
**Brazing — Grouping systems for
materials — American materials**

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Published in Switzerland

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 11, *Qualification requirements for welding and allied processes personnel*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html. Official interpretations of ISO/TC 44 documents, where they exist, are available from this page: <https://committee.iso.org/sites/tc44/home/interpretation.html>.

Introduction

This document mirrors the similar materials grouping system given in ISO/TR 20173 for welding of US materials.

Parent materials have been grouped to minimize the number of brazer and brazing procedure qualification tests. Substitution of one parent material for another, for any purpose other than for qualification, even when within the allowable rules, should only be made after an evaluation of the material's suitability for its intended use. For some parent material substitutions, additional tests can be appropriate to verify the suitability of the substituted parent material.

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Brazing — Grouping systems for materials — American materials

1 Scope

This document provides a grouping system for American parent materials for brazing.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 Basis for classification of base metals for brazing qualification

Parent materials are grouped in [Table 1](#) to [Table 10](#).

Where classification is dependent on the amount of a given element, the controlling value is the maximum content given in the parent material specification.

The tensile strength given in the tables is for the annealed condition. Where the minimum tensile strength is not given, that value is established by the document referencing this document.

[Subclauses 4.1](#) to [4.8](#) give the parent material group numbers for the materials listed.

4.1 Ferrous alloys

- 100 Steels containing 1 % or less chromium
- 110 Steels containing more than 1 % chromium (see NOTE 1).
- 120 Steels containing aluminium or titanium
- 130 Stainless steels, austenitic
- 140 Stainless steels, austenitic containing titanium of less than 0,3 %
- 145 Stainless steels, austenitic-ferritic (duplex)
- 150 Stainless steels, martensitic, and ferritic
- 160 Stainless steels, martensitic, and ferritic containing less than 0,3 % combined aluminium and titanium
- 170 Cast iron
- 180 Cast iron, austenitic

NOTE 1 Steels with 12 % or greater chromium are included in stainless steels.

NOTE 2 Where the tensile strength given in the specification is dependent on parent material thickness, the strength given in the tables is the value for the thickest parent material, up to a limit of 25 mm.

4.2 Aluminium and alloys

- 200 Aluminium and aluminium alloys containing no magnesium
- 210 Aluminium alloys containing less than 1 % magnesium
- 220 Aluminium alloys containing 1 % or more magnesium

4.3 Copper and alloys

- 300 Copper and copper alloys
- 310 Copper alloys containing 0,5 % to 1 % lead
- 320 Copper alloys containing more than 1 % and no more than 7 % lead
- 330 Copper alloys containing more than 1 % silicon
- 340 Copper alloys containing 0,5 % to 1 % aluminium or beryllium
- 350 Copper alloys containing more than 1 % and no more than 5 % aluminium or beryllium
- 360 Copper alloys containing more than 5 % aluminium or beryllium

4.4 Nickel and alloys

- 400 Nickel and nickel-copper alloys
- 410 Nickel-molybdenum alloys
- 420 Nickel-chromium-iron and nickel-chromium-molybdenum alloys
- 430 Nickel-chromium-iron and nickel-chromium-molybdenum alloys containing less than 1,5 % combined aluminium and titanium

4.5 Titanium and alloys

- 500

4.6 Zirconium and alloys

- 600

4.7 Magnesium alloys

- 700

4.8 Cobalt alloys

- 800

Table 1 — American grouping system for steels

Standards body	Specification	Type/Grade/Class	Group No.	Minimum tensile strength MPa
ASTM	A27	N1	100	
ASTM	A27	N2	100	
ASTM	A27	U60-30	100	
ASTM	A27	60-30	100	
ASTM	A27	65-35	100	
ASTM	A27	70-36	100	
ASTM	A27	70-40	100	
ASTM	A36		100	400
ASTM	A53	F	100	310
ASTM	A53	E, A	100	331
ASTM	A53	E, B	100	414
ASTM	A53	S, A	100	331
ASTM	A53	S, B	100	414
ASTM	A105		100	483
ASTM	A106	A	100	331
ASTM	A106	B	100	345
ASTM	A106	C	100	483
ASTM	A113	A	100	414
ASTM	A113	B	100	345
ASTM	A113	C	100	331
ASTM	A128	A	100	
ASTM	A128	B1	100	
ASTM	A128	B2	100	
ASTM	A128	B3	100	
ASTM	A128	B4	100	
ASTM	A128	D	100	
ASTM	A128	E1	100	
ASTM	A128	E2	100	
ASTM	A128	F	100	
ASTM	A131	A	100	400
ASTM	A131	B	100	400
ASTM	A131	CS	100	
ASTM	A131	D	100	400
ASTM	A131	DS	100	
ASTM	A131	E	100	400
ASTM	A131	AH32	100	
ASTM	A131	DH32	100	
ASTM	A131	EH32	100	
ASTM	A131	AH36	100	
ASTM	A131	DH36	100	
ASTM	A131	EH36	100	
ASTM	A135	A	100	331

