



Designation: ~~B221-08~~ Designation: B221 - 12

Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes¹

This standard is issued under the fixed designation B221; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense. Note—Appendix and Table X1.1 updated and the year date was changed on Aug. 8, 2008.

1. Scope*

1.1 This specification² covers aluminum and aluminum-alloy extruded bars, rods, wire, profiles, and tubes in the aluminum alloys (Note 1) and tempers shown in Table 2.

NOTE 1—Throughout this specification, the use of the term *alloy* in the general sense includes aluminum as well as aluminum alloy.

NOTE 2—For rolled or cold-finished bar and rod refer to Specification B211, for drawn seamless tube used in pressure applications, Specification B210, for structural pipe and tube, Specification B429/B429M, and for seamless pipe and tube used in pressure applications, Specification B241/B241M.

NOTE 3—Structural pipe and tube produced in accordance with B221 is not intended for fluid-carrying applications involving pressure. Refer to either Specification B210 or B241/B241M, as appropriate, for seamless pipe and tube used in fluid-carrying applications involving pressure.

1.2 Alloy and temper designations are in accordance with ANSI H35.1/H35.1M. The equivalent Unified Numbering System alloy designations are those of Table 1 preceded by A9; for example, A91100 for Aluminum 1100 in accordance with Practice E527.

1.3 For acceptance criteria for inclusion of new aluminum and aluminum alloys in this specification, see Annex A2.

1.4 A complete metric companion to B221 has been developed—B221M; therefore, no metric equivalents are presented in this specification.

2. Referenced Documents

2.1 The following documents of the issue in effect on the date of material purchase, unless otherwise noted, form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards*:³

B210 Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes

B211 Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire

B241/B241M Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube

B429/B429M Specification for Aluminum-Alloy Extruded Structural Pipe and Tube

B557 Test Methods for Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products

B594 Practice for Ultrasonic Inspection of Aluminum-Alloy Wrought Products for Aerospace Applications

B660 Practices for Packaging/Packing of Aluminum and Magnesium Products

B666/B666M Practice for Identification Marking of Aluminum and Magnesium Products

B807/B807M Practice for Extrusion Press Solution Heat Treatment for Aluminum Alloys

B881 Terminology Relating to Aluminum- and Magnesium-Alloy Products

B918 Practice for Heat Treatment of Wrought Aluminum Alloys

B945 Practice for Aluminum Alloy Extrusions Press Cooled from an Elevated Temperature Shaping Process for Production of T1, T2, T5 and T10 Type Tempers

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E34 Test Methods for Chemical Analysis of Aluminum and Aluminum-Base Alloys E55 Practice for Sampling Wrought

¹ This specification is under the jurisdiction of ASTM Committee B07 on Light Metals and Alloys and is the direct responsibility of Subcommittee B07.03 on Aluminum Alloy Wrought Products.

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² For ASME Boiler and Pressure Vessel Code applications see related Specification SB-221 in Section II of this Code.

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

*A Summary of Changes section appears at the end of this standard.

TABLE 1 Chemical Composition Limits ^{A,B,C}

NOTE 1—In case of a discrepancy between the values listed in Table 2 and those listed in the “International Alloy Designations and Chemical Composition Limits for Wrought Aluminum and Wrought Aluminum Alloys” (known as the “Teal Sheets”), the composition limits registered with the Aluminum Association and published in the “Teal Sheets” should be considered the controlling composition. The “Teal Sheets” are available at <http://www.aluminum.org/tealsheets>.

