27	5828	Waspaloy, AISI 685	40
27	5832	Inconel Alloy 718	37
32	5837	Inconel Alloy 625	37
31	5860	Custom 455	27
27	5870	Inconel Alloy 601	37
27	7235	A-286, AISI 660	30
27	7236	Crucible WF-11, L-605, AISI 670	43
35	7237	Hastelloy Alloy X, AISI 680	36
27	7469	Allvac René 41, AISI 683	35
36	7470	Greek Ascology, AISI 615	31
39	7471	Waspaloy, AISI 685	40
40	7474	Armco 17-4 PH, AISI 630, ACI CB-7 Cu	27
36	7478	A-286, AISI 660	30
36	7479	A-286, AISI 660	30
35	7481	A-286, AISI 660	30

MILITARY AND FEDERAL SPECIFICATIONS

43	MIL-C-24111	Armco 17-4 PH, AISI 630, ACI CB-7 Cu	27
28	MIL-C-45662	Elgiloy	43
25	MIL-N-6710	Inconel Alloy 600, ACI CY-40	37
44	MIL-N-6840	Inconel Alloy 600, ACI CY-40	37
32	MIL-N-7786	Inconel Alloy X-750, AISI 688	38
32	MIL-N-8550	Inconel Alloy X-750, AISI 688	38
43	MIL-N-23228	Inconel Alloy 600, ACI CY-40	37
27	MIL-N-23229	Inconel Alloy 600, ACI CY-40	37
27	MIL-N-24114	Inconel Alloy X-750, AISI 688	38
38	MIL-S-8840	AM 355, AM 350, AISI 633, AISI 634	27
27	MIL-S-8955	Armco PH 15-7 Mo, AISI 632	27
27	MIL-S-17759	Crucible HNM	30
32	MIL-S-21977	Inconel Alloy X-750, AISI 688	38
32	MIL-S-22216	Armco 17-4 PH, AISI 630, ACI CB-7 Cu	27
36	MIL-S-25043	Armco 17-7 PH, AISI 631	27
36	MIL-S-23192	Inconel Alloy X-750, AISI 688	38
32	MIL-S-46042	19-9 DL, AISI 651	32
32	MIL-S-46123	Almar 362	27
43	MIL-S-81506	Armco 17-4 PH, AISI 630, ACI CB-7 Cu	27
43	MIL-T-7840	Inconel Alloy 600, ACI CY-40	37
36	MIL-T-9821	Armco 21-6-9	25
36	MIL-W-46078	Armco 17-7 PH, AISI 631	27
35	QQ-W-390	Inconel Alloy 600, ACI CY-40	37