Table 1 (continued)

Standards body	Specification	Type/Grade/Class	Group No.	Minimum tensile strength MPa
ASTM	A135	B	100	414
ASTM	A139	A	100	331
ASTM	A139	B	100	414
ASTM	A139	C	100	414
ASTM	A139	D	100	414
ASTM	A139	E	100	455
ASTM	A161	Low carbon	100	324
ASTM	A161	T1	100	379
ASTM	A178	A	100	
ASTM	A178	C	100	414
ASTM	A179		100	
ASTM	A181	Class 60	100	414
ASTM	A181	Class 70	100	
ASTM	A182	Class F1	100	
ASTM	A182	Class F2	100	
ASTM	A192		100	324
ASTM	A202	A	100	
ASTM	A202	B	100	414
ASTM	A203	A	100	
ASTM	A203	B	100	
ASTM	A203	D	100	
ASTM	A203	E	100	
ASTM	A204	A	100	
ASTM	A204	B	100	
ASTM	A204	C	100	
ASTM	A209	T1	100	379
ASTM	A209	T1a	100	414
ASTM	A209	T1b	100	365
ASTM	A210	A1	100	414
ASTM	A210	C	100	
ASTM	A213	T2	100	414
ASTM	A214		100	
ASTM	A216	WCA	100	
ASTM	A216	WCB	100	
ASTM	A216	WCC	100	
ASTM	A217	WC1	100	
ASTM	A217	WC4	100	
ASTM	A217	WC5	100	
ASTM	A225	A	100	
ASTM	A225	B	100	
ASTM	A226		100	324
ASTM	A236	A	100	

Table 1 (continued)

Standards body	Specification	Type/Grade/Class	Group No.	Minimum tensile strength MPa
ASTM	A236	B	100	
ASTM	A236	C	100	
ASTM	A236	D	100	
ASTM	A236	E	100	
ASTM	A236	F	100	
ASTM	A236	G	100	
ASTM	A236	H	100	
ASTM	A242	1	100	
ASTM	A242	2	100	
ASTM	A250	T1	100	
ASTM	A250	T1a	100	
ASTM	A250	T1b	100	
ASTM	A266	Class 1	100	
ASTM	A266	Class 2	100	
ASTM	A266	Class 3	100	
ASTM	A283	A	100	
ASTM	A283	B	100	
ASTM	A283	C	100	
ASTM	A283	D	100	
ASTM	A284	C	100	414
ASTM	A284	D	100	414
ASTM	A285	A	100	310
ASTM	A285	B	100	345
ASTM	A285	C	100	379
ASTM	A299		100	
ASTM	A302	A	100	
ASTM	A302	B	100	
ASTM	A302	C	100	
ASTM	A302	D	100	
ASTM	A333	1	100	
ASTM	A333	3	100	
ASTM	A333	6	100	
ASTM	A333	7	100	
ASTM	A333	8	100	
ASTM	A333	9	100	
ASTM	A334	1	100	
ASTM	A334	3	100	
ASTM	A334	6	100	
ASTM	A334	7	100	
ASTM	A334	8	100	
ASTM	A334	9	100	
ASTM	A335	P1	100	379

Table 1 (continued)