Alloy	Silicon	Iron	Copper	Manga- nese	Magne- sium	Chromium	Zinc	Titanium	Vanadium	Other Elements ^D		Aluminum
										Each	Total ^E	
1060	0.25	0.35	0.05	0.03	0.03	...	0.05	0.03	0.05	0.03	...	99.60 min ^F
1100	0.95 Si + Fe		0.05-0.20	0.05	...	...	0.10	...	...	0.05 ^G	0.15	99.00 min ^F
2014	0.50-1.2	0.7	3.9-5.0	0.40-1.2	0.20-0.8	0.10	0.25	0.15 ^H	...	0.05 ^G	0.15	remainder
2014	0.50-1.2	0.7	3.9-5.0	0.40-1.2	0.20-0.8	0.10	0.25	0.15 ^H	...	0.05 ^G	0.15	remainder
2024	0.50	0.50	3.8-4.9	0.30-0.9	1.2-1.8	0.10	0.25	0.15 ^G	...	0.05 ^G	0.15	remainder
2024	0.50	0.50	3.8-4.9	0.30-0.9	1.2-1.8	0.10	0.25	0.15 ^H	...	0.05 ^H	0.15	remainder
2219	0.20	0.30	5.8-6.8	0.20-0.40	0.02	...	0.10	0.02-0.10	0.05-0.15	0.05 ^H	0.15 ^I	remainder
2219	0.20	0.30	5.8-6.8	0.20-0.40	0.02	...	0.10	0.02-0.10	0.05-0.15	0.05 ^I	0.15 ^I	remainder
3003	0.6	0.7	0.05-0.20	1.0-1.5	...	...	0.10	...	...	0.05	0.15	remainder
Alclad 3003	...	3003 Clad with 7072 alloy		...	...	...	...	...	...	...	...	...
3004	0.30	0.7	0.25	1.0-1.5	0.8-1.3	...	0.25	...	...	0.05	0.15	remainder
3102	0.40	0.7	0.10	0.05-0.40	...	...	0.30	0.10	...	0.05	0.15	remainder
5052	0.25	0.40	0.10	0.10	2.2-2.8	0.15-0.35	0.10	...	...	0.05	0.15	remainder
5083	0.40	0.40	0.10	0.40-1.0	4.0-4.9	0.05-0.25	0.25	0.15	...	0.05	0.15	remainder
5086	0.40	0.50	0.10	0.20-0.7	3.5-4.5	0.05-0.25	0.25	0.15	...	0.05	0.15	remainder
5154	0.25	0.40	0.10	0.10	3.1-3.9	0.15-0.35	0.20	0.20	...	0.05 ^G	0.15	remainder
5454	0.25	0.40	0.10	0.50-1.0	2.4-3.0	0.05-0.20	0.25	0.20	...	0.05	0.15	remainder
5456	0.25	0.40	0.10	0.50-1.0	4.7-5.5	0.05-0.20	0.25	0.20	...	0.05	0.15	remainder
6005	0.6-0.9	0.35	0.10	0.10	0.40-0.6	0.10	0.10	0.10	...	0.05	0.15	remainder
6005A	0.50-0.9	0.35	0.30	0.50 ^J	0.40-0.7	0.30 ^J	0.20	0.10	...	0.05	0.15	remainder
6005A	0.50-0.9	0.35	0.30	0.50 ^J	0.40-0.7	0.30 ^J	0.20	0.10	...	0.05	0.15	remainder
6020 ^K	0.40-0.9	0.50	0.30-0.9	0.35	0.6-1.2	0.15	0.20	0.15	...	0.05	0.15	remainder
6041 ^L	0.50-0.9	0.15-0.7	0.15-0.6	0.05-0.20	0.8-1.2	0.05-0.15	0.25	0.15	...	0.05	0.15	remainder
6042 ^M	0.50-1.2	0.7	0.20-0.6	0.40	0.7-1.2	0.04-0.35	0.25	0.15	...	0.05	0.15	remainder
