

FED. SUPPLY CLASS

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General Notes:

- (1) These charts contain approximate hardness values for use in determining the condition or temper of commonly used aircraft materials. Materials and parts meeting the hardness requirements of these charts may be accepted providing other material property and processing requirements established by individual companies have been satisfactorily met. Material shall not be rejected solely on the basis of failing to meet the hardness requirements of these charts.
 - (2) Procurement specifications are listed for information only and may be superseded at any time.
 - (3) In case of conflict between these values and those given in the applicable procurement specification or individual company specification, the latter specifications, as applicable, shall govern.
 - (4) Additional aluminum alloy hardness values may be obtained from AMS2658.
- * Hardness values followed by an asterisk (*) indicate the data were taken from procurement specifications. All other values were established on the basis of data compiled and analyzed by the subcommittee members.
- ** Specification numbers followed by two asterisks (**) indicates the documents have been cancelled, superseded, inactivated, or are noncurrent.

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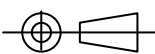
THIRD ANGLE PROJECTION 	CUSTODIAN NATIONAL AEROSPACE STANDARDS COMMITTEE	REVISION 3
PROCUREMENT SPECIFICATION NONE	TITLE CHARTS, ROCKWELL HARDNESS ③	CLASSIFICATION STANDARD PRACTICE D1AS531 SHEET 1 OF 11

CHART A – MAGNESIUM ALLOYS

ALLOY	UNS DESIGNATION	SPECIFICATIONS	FORM	CONDITION	HARDNESS (ROCKWELL)
AZ31B	M11311	AMS4376; AN-M-29**; ASTM B90/B90M; QQ-M-44**; AMS4376; AMS4377	Sheet up to .125 incl.	Condition H – Hard Rolled	74 HRE Min
AZ61A	M11610	QQ-M-31**; Comp. AZ61A; AMS4350; AN-M-24**; ASTM B107/B107M	Extruded bar and shape	As Extruded	63 HRE Min
AZ80A	M11800	QQ-M-40**; ASTM B91; Comp. AZ80A; AN-M-21**; AMS4360**	Forging	As Forged	70 HRE Min

CHART B – NONHEAT TREATABLE ALUMINUM ALLOYS

ALLOY	UNS DESIGNATION	SPECIFICATIONS	FORM	CONDITION	HARDNESS (ROCKWELL)
1100-0	A91100	QQ-A-225/1**; AMS-QQ-A-225/1**; ASTM B211; QQ-A-250/1**; AMS-QQ-A-250/1**; WW-T-700/1**; ASTM B210; AMS4001**; ASTM B209	All	Annealed	50 HRH Max
1100-H14	A91100	QQ-A-225/1**; AMS-QQ-A-225/1**; ASTM B211; QQ-A-250/1**; AMS-QQ-A-250/1**; WW-T-700/1**; AMS4062**; ASTM B209; ASTM B210; AMS4003**	All	Strain-hardened (1/2 hard)	70-85 HRH
3003-0	A93003	QQ-A-225/2**; AMS-QQ-A-225/2**; QQ-A-250/2**; AMS-QQ-A-250/2**; WW-T-700/2**; AMS4065**; ASTM B209; ASTM B210; ASTM B211; AMS4006**	All	Annealed	65 HRH Max
3003-H14	A93003	QQ-A-225/2**; AMS-QQ-A-225/2**; ASTM B211; QQ-A-250/2**; AMS-QQ-A-250/2**; WW-T-700/2**; AMS4067**; ASTM B210; AMS4008**; ASTM B209	All	Strain-hardened (1/2 hard)	80-90 HRH
3003-H16	A93003	QQ-A-225/2**; AMS-QQ-A-225/2**; ASTM B211; QQ-A-250/2**; AMS-QQ-A-250/2**; ASTM B209; WW-T-700/2**; ASTM B210	All	Strain-hardened (3/4 hard)	88-95 HRH; 54-66 HRE; 62-68 HR15T
3003-H18	A93003	QQ-A-225/2**; AMS-QQ-A-225/2**; ASTM B211; QQ-A-250/2**; AMS