Standards body	Specification	Type/Grade/Class	Group No.	Minimum tensile strength MPa
ASTM	A335	P2	100	379
ASTM	A335	P15	100	414
ASTM	A336	F1	100	
ASTM	A336	F30	100	
ASTM	A336	F31	100	
ASTM	A350	LF1	100	414
ASTM	A350	LF2	100	
ASTM	A350	LF3	100	
ASTM	A350	LF5	100	
ASTM	A350	LF9	100	
ASTM	A352	LCA	100	414
ASTM	A352	LCB	100	448
ASTM	A352	LCC	100	
ASTM	A352	LC1	100	
ASTM	A352	LC2	100	
ASTM	A352	LC3	100	
ASTM	A352	LC4	100	
ASTM	A356	1	100	483
ASTM	A356	2	100	448
ASTM	A356	5	100	483
ASTM	A366		100	
ASTM	A369	FPA	100	331
ASTM	A369	FPB	100	414
ASTM	A369	FP1	100	379
ASTM	A369	FP2	100	379
ASTM	A381	Class Y35	100	414
ASTM	A381	Class Y42	100	414
ASTM	A381	Class Y46	100	434
ASTM	A381	Class Y48	100	427
ASTM	A381	Class Y50	100	441
ASTM	A381	Class Y52	100	455
ASTM	A381	Class Y56	100	
ASTM	A381	Class Y60	100	
ASTM	A381	Class Y65	100	
ASTM	A387	2	100	379
ASTM	A414	A	100	310
ASTM	A414	B	100	345
ASTM	A414	C	100	379
ASTM	A414	D	100	414
ASTM	A414	E	100	448
ASTM	A414	F	100	483
ASTM	A414	G	100	517

Table 1 (continued)

Standards body	Specification	Type/Grade/Class	Group No.	Minimum tensile strength MPa
ASTM	A423	2	100	
ASTM	A426	CP1	100	448
ASTM	A426	CP2	100	414
ASTM	A426	CP15	100	414
ASTM	A441		100	462
ASTM	A442	55	100	379
ASTM	A442	60	100	414
ASTM	A455	I	100	483
ASTM	A455	II	100	483
ASTM	A486	Class 70	100	483
ASTM	A486	Class 90	100	
ASTM	A487	Class 1	100	
ASTM	A487	Class 2	100	
ASTM	A487	Class 4	100	
ASTM	A487	Class 6	100	
ASTM	A487	Class 7	100	
ASTM	A487	Class 10	100	
ASTM	A487	Class 11	100	483
ASTM	A487	Class 12	100	483
ASTM	A487	Class 13	100	
ASTM	A487	Class 14	100	
ASTM	A487	Class A	100	414
ASTM	A487	Class B	100	483
ASTM	A487	Class C	100	483
ASTM	A487	Class D	100	552
ASTM	A500	A	100	310
ASTM	A500	B	100	400
ASTM	A500	C	100	427
ASTM	A501		100	400
ASTM	A512	MT 1010	100	
ASTM	A512	MT 1015	100	
ASTM	A512	MTX 1015	100	
ASTM	A512	MT 1020	100	
ASTM	A512	MTX 1020	100	
ASTM	A512	1025	100	
ASTM	A512	1110	100	
ASTM	A512	1115	100	
ASTM	A512	1030	100	
ASTM	A513	1008	100	
ASTM	A513	MT 1010	100	
ASTM	A513	MT 1015	100	
ASTM	A513	MTX 1015	100	

Table 1 (continued)

Standards body	Specification	Type/Grade/Class	Group No.	Minimum tensile strength MPa
ASTM	A513	1016	100	
ASTM	A513	1017	100	
ASTM	A513	1018	100	
ASTM	A513	1019	100	
ASTM	A513	MT 1020	100	
ASTM	A513	MTX 1020	100	
ASTM	A513	1021	100	
ASTM	A513	1022	100	
ASTM	A513	1023	100	
ASTM	A513	1024	100	
ASTM	A513	1025	100	
ASTM	A513	1026	100	
ASTM	A513	1027	100	
ASTM	A513	1030	100	
ASTM	A513	1033	100	
ASTM	A513	1035	100	
ASTM	A513	8630	100	
ASTM	A515	55	100	379
ASTM	A515	60	100	414
ASTM	A515	65	100	
ASTM	A515	70	100	
ASTM	A516	55	100	379
ASTM	A516	60	100	414
ASTM	A516	65	100	
ASTM	A516	70	100	
ASTM	A519	1008	100	
ASTM	A519	1010	100	
ASTM	A519	MT 1010	100	
ASTM	A519	1012	100	
ASTM	A519	1015	100	
ASTM	A519	MT 1015	100	
ASTM	A519	MTX 1015	100	
ASTM	A519	1016	100	
ASTM	A519	1017	100	
ASTM	A519	1018	100	
ASTM	A519	1019	100	
ASTM	A519	1020	100	
ASTM	A519	MT 1020	100	
ASTM	A519	MTX 1020	100	
ASTM	A519	1021	100	
ASTM	A519	1022	100	
ASTM	A519	1025	100	

Table 1 (continued)