6060	0.30-0.6	0.10-0.30	0.10	0.10	0.35-0.6	0.5	0.15	0.10	...	0.05	0.15	remainder
6061 ^N	0.40-0.8	0.7	0.15-0.40	0.15	0.8-1.2	0.04-0.35	0.25	0.15	...	0.05	0.15	remainder
6061 ^N	0.40-0.8	0.7	0.15-0.40	0.15	0.8-1.2	0.04-0.35	0.25	0.15	...	0.05	0.15	remainder
6063	0.20-0.6	0.35	0.10	0.10	0.45-0.9	0.10	0.10	0.10	...	0.05	0.15	remainder
6064 ^O	0.40-0.8	0.7	0.15-0.40	0.15	0.8-1.2	0.05-0.14	0.25	0.15	...	0.05	0.15	remainder
6066	0.9-1.8	0.50	0.7-1.2	0.6-1.1	0.8-1.4	0.40	0.25	0.20	...	0.05	0.15	remainder
6070	1.0-1.7	0.50	0.15-0.40	0.40-1.0	0.50-1.2	0.10	0.25	0.15	...	0.05	0.15	remainder
6082	0.7-1.3	0.50	0.10	0.40-1.0	0.6-1.2	0.25	0.20	0.10	...	0.05	0.15	remainder
6105	0.6-1.0	0.35	0.10	0.15	0.45-0.8	0.10	0.10	0.10	...	0.05	0.15	remainder
6162	0.40-0.8	0.50	0.20	0.10	0.7-1.1	0.10	0.25	0.10	...	0.05	0.15	remainder
6262	0.40-0.8	0.7	0.15-0.40	0.15	0.8-1.2	0.04-0.14	0.25	0.15	...	0.05 ^K	0.15 ^K	remainder
6262	0.40-0.8	0.7	0.15-0.40	0.15	0.8-1.2	0.04-0.14	0.25	0.15	...	0.05 ^P	0.15 ^P	remainder
6351	0.7-1.3	0.50	0.10	0.40-0.8	0.40-0.8	...	0.20	0.20	...	0.05	0.15	remainder
6360	0.35-0.8	0.10-0.30	0.15	0.02-0.15	0.25-0.45	0.05	0.10	0.10	...	0.05	0.15	remainder
6463	0.20-0.6	0.15	0.20	0.05	0.45-0.9	...	0.05	...	...	0.05	0.15	remainder
6560	0.30-0.7	0.10-0.30	0.05-0.20	0.20	0.20-0.6	0.05	0.15	0.10	...	0.05	0.15	remainder
7005	0.35	0.40	0.10	0.20-0.7	1.0-1.8	0.06-0.20	4.0-5.0	0.01-0.06	...	0.05 ^L	0.15 ^L	remainder
7005	0.35	0.40	0.10	0.20-0.7	1.0-1.8	0.06-0.20	4.0-5.0	0.01-0.06	...	0.05 ^O	0.15 ^O	remainder
7072 ^M	0.7 Si + Fe		0.10	0.10	0.10	...	0.8-1.3	...	...	...	...	remainder
7072 ^R	0.7 Si + Fe		0.10	0.10	0.10	...	0.8-1.3	...	...	...	...	remainder
7075	0.40	0.50	1.2-2.0	0.30	2.1-2.9	0.18-0.28	5.1-6.1	0.20 ^N	...	0.05 ^N	0.15	remainder
7075	0.40	0.50	1.2-2.0	0.30	2.1-2.9	0.18-0.28	5.1-6.1	0.20 ^S	...	0.05 ^S	0.15	remainder
7116	0.15	0.30	0.50-1.1	0.05	0.8-1.4	...	4.2-5.2	0.05	0.05	0.05 ^T	0.15	remainder
7129	0.15	0.30	0.50-0.9	0.10	1.3-2.0	0.10	4.2-5.2	0.05	0.05	0.05 ^O	0.15	remainder
7129	0.15	0.30	0.50-0.9	0.10	1.3-2.0	0.10	4.2-5.2	0.05	0.05	0.05 ^T	0.15	remainder
7178	0.40	0.50	1.6-2.4	0.30	2.4-3.1	0.18-0.28	6.3-7.3	0.20	...	0.05	0.15	remainder

