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

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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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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

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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

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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