Standards body	Specification	Type/Grade/Class	Group No.	Minimum tensile strength MPa
ASTM	A519	1026	100	
ASTM	A519	1030	100	
ASTM	A519	1035	100	
ASTM	A519	1040	100	
ASTM	A519	1045	100	
ASTM	A519	1050	100	
ASTM	A519	1118	100	
ASTM	A519	11L18	100	
ASTM	A519	1132	100	
ASTM	A519	1137	100	
ASTM	A519	1141	100	
ASTM	A519	1144	100	
ASTM	A519	1213	100	
ASTM	A519	12L14	100	
ASTM	A519	1215	100	
ASTM	A519	1330	100	
ASTM	A519	1335	100	
ASTM	A519	1340	100	
ASTM	A519	1345	100	
ASTM	A519	1518	100	
ASTM	A519	1524	100	
ASTM	A519	1541	100	
ASTM	A519	3140	100	
ASTM	A519	4012	100	
ASTM	A519	4023	100	
ASTM	A519	4024	100	
ASTM	A519	4027	100	
ASTM	A519	4028	100	
ASTM	A519	4037	100	
ASTM	A519	4042	100	
ASTM	A519	4047	100	
ASTM	A519	4063	100	
ASTM	A519	4118	100	
ASTM	A519	4337	100	
ASTM	A519	E4337	100	
ASTM	A519	4340	100	
ASTM	A519	E4340	100	
ASTM	A519	4422	100	
ASTM	A519	4427	100	
ASTM	A519	4520	100	
ASTM	A519	4615	100	
ASTM	A519	4617	100	

Table 1 (continued)

Standards body	Specification	Type/Grade/Class	Group No.	Minimum tensile strength MPa
ASTM	A519	4620	100	
ASTM	A519	4621	100	
ASTM	A519	4718	100	
ASTM	A519	4720	100	
ASTM	A519	4815	100	
ASTM	A519	4817	100	
ASTM	A519	4820	100	
ASTM	A519	5015	100	
ASTM	A519	5115	100	
ASTM	A519	5120	100	
ASTM	A519	5132	100	
ASTM	A519	5140	100	
ASTM	A519	5145	100	
ASTM	A519	5150	100	
ASTM	A519	5155	100	
ASTM	A519	5160	100	
ASTM	A519	E50100	100	
ASTM	A519	6118	100	
ASTM	A519	6120	100	
ASTM	A519	8115	100	
ASTM	A519	8615	100	
ASTM	A519	8617	100	
ASTM	A519	8620	100	
ASTM	A519	8622	100	
ASTM	A519	8625	100	
ASTM	A519	8627	100	
ASTM	A519	8630	100	
ASTM	A519	8637	100	
ASTM	A519	8640	100	
ASTM	A519	8642	100	
ASTM	A519	8645	100	
ASTM	A519	8650	100	
ASTM	A519	8655	100	
ASTM	A519	8660	100	
ASTM	A519	8720	100	
ASTM	A519	8735	100	
ASTM	A519	8740	100	
ASTM	A519	8742	100	
ASTM	A519	8822	100	
ASTM	A519	9255	100	
ASTM	A519	9260	100	
ASTM	A519	9262	100	

Table 1 (continued)

Standards body	Specification	Type/Grade/Class	Group No.	Minimum tensile strength MPa
ASTM	A519	9840	100	
ASTM	A519	9850	100	
ASTM	A519	50B40	100	
ASTM	A519	50B44	100	
ASTM	A519	50B46	100	
ASTM	A519	50B50	100	
ASTM	A519	50B60	100	
ASTM	A519	51B60	100	
ASTM	A519	81B45	100	
ASTM	A519	86B45	100	
ASTM	A519	94B15	100	
ASTM	A519	94B17	100	
ASTM	A519	94B30	100	
ASTM	A519	94B40	100	
ASTM	A523	A	100	331
ASTM	A523	B	100	414
ASTM	A524		100	379
ASTM	A526		100	
ASTM	A527		100	
ASTM	A529		100	
ASTM	A537		100	
ASTM	A539		100	310
ASTM	A556	A2	100	324
ASTM	A556	B2	100	427
ASTM	A556	C2	100	
ASTM	A557	A2	100	324
ASTM	A557	B2	100	414
ASTM	A557	C2	100	483
ASTM	A570	A	100	310
ASTM	A570	B	100	338
ASTM	A570	C	100	359
ASTM	A570	D	100	379
ASTM	A570	E	100	400
ASTM	A572	42	100	290
ASTM	A572	50	100	345
ASTM	A572	60	100	414
ASTM	A572	65	100	448
ASTM	A573	58	100	400
ASTM	A573	65	100	448
ASTM	A573	70	100	
ASTM	A575	1008	100	
ASTM	A575	1010	100	