^A Limits are in weight percent maximum unless shown as a range, or stated otherwise.

^B Analysis shall be made for the elements for which limits are shown in this table.

^C For the purpose of determining conformance to these limits, an observed value or a calculated value obtained from analysis shall be rounded to the nearest unit in the last right-hand place of the figures used in expressing the specified limit, in accordance with the rounding-off method of Practice E29.

^D Others include listed elements for which no specific limit is shown as well as unlisted metallic elements. The producer may analyze samples for trace elements not specified in the specification. However, such analysis is not required and may not cover all metallic Others elements. Should any analysis by the producer or the purchaser establish that an Others element exceeds the limit of Each or that the aggregate of several Others elements exceeds the limit of Total, the material shall be considered nonconforming.

^E Other Elements—Total shall be the sum of unspecified metallic elements 0.010 % or more, rounded to the second decimal before determining the sum.

^F The aluminum content shall be calculated by subtracting from 100.00 % the sum of all metallic elements present in amounts of 0.010 % or more each, rounded to the second decimal before determining the sum.

^G Be 0.0003 max for welding electrode, welding rod, and filler wire.

^H Upon agreement between the purchaser and the producer or supplier, a Zr + Ti limit of 0.20 % max is permitted. Properties in Specification (Table 2) are not based on the Zirconium and Titanium algorithm.

^I Zirconium, 0.10-0.25 %. The total for other elements does not include zirconium.

^J Manganese plus chromium shall total 0.12-0.50.

^K Lead 0.05 % max, Tin 0.9-1.5 %.

^L Bismuth 0.30-0.9 %, Tin 0.35-1.2 %.

^M Bismuth 0.20-0.8 % Lead 0.15-0.40 %.

^N In 1965 the requirements for 6062 were combined with those for 6061 by revising the minimum chromium from “0.15 %” to “0.04 %.” This action cancelled alloy 6062.

^O Bismuth 0.50-0.7 %, Lead 0.20-0.40 %.

^P Bismuth and lead shall be 0.40-0.7 % each.

TABLE 2 Continued

Temper	Specified Section or Wall Thickness, in.	Area, in. ²	Tensile Strength, ksi		Yield Strength (0.2 % offset), ksi		Elongation in 2 in. or 4 × Diameter, min, % ^{C,D}		
			min	max	min	max			
T3511 ^E T3511 ^E	{ B0221-08_9	up through 25	70.0	52.0 ^I	10				
		{ B0221-12_9	up through 25	70.0	52.0 ^H	10			
		1.500 and over	over 25	68.0	48.0 ^J	8			
T42 ^G T42 ^F	{ B0221-08_10	up through 0.749	all	57.0	38.0	12			
		{ B0221-12_10	up through 0.749	all	57.0	38.0	12		
		0.750-1.499	all	57.0	38.0	10			
T81 T81 T8510 ^E T8511 ^E	{ B0221-08_11	up through 25	66.0	57.0	38.0	10			
		{ B0221-12_11	up through 25	66.0	57.0	38.0	10		
		1.500 and over	over 25 through 32	66.0	57.0	38.0	8		
T81 T81 T8510 ^E T8511 ^E	{ B0221-08_12	0.050-0.249	all	64.0	56.0	4			
		{ B0221-12_12	0.050-0.249	all	64.0	56.0	4		
		0.250-1.499	all	66.0	58.0	5			
T8511 ^E	{ B0221-08_13	up through 32	66.0	58.0	5				
		1.500 and over	up through 32	66.0	58.0	5			
Alloy 2219 ^E									
Alloy 2219 ^D									
O		all	all	32.0	18.0	12			
T31									
T3510 ^E T3510 ^E	{ B0221-08_13	up through 0.499	up through 25	42.0	26.0	14			
		{ B0221-12_13	up through 0.499	up through 25	42.0	26.0	14		
T3511 ^E T3511 ^E	{ B0221-08_14	0.500-2.999	up through 25	45.0	27.0	14			
		{ B0221-12_14	up through 0.499	up through 25	45.0	27.0	14		
T62 ^G T62 ^F	{ B0221-08_14	up through 0.999	up through 25	54.0	36.0	6			
		{ B0221-12_14	up through 0.999	up through 25	54.0	36.0	6		
T81 T81 T8510 ^E	{ B0221-08_15	1.000 and over	up through 25	54.0	36.0	6			
		{ B0221-12_15	up through 2.999	up through 25	58.0	42.0	6		
T8510 ^E T8511 ^E T8511 ^E	{ B0221-08_15	up through 2.999	up through 25	58.0	42.0	6			
		{ B0221-12_15	up through 2.999	up through 25	58.0	42.0	6		
Alloy 3003 ^E									
Alloy 3003 ^D									
O		all	all	14.0	5.0	25			
H112		all	all	14.0	5.0	25			
Alloy Alclad 3003 ^E									
Alloy Alclad 3003 ^D									
O		all	all	13.0	4.5	25			