APPENDIX

ASTM COMMITTEE A-10 XM NUMBERS FOR PROPRIETARY ALLOYS

CHEMICAL REQUIREMENTS

Ident. No.	Proprietary Ident.	C	Mn	P	S	Si	Cr	Ni	Mo	Cu	Other
XM-1	203-EZ	.08 Max	5.0-6.5	.04 Max	.18-.35	1.0 Max	16.0-18.0	5.0-6.5	.50 Max	1.75-2.25	--
XM-2	303-MA	.15 Max	2.00 Max	.05 Max	.11-.16	1.0 Max	17.0-19.0	8.0-10.0	.40-.60	--	Al .60-1.00
XM-3	303-Pb	.15 Max	2.00 Max	.04 Max	.12-.25	1.0 Max	17.0-19.0	8.0-10.0	.60 Max	--	Pb .12-.30
XM-4	303-Cu	.15 Max	2.00 Max	.15 Max	.10 Min	1.0 Max	17.0-19.0	8.0-10.0	--	2.5-4.0	Se .10 Max
XM-5	303 + X	.15 Max	2.5-4.5	.20 Max	.25 Min	1.0 Max	17.0-19.0	7.0-10.0	.60 Max	--	--
XM-6	416 + X	.15 Max	1.5-2.5	.06 Max	.25 Min	1.0 Max	12.0-14.0	--	.60 Max	--	--
XM-7	18-9 LW	.10 Max	2.0 Max	.045 Max	.030 Max	1.0 Max	17.0-19.0	8.0-10.0	--	3.0-4.0	--
XM-8	430 Ti-Al	.07 Max	.20-.50	.030 Max	.030 Max	.20-.50	17.75-18.75	.50 Max	--	--	Ti 12 X C Min Ti 1.10 Max Al 0.15 Max
XM-9	Almar 362	.05 Max	.50 Max	.03 Max	.030 Max	.30 Max	14.0-14.5	6.25-7.0	.30 Max	--	Ti .60-.90 Al .10 Max
XM-10	21-6-9	.08 Max	8.0-10.0	.060 Max	.030 Max	1.00 Max	18.0-21.0	5.0-7.0	--	--	N .15-.40
XM-11	21-6-9LC	.04 Max	8.0-10.0	.060 Max	.030 Max	1.00 Max	18.0-21.0	5.0-7.0	--	--	N .15-.40
XM-12	15-5 PH	.07 Max	1.00 Max	.04 Max	.03 Max	1.00 Max	14.0-15.5	3.5-5.5	--	2.5-4.5	Cb .15-.45
XM-13	PH 13-8 Mo	.05 Max	.10 Max	.010 Max	.008 Max	.10 Max	12.25-13.25	7.5-8.5	2.0-2.5	--	Al .90-1.35 N .010 Max
Cryogenic											
XM-14	Tenelon	.12 Max	14.0-16.0	.060 Max	.030 Max	1.00 Max	17.0-19.0	5.0-6.0	--	--	N .35-.50
XM-15	18-18-2	.08 Max	2.0 Max	.030 Max	.030 Max	1.5-2.5	17.0-19.0	17.5-18.5	--	--	--
XM-16	Custom 455	.05 Max	.50 Max	.040 Max	.030 Max	.50 Max	11.0-12.5	7.5-9.5	.50 Max	1.5-2.5	Ti .80-1.40 Cb .10-.50
XM-17	216	.08 Max	7.5-9.0	.045 Max	.030 Max	1.0 Max	17.5-22.0	5.0-7.0	2.0-3.0	--	N .25-.50
XM-18	216-L	.03 Max	7.5-9.0	.045 Max	.030 Max	1.0 Max	17.5-22.0	5.0-7.0	2.0-3.0	--	N .25-.50
XM-19	22-13-5	.06 Max	4.0-6.0	.040 Max	.030 Max	1.0 Max	20.5-23.5	11.5-13.5	1.5-3.0	--	N .20-.40 Cb .10-.30 V .10-.30
XM-20 ^(a)	304 N	.08 Max	2.0 Max	.045 Max	.030 Max	1.0 Max	18.0-20.0	8.0-10.5	--	--	N .10-.16
XM-21	304 N	.08 Max	2.0 Max	.045 Max	.030 Max	1.0 Max	18.0-20.0	8.0-10.5	--	--	N .16-.30
XM-22 ^(a)	316 N	.08 Max	2.0 Max	.045 Max	.030 Max	1.0 Max	16.0-18.0	10.0-14.0	2.0-3.0	--	N .10-.16
XM-24	PH 14-8 Mo	.05 Max	.10 Max	.010 Max	.008 Max	.10 Max	14.75-15.50	8.00-8.75	2.0-2.5	--	Al 0.90-1.35 N 0.10 Max
XM-25	Custom 450	.05 Max	1.00 Max	.03 Max	.03 Max	1.00 Max	14.0-16.0	5.0-7.0	.50-1.00	1.25-1.75	Cb + Ta x C Min
XM-26	744 X, 326	.05 Max	1.0 Max	.03 Max	.03 Max	0.6 Max	25.0-27.0	6.0-7.0	--	--	Ti 0.25 Max
XM-27	26-1	.01 Max	.40 Max	.02 Max	.02 Max	.40 Max	25.0/27.5	.50 Max	.75/1.50	.20 Max	N .015 Max
XM-28	--	.015 Max	11.0-14.0	.06 Max	.03 Max	1.0 Max	16.5-19.0	0.5-2.5	--	--	N .20-.45
XM-29	--	.08 Max	11.5-14.5	.06 Max	.03 Max	1.0 Max	17.0-19.0	2.25-3.75	--	--	N .20-.40

(a) XM-20 and XM-22 will be cancelled; 304 N and 316 N will be used.

(b) No specification prepared yet -- not even introduced for subcommittee action.