Table 1 (continued)

Standards body	Specification	Type/Grade/Class	Group No.	Minimum tensile strength MPa
ASTM	A575	1012	100	
ASTM	A575	1015	100	
ASTM	A575	1017	100	
ASTM	A575	1020	100	
ASTM	A575	1023	100	
ASTM	A575	1025	100	
ASTM	A575	1044	100	
ASTM	A587		100	331
ASTM	A588	A	100	
ASTM	A588	B	100	
ASTM	A588	C	100	
ASTM	A588	D	100	
ASTM	A588	E	100	
ASTM	A588	F	100	
ASTM	A588	G	100	
ASTM	A588	H	100	
ASTM	A588	J	100	
ASTM	A595	A	100	379
ASTM	A595	B	100	414
ASTM	A611		100	
ASTM	A612		100	
ASTM	A618	I	100	
ASTM	A618	II	100	
ASTM	A618	III	100	448
ASTM	A633	A	100	434
ASTM	A633	B	100	434
ASTM	A633	C	100	
ASTM	A633	D	100	
ASTM	A633	E	100	
ASTM	A658		100	448
ASTM	A660	WCA	100	414
ASTM	A660	WCB	100	483
ASTM	A660	WCC	100	483
ASTM	A709	36	100	400
ASTM	A709	50	100	448
ASTM	A709	50W	100	
ASTM	A732	1	100	414
ASTM	A732	2	100	448
ASTM	A732	3	100	517
ASTM	A732	4	100	
ASTM	A732	5	100	
ASTM	A732	6	100	

Table 1 (continued)

Standards body	Specification	Type/Grade/Class	Group No.	Minimum tensile strength MPa
ASTM	A732	7	100	
ASTM	A732	8	100	
ASTM	A732	9	100	
ASTM	A732	10	100	
ASTM	A732	11	100	
ASTM	A732	12	100	
ASTM	A732	13	100	
ASTM	A732	14	100	
ABS	ABS	A	100	400
ABS	ABS	B	100	400
ABS	ABS	D	100	400
ABS	ABS	E	100	400
ABS	ABS	DS	100	
ABS	ABS	CS	100	
ABS	ABS	AH32	100	
ABS	ABS	DH32	100	
ABS	ABS	EH32	100	
ABS	ABS	AH36	100	
ABS	ABS	DH36	100	
ABS	ABS	EH36	100	
ASTM	A128	C	110	
ASTM	A182	F5	110	
ASTM	A182	F5a	110	
ASTM	A182	F7	110	
ASTM	A182	F9	110	
ASTM	A182	F11	110	
ASTM	A182	F12	110	
ASTM	A182	F21	110	
ASTM	A182	F22	110	
ASTM	A199	T3b	110	414
ASTM	A199	T4	110	414
ASTM	A199	T5	110	414
ASTM	A199	T7	110	414
ASTM	A199	T9	110	414
ASTM	A199	T11	110	414
ASTM	A199	T21	110	414
ASTM	A199	T22	110	414
ASTM	A200	T3b	110	414
ASTM	A200	T4	110	414
ASTM	A200	T5	110	414
ASTM	A200	T7	110	414
ASTM	A200	T9	110	414

Table 1 (continued)

Standards body	Specification	Type/Grade/Class	Group No.	Minimum tensile strength MPa
ASTM	A200	T11	110	414
ASTM	A200	T21	110	414
ASTM	A200	T22	110	414
ASTM	A213	T3b	110	414
ASTM	A213	T5	110	414
ASTM	A213	T5b	110	414
ASTM	A213	T5c	110	414
ASTM	A213	T7	110	414
ASTM	A213	T9	110	414
ASTM	A213	T11	110	414
ASTM	A213	T12	110	414
ASTM	A213	T17	110	414
ASTM	A213	T21	110	414
ASTM	A213	T22	110	414
ASTM	A217	WC6	110	
ASTM	A217	WC9	110	
ASTM	A217	C5	110	
ASTM	A217	C12	110	
ASTM	A335	P5	110	414
ASTM	A335	P5b	110	414
ASTM	A335	P5c	110	414
ASTM	A335	P7	110	414
ASTM	A335	P9	110	414
ASTM	A335	P11	110	414
ASTM	A335	P12	110	414
ASTM	A335	P21	110	414
ASTM	A335	P22	110	414
ASTM	A336	F5	110	414
ASTM	A336	F5a	110	
ASTM	A336	F12	110	
ASTM	A336	F21	110	414
ASTM	A336	F21a	110	414
ASTM	A336	F22	110	414
ASTM	A336	F22a	110	414
ASTM	A336	F32	110	
ASTM	A352	LC2-1	110	
ASTM	A356	6	110	
ASTM	A356	8	110	
ASTM	A356	9	110	
ASTM	A356	10	110	
ASTM	A369	FP3b	110	414
ASTM	A369	FP5	110	414