TABLE 2 *Continued*

Temper	Specified Section or Wall Thickness, in.	Area, in. ²	Tensile Strength, ksi		Yield Strength (0.2 % offset), ksi		Elongation in 2 in. or 4 × Diameter, min, % ^{C,D}	
			min	max	min	max		
H112	all	all	13.0	...	4.5 ^K	...	25	
H112	all	all	13.0	...	4.5 ^J	...	25	
Alloy 3004 ^E								
Alloy 3004 ^D								
O	all	all	23.0	29.0	8.5	...	...
Alloy 3102								
H112 ^L	0.028–0.050	all	11.0	18.0	4.0	...	25	
H112 ^K	0.028–0.050	all	11.0	18.0	4.0	...	25	
Alloy 5052								
O	all	all	25.0	35.0	10.0	...	...
Alloy 5083 ^E								
Alloy 5083 ^D								
Ø	up through 5.000 ^M	up through 32	39.0	51.0	16.0	...	14	
O	up through 5.000 ^L	up through 32	39.0	51.0	16.0	...	14	
H111	up through 5.000 ^M	up through 32	40.0	...	24.0	...	12	
H111	up through 5.000 ^L	up through 32	40.0	...	24.0	...	12	
H112	up through 5.000 ^M	up through 32	39.0	...	16.0	...	12	
H112	up through 5.000 ^L	up through 32	39.0	...	16.0	...	12	
Alloy 5086 ^E								
Alloy 5086 ^D								
Ø	up through 5.000 ^M	up through 32	35.0	46.0	14.0	...	14	
O	up through 5.000 ^L	up through 32	35.0	46.0	14.0	...	14	
H111	up through 5.000 ^M	up through 32	36.0	...	21.0	...	12	
H111	up through 5.000 ^L	up through 32	36.0	...	21.0	...	12	
H112	up through 5.000 ^M	up through 32	35.0	...	14.0	...	12	
H112	up through 5.000 ^L	up through 32	35.0	...	14.0	...	12	
Alloy 5154								
O	all	all	30.0	41.0	11.0	...	...
H112	all	all	30.0	41.0	11.0	...	...
Alloy 5454 ^E								
Alloy 5454 ^D								
Ø	up through 5.000 ^M	up through 32	31.0	41.0	12.0	...	14	
O	up through 5.000 ^L	up through 32	31.0	41.0	12.0	...	14	
H111	up through 5.000 ^M	up through 32	33.0	...	19.0	...	12	
H111	up through 5.000 ^L	up through 32	33.0	...	19.0	...	12	
H112	up through 5.000 ^M	up through 32	31.0	...	12.0	...	12	
H112	up through 5.000 ^L	up through 32	31.0	...	12.0	...	12	
Alloy 5456 ^E								
Alloy 5456 ^D								
Ø	up through 5.000 ^M	up through 32	41.0	53.0	19.0	...	14	
O	up through 5.000 ^L	up through 32	41.0	53.0	19.0	...	14	
H111	up through 5.000 ^M	up through 32	42.0	...	26.0	...	12	
H111	up through 5.000 ^L	up through 32	42.0	...	26.0	...	12	
H112	up through 5.000 ^M	up through 32	41.0	...	19.0	...	12	
H112	up through 5.000 ^L	up through 32	41.0	...	19.0	...	12	
Alloy 6005								
T1	up through 0.500	all	25.0	...	15.0	...	16	
T5	$\left\{ \begin{array}{l} B0221-08_{16} \\ 0.125-1.000 \end{array} \right.$	up through 0.124	all	38.0	...	35.0	...	8
		$\left\{ \begin{array}{l} B0221-12_{16} \\ 0.124 \end{array} \right.$	up through 0.124	all	...	38.0	...	35.0
T5	0.125–1.000	all	38.0	...	35.0	...	10	
Alloy 6005A								

TABLE 2 Continued

Temper	Specified Section or Wall Thickness, in.	Area, in. ²	Tensile Strength, ksi		Yield Strength (0.2 % offset), ksi		Elongation in 2 in. or 4 × Diameter, min, % ^{C,D}	
			min	max	min	max		
T1	up through 0.249	all	25.0	...	14.5	...	15	
T5	up through 0.249	all	38.0	...	31.0	...	7	
T61	0.250-0.999	all	38.0	...	31.0	...	9	
	up through 0.249	all	38.0	...	35.0	...	8	
	0.250-0.999	all	38.0	...	35.0	...	10	
Alloy 6060								
Alloy 6020								
T5†	up through 0.125	all	22.0	...	16.0	...	10	
T6511	3.250-6.000	all	38.0	...	35.0	...	10	
Alloy 6041								
T6 ^M	0.400-2.000	all	45.0	...	40.0	...	10	
T6511 ^M	0.400-2.000	all	45.0	...	40.0	...	10	
Alloy 6042								
T5	0.400-0.499	all	38.0	...	35.0	...	10	
T5511	0.500-1.800	all	42.0	...	35.0	...	10	
	0.400-0.499	all	38.0	...	35.0	...	10	
	0.500-1.800	all	42.0	...	35.0	...	10	
Alloy 6060								
T51	up through 0.125	all	22.0	...	16.0	...	8	
T61	up through 0.124	all	30.0	...	25.0	...	8	
	0.125-1.000	all	30.0	...	25.0	...	10	
Alloy 6061 ^E								
Alloy 6061 ^D								
O	all	all	...	22.0	...	16.0	16	
T1	up through 0.625	all	26.0	...	14.0	...	16	
T4	} B0221-08_17 B0221-12_17	all	all	26.0	...	16.0	...	16
T4510 ^E								
T4510 ^E	all	all	26.0	...	16.0	...	16	
T4511 ^E	} B0221-08_18 B0221-12_18	all	all	26.0	...	12.0	...	16
T4511 ^E								
T42 ^G	all	all	26.0	...	12.0	...	16	
T42 ^F	all	all	26.0	...	12.0	...	16	
T51	up through 0.625	all	35.0	...	30.0	...	8	
T6, T62 ^G	} B0221-08_18 B0221-12_18	up through 0.249	all	38.0	...	35.0	...	8
T6, T62 ^F								
T6510 ^E	0.250 and over	all	38.0	...	35.0	...	10	
T6511 ^E	0.250 and over	all	38.0	...	35.0	...	10	
T6511 ^E	0.250 and over	all	38.0	...	35.0	...	10	
Alloy 6063								
O	all	all	...	19.0	...	...	18
T4	} B0221-08_19 B0221-12_19	up through 0.500	all	17.0	...	9.0	...	12
T1								
	0.501-1.000	all	16.0	...	8.0	...	12	
T4, T42 ^G	} B0221-08_20 B0221-12_20	up through 0.500	all	19.0	...	10.0	...	14
T4, T42 ^F								
	0.501-1.000	all	18.0	...	9.0	...	14	
T5	} B0221-08_21 B0221-12_21	up through 0.500	all	22.0	...	16.0	...	8
T5								
	0.501-1.000	all	21.0	...	15.0	...	8	

TABLE 2 *Continued*

Temper	Specified Section or Wall Thickness, in.	Area, in. ²	Tensile Strength, ksi		Yield Strength (0.2 % offset), ksi		Elongation in 2 in. or 4 × Diameter, min, % ^{C,D}		
			min	max	min	max			
T52	$\left\{ \begin{array}{l} B0221-08_22 \\ \\ \\ \end{array} \right.$	up through 1.000	all	22.0	30.0	16.0	25.0	8	
T54		up through 0.124	all	33.0	...	30.0	...	8	
T54		$\left\{ \begin{array}{l} B0221-12_22 \\ \text{up through} \\ 0.124 \end{array} \right.$	all	all	33.0	30.0	...
T6, T62 ^G	$\left\{ \begin{array}{l} B0221-08_23 \\ \\ \\ \end{array} \right.$	0.125–0.499	all	33.0	...	30.0	...	10	
T6, T62 ^F		up through 0.124	all	30.0	...	25.0	...	8	
T6, T62 ^F		$\left\{ \begin{array}{l} B0221-12_23 \\ \text{up through} \\ 0.124 \end{array} \right.$	all	all	30.0	25.0	...
T65	0.125–1.000	up through 0.182	all	30.0	...	25.0	...	10	
				36.0	...	33.0	...	8	
Alloy 6064									
T6 ^M	0.400–2.000	all		38.0	...	35.0	...	10	
T6511 ^M	0.400–2.000	all		38.0	...	35.0	...	10	
Alloy 6066									
O	all	all			29.0	...	18.0	16	
T4, T4510,	all	all		40.0	...	25.0	...	14	
T4511 ^E	all	all		40.0	...	25.0	...	14	
T42 ^G	all	all		40.0	...	24.0	...	14	
T42 ^F	all	all		40.0	...	24.0	...	14	
T6, T6510,	all	all		50.0	...	45.0	...	8	
T6511 ^E	all	all		50.0	...	45.0	...	8	
T62 ^G	all	all		50.0	...	42.0	...	8	
T62 ^F	all	all		50.0	...	42.0	...	8	
Alloy 6070									
T6, T62	up through 2.999	up through 32		48.0	...	45.0	...	6	
Alloy 6082									
T6, T6511	$\left\{ \begin{array}{l} B0221-08_24 \\ \\ \\ \end{array} \right.$	0.200–0.750	all	45.0	...	38.0	...	6	
T6, T6511		$\left\{ \begin{array}{l} B0221-12_24 \\ \text{up through} \\ 0.751-6.000 \end{array} \right.$	all	all	45.0	38.0	...
T6, T6511		6.001–8.000	all		41.0	...	35.0	...	6
Alloy 6105									
T1	$\left\{ \begin{array}{l} B0221-08_25 \\ \\ \\ \end{array} \right.$	up through 0.500	all	25.0	...	15.0	...	16	
T5		up through 0.124	all	38.0	...	35.0	...	8	
T5		$\left\{ \begin{array}{l} B0221-12_25 \\ \text{up through} \\ 0.124 \end{array} \right.$	all	all	38.0	35.0	...
	0.125–1.000		all	38.0	...	35.0	...	10	
Alloy 6162									
T5, T5510, ^E	up thru 1.000	all		37.0	...	34.0	...	7	
T5511 ^E	up thru 1.000	all		37.0	...	34.0	...	7	
T6, T6510, ^E	up thru 0.249	all		38.0	...	35.0	...	8	
T6511 ^E	up thru 0.249	all		38.0	...	35.0	...	8	
T6, T6510, ^E	0.250–0.499	all		38.0	...	35.0	...	10	
T6511 ^E									
Alloy 6262									