Table 1 (continued)

Standards body	Specification	Type/Grade/Class	Group No.	Minimum tensile strength MPa
ASTM	A369	FP7	110	414
ASTM	A369	FP9	110	414
ASTM	A369	FP11	110	414
ASTM	A369	FP12	110	414
ASTM	A369	FP21	110	414
ASTM	A369	FP22	110	414
ASTM	A387	5	110	414
ASTM	A387	7	110	414
ASTM	A387	9	110	414
ASTM	A387	11	110	414
ASTM	A387	12	110	414
ASTM	A387	21	110	414
ASTM	A387	22	110	414
ASTM	A389	C23	110	
ASTM	A389	C24	110	
ASTM	A405	P24	110	414
ASTM	A423	I	110	
ASTM	A426	CP5	110	414
ASTM	A426	CP5b	110	414
ASTM	A426	CP7	110	414
ASTM	A426	CP9	110	
ASTM	A426	CP11	110	
ASTM	A426	CP12	110	414
ASTM	A426	CP21	110	414
ASTM	A426	CP22	110	483
ASTM	A473	Type 501	110	414
ASTM	A473	Type 501A	110	414
ASTM	A473	Type 501B	110	414
ASTM	A473	Type 502	110	414
ASTM	A487	Class 8	110	
ASTM	A487	Class 9	110	
ASTM	A513	4130	110	
ASTM	A519	E3310	110	
ASTM	A519	4130	110	
ASTM	A519	4135	110	
ASTM	A519	4137	110	
ASTM	A519	4140	110	
ASTM	A519	4142	110	
ASTM	A519	4145	110	
ASTM	A519	4147	110	
ASTM	A519	4150	110	
ASTM	A519	4320	110	

Table 1 (continued)

Standards body	Specification	Type/Grade/Class	Group No.	Minimum tensile strength MPa
ASTM	A519	5130	110	
ASTM	A519	5135	110	
ASTM	A519	5147	110	
ASTM	A519	51100	110	
ASTM	A519	52100	110	
ASTM	A519	6150	110	
ASTM	A519	E9310	110	
ASTM	A595	C	110	414
ASTM	A333	4	120	414
ASTM	A519	E7140	120	
ASTM	A562		120	379

Table 2 — American grouping system for stainless steels

UNS Number	Common name	Group No.	Minimum tensile strength MPa
J91540	CA6NM	130	
J92500	CF3	130	483
J92600	CF8	130	483
J92602	CF20	130	483
J92603	HF	130	483
J92613	HC30	130	
J9270	CF3	130	448
J92701	CF16F	130	483
J92710	CF8C	130	483
J92800	CF3M	130	448
J92803	HF30	130	
J92900	CF8M	130	483
J92971	CF10MC	130	448
J93000	CG8M	130	517
J93001	CG12	130	517
J93005	HD	130	517
J93015	HD50	130	
J93303		130	
J93400	CH8	130	448
J93401	CH10	130	483
J93402	CH20	130	483
J93403	HE	130	586
J93413	HE35	130	
J93423	CE30	130	552
J93503	HH	130	517
J93513	HH30	130	

Table 2 (continued)

UNS Number	Common name	Group No.	Minimum tensile strength MPa
J94003	HI	130	483
J94013	HI35	130	
J94202	CK20	130	448
J94203	HK30	130	448
J94204	HK40	130	427
J94213	HN	130	434
J94214	HN40	130	
J94224	HK	130	448
J94603	HT30	130	448
J94604	HL	130	448
J94613	HL30	130	
J94650	CN7MS	130	427
J95150	CN7M	130	427
S16800	16-8-2H	130	483
S20200	202	130	621
S20910	XM19	130	689
S21400	XM31	130	724
S21600	XM17	130	621
S21800	Nitronic 60	130	655
S21900	XM10	130	621
S21904	XM11	130	621
S24000	18-3-Mn	130	689
S30100	301	130	517
S30102	302	130	517
S30215	302B	130	517
S30300	303	130	517
S30323	303Se	130	517
S30400	304	130	517
S30403	304L	130	517
S30409	304H	130	517
S30451	304N	130	517
S30452	XM21	130	586
S30500	305	130	517
S30900	309	130	483
S30908	309S	130	517
S31000	310	130	517
S31008	310S	130	586
S31400	314	130	517
S31600	316	130	517
S31603	316L	130	483
S31609	316H	130	517
S31651	316N	130	517

Table 2 (continued)

UNS Number	Common name	Group No.	Minimum tensile strength MPa
S31700	317	130	517
S31703	317L	130	517
S33100	F10	130	552
S34700	347	130	517
S34709	347H	130	517
S34800	348	130	517
S34809	348H	130	517
S35000	AM350 PH	130	
S35500	AM355 PH	130	
S38100	XM15	130	517
S32100	321	140	517
S32109	321H	140	517
J92205	4A	145	620
J93345	CE8MN	145	655
J93370	1A	145	690
J93370	CD4MCu	145	690
J93371	3A	145	655
J93372	1B	145	690
J93373	1C	145	690
J93380	6A	145	690
J93380	CD3MWCuN	145	690
J93404	5A	145	690
S31200	F50	145	690
S31260	S31260	145	690
S31500	S31500	145	635
S31803	F51	145	620
S32003	S32003	145	620
S32101	LDX 2101	145	650
S32202	S32202	145	650
S32205	F60	145	655
S32304	2304	145	600
S32550	F61	145	750
S32750	F53	145	800
S32760	F55	145	750
S32900	329	145	620
S32900	S32900	145	620
S32906	S32906	145	750
S32950	S32950	145	690
S39274	F54	145	800
S82012	FDX 25	145	650
S82031	FDX 27	145	650
S82441	LDX 2404	145	680

Table 2 (continued)

UNS Number	Common name	Group No.	Minimum tensile strength MPa
J91150	CA15	150	
J91151	CA15M	150	
J91153	CA40	150	
J91540	CA6NM	150	
J91803	CB30	150	448
J92605	HC	150	379
K91151	F6	150	
S17400	17-4 PH	150	
S32900	329	150	621
S40300	403	150	483
S41000	410	150	483
S41008	410S	150	414
S41400	414	150	793
S41600	416	150	414
S41623	416Se	150	483
S42000	420	150	
S42900	429	150	448
S43000	430	150	483
S43020	430F	150	483
S43023	430FSe	150	483
S43100	431	150	793
S44002	440A	150	
S44003	440B	150	
S44004	440C	150	
S44300	443	150	483
S44600	446	150	483
S44700	28-4	150	483
S44800	28-4-2	150	483
S40500	405	160	414
S40900	409	160	414
S43036	430Ti	160	414
S44400		160	414
S44626	26-1	160	469

Table 3 — American grouping system for cast irons

Standards body	Specification	Type/Grade/Class	UNS Number	Group No.	Minimum tensile strength MPa
ASTM	A47	32510	F22200	170	345
ASTM	A47	35018	F22400	170	365
ASTM	A48	20	F11401	170	138
ASTM	A48	25	F11701	170	172

Table 3 (continued)