E716 Practices for Sampling and Sample Preparation of Aluminum and Aluminum Alloys for Determination of Chemical Composition by Spectrochemical Analysis
E1004 Test Method for Determining Electrical Conductivity Using the Electromagnetic (Eddy-Current) Method

TABLE 2 Continued

Temper	Specified Section or Wall Thickness, in.	Area, in. ²	Tensile Strength, ksi		Yield Strength (0.2 % offset), ksi		Elongation in 2 in. or 4 × Diameter, min, % ^{C,D}
			min	max	min	max	
T6	} B0221-08_26 } B0221-12_26	all	all	38.0	...	35.0	10
T6510 ^E T6511 ^E							
T6510 ^E T6511 ^E	} B0221-12_27	all	38.0	...	35.0	...	10
T6510 ^E T6511 ^E							
Alloy 6351							
T1	up through 0.499	up through 20	26.0	...	13.0	...	15
T11	up through 0.749	all	26.0	...	16.0	...	16
T4	up through 0.749	all	32.0	...	19.0	...	16
T5	up through 0.249	all	38.0	...	35.0	...	8
	0.250–1.000	all	38.0	...	35.0	...	10
T51	0.125–1.000	all	36.0	...	33.0	...	10
T54	up through 0.500	all	30.0	...	20.0	...	10
	} B0221-08_28	up through 0.124	all	42.0	...	37.0	8
T6	0.125–0.749	all	42.0	...	37.0	...	10
Alloy 6360							
T5	up through 0.250	all	22.0	...	16.0	...	8
T6	up through 0.120	all	30.0	...	25.0	...	8
	0.121–0.250	all	30.0	...	25.0	...	10
Alloy 6463							
T1	up through 0.500	up through 20	17.0	...	9.0	...	12
T5	up through 0.500	up through 20	22.0	...	16.0	...	8
T6	} B0221-08_29	up through 0.124	all	30.0	...	25.0	8
T6								} B0221-12_29	up through 0.124	all	30.0	...	25.0	8
	0.125–0.500	up through 20	30.0	...	25.0	...	10
Alloy 6560							
T5	0.090–0.125	all	22.0	...	16.0	...	8
T6	0.090–0.125	all	30.0	...	25.0	...	8
Alloy 7005							
T53	up through 0.750	all	50.0	...	44.0	...	10
Alloy 7075 ^E							
Alloy 7075 ^D							
O	all	all	...	40.0	...	24.0	10

E1251 Test Method for Analysis of Aluminum and Aluminum Alloys by Spark Atomic Emission Spectrometry
G34 Test Method for Exfoliation Corrosion Susceptibility in 2XXX and 7XXX Series Aluminum Alloys (EXCO Test)
G47 Test Method for Determining Susceptibility to Stress-Corrosion Cracking of 2XXX and 7XXX Aluminum Alloy Products
Method of Test for Exfoliation Corrosion Susceptibility in 7XXX Series Copper-Containing Aluminum Alloys (EXCO Test) (G 34-72)
Test Method for Determining Susceptibility to Stress-Corrosion Cracking of 2XXX and 7XXX Aluminum Alloy Products
2.3 ANSI Standards:⁴
H35.1 ANSI H35.1/H35.1M Alloy and Temper Designation Systems for Aluminum
H35.2 Dimensional Tolerances for Aluminum Mill Products

⁴The applicable edition in the use of this specification is G34-72, which is available in the gray pages of the *Annual Book of ASTM Standards*, Vol 02.02.
⁴ Available from Aluminum Association, Inc., 1525 Wilson Blvd., Suite 600, Arlington, VA 22209, <http://www.aluminum.org>.

TABLE 2 *Continued*

Temper	Specified Section or Wall Thickness, in.	Area, in. ²	Tensile Strength, ksi		Yield Strength (0.2 % offset), ksi		Elongation in 2 in. or 4 × Diameter, min, % ^{C,D}			
			min	max	min	max				
F6, T62 ^G T6, T62 ^F F6510 ^E T6510 ^E F6511 ^E	B0221-08_30	all	up through 0.249	78.0	...	70.0	...	7		
			up through 0.249	all	78.0	...	70.0	...	7	
	B0221-08_31	0.500-1.499	0.500-1.499	up through 0.249	all	81.0	...	73.0	...	7
				up through 0.249	all	81.0	...	72.0	...	7
	B0221-08_32	1.500-2.999	1.500-2.999	up through 0.249	all	81.0	...	81.0	...	7
				up through 0.249	all	81.0	...	72.0	...	7
	T6511 ^E	3.000-4.499	81.0	up through 20	...	71.0	...	7		
				up through 20	...	71.0	...	7		
		4.500-5.000	78.0	over 20	...	70.0	...	6		
				through 32	...	68.0	...	6		
F73 T73	B0221-08_33	0.062-0.249	up through 20	68.0	...	58.0	...	7		
			up through 20	...	68.0	...	58.0	...	7	
	B0221-12_34	0.250-1.499	0.250-1.499	up through 20	...	70.0	...	61.0	...	8
				up through 25	...	70.0	...	61.0	...	8
	T73510 ^E	0.250-1.499	69.0	up through 25	...	59.0	...	8		
				up through 25	...	59.0	...	8		
	T73511 ^E	1.500-2.999	68.0	up through 20	...	57.0	...	7		
				up through 20	...	57.0	...	7		
	T73510 ^E	3.000-4.499	65.0	over 20 through 32	...	55.0	...	7		
				over 20 through 32	...	55.0	...	7		
F76 T76 F76510 ^E	B0221-08_35	all	up through 0.049	73.0	...	63.0	...	7		
			up through 0.049	all	73.0	...	63.0	...	7	
	B0221-08_36	0.050-0.124	0.050-0.124	up through 0.049	all	74.0	...	64.0	...	7
				up through 0.049	all	74.0	...	64.0	...	7
	B0221-12_36	0.125-0.249	0.125-0.249	up through 20	...	74.0	...	64.0	...	7
				up through 20	...	74.0	...	64.0	...	7
	T76510 ^E	0.125-0.249	75.0	up through 20	...	65.0	...	7		
				up through 20	...	65.0	...	7		
	T76511 ^E	0.250-1.000	75.0	up through 20	...	65.0	...	7		
				up through 20	...	65.0	...	7		
T76511 ^E	1.001-2.000	74.0	up through 20	...	64.0	...	7			
			up through 20	...	64.0	...	7			
T76511 ^E	2.001-3.000	74.0	up through 20	...	63.0	...	7			
			up through 20	...	63.0	...	7			
T76511 ^E	3.001-4.000	74.0	up through 20	...	63.0	...	7			
			up through 20	...	63.0	...	7			
Alloy 7116										
T5	0.125-0.500	all	48.0	...	42.0	...	8			
Alloy 7129										
T5, T6	up through 0.500	all	55.0	...	49.0	...	9			