Standards body	Specification	Type/Grade/Class	UNS Number	Group No.	Minimum tensile strength MPa
ASTM	A48	30	F12101	170	207
ASTM	A48	35	F12401	170	241
ASTM	A48	40	F12801	170	
ASTM	A48	45	F13101	170	
ASTM	A48	50	F13501	170	
ASTM	A48	55	F13801	170	
ASTM	A48	60	F14101	170	
ASTM	A126	A	F11501	170	145
ASTM	A126	B	F12102	170	214
ASTM	A126	C	F12802	170	
ASTM	A159	G1800	F10004	170	
ASTM	A159	G2500	F10005	170	
ASTM	A159	G3000	F10006	170	
ASTM	A159	G3500	F10007	170	
ASTM	A159	G4000	F10008	170	
ASTM	A159			170	
ASTM	A159			170	
ASTM	A197		F22000	170	276
ASTM	A220	Grade 40010	F22830	170	
ASTM	A220	Grade 45008	F23130	170	
ASTM	A220	Grade 45006	F23131	170	
ASTM	A220	Grade 50005	F23530	170	
ASTM	A220	Grade 60004	F24130	170	
ASTM	A220	Grade 70003	F24830	170	
ASTM	A220	Grade 80002	F25530	170	
ASTM	A220	Grade 90001	F26230	170	
ASTM	A278	Class 20	F11401	170	138
ASTM	A278	Class 25	F11701	170	172
ASTM	A278	Class 30	F12101	170	207
ASTM	A278	Class 35	F12401	170	241
ASTM	A278	Class 40	F12803	170	
ASTM	A278	Class 45	F13101	170	
ASTM	A278	Class 50	F13502	170	
ASTM	A278	Class 55	F13801	170	
ASTM	A278	Class 60	F14102	170	
ASTM	A278	Class 70	F14801	170	
ASTM	A278	Class 80	F15501	170	
ASTM	A319	Class I	F10001	170	
ASTM	A319	Class II	F10002	170	
ASTM	A319	Class III	F10003	170	
ASTM	A338			170	
ASTM	A395	60-40-18	F32800	170	

Table 3 (continued)

Standards body	Specification	Type/Grade/Class	UNS Number	Group No.	Minimum tensile strength MPa
ASTM	A476	80-60-03	F34100	170	
ASTM	A536	Grade 604018	F32800	170	
ASTM	A536	Grade 654512	F33100	170	
ASTM	A536	Grade 805506	F33800	170	
ASTM	A536	Grade 1009003	F34800	170	
ASTM	A536	Grade 1209002	F36200	170	
ASTM	A602	Grade M3210	F20000	170	345
ASTM	A602	Grade M4504		170	
ASTM	A602	Grade M5003		170	
ASTM	A602	Grade M5503		170	
ASTM	A602	Grade M7002		170	
ASTM	A602	Grade M8501		170	
ASTM	A436	Type 1	F41000	180	172
ASTM	A436	Type 1b	F41001	180	207
ASTM	A436	Type 2	F41002	180	172
ASTM	A436	Type 2b	F41003	180	207
ASTM	A436	Type 3	F41004	180	172
ASTM	A436	Type 4	F41005	180	172
ASTM	A436	Type 5	F41006	180	138
ASTM	A436	Type 6	F41007	180	172
ASTM	A439	Type D2	F43000	180	400
ASTM	A439	Type D2B	F43001	180	400
ASTM	A439	Type D2C	F43002	180	400
ASTM	A439	Type D3	F43003	180	379
ASTM	A439	Type D3A	F43004	180	379
ASTM	A439	Type D4	F41005	180	414
ASTM	A439	Type D5	F41006	180	379
ASTM	A439	Type D5B	F41007	180	379
ASTM	A571	Type D2M	F43010	180	448

Table 4 — American grouping system for aluminium and alloys

UNS Number	Common name	Group No.	Minimum tensile strength MPa
A91060	1060	200	55
A91100	1100	200	76
A93003	3003	200	97
A93003 Alclad	Alc. 3003	200	90
A93005	3005	210	117
A93105	3105	210	97
A96063	6063	210	90
A96951	6951	210	117

Table 4 (continued)

UNS Number	Common name	Group No.	Minimum tensile strength MPa
A07100	710.0	210	221
A07110	711.0	210	179
A07120	712.0	210	234
A93004	3004	220	152
A95005	5005	220	103
A95050	5050	220	124
A96061	6061	220	124
A96061 Alclad	Alc. 6061	220	117

Table 5 — American grouping system for copper and alloys

UNS Number	Common name	Group No.	Minimum tensile strength MPa
C10100	OFE	300	
C10200	OF	300	207
C10300	OFXLP	300	207
C10400	OFS	300	207
C10500	OFS	300	207
C10700	OFS	300	207
C10800	OFLP	300	207
C10920		300	
C10930		300	
C10940		300	
C11000	FTP	300	207
C11300	STP	300	
C11400	STP	300	
C11500	STP	300	
C11600	STP	300	
C12000	DLP	300	207
C12100	DLP	300	
C12200	DHP	300	207
C12500	FRTTP	300	207
C12700	FRSTP	300	
C12800	FRSTP	300	
C12900	FRSTP	300	
C13000	FRSTP	300	
C14200	DPA	300	207
C14300	Cadmium copper	300	
C14310	Cadmium copper	300	
C14500	DPTE	300	
C14700	Sulphur copper	300	
C14710	Sulphur copper	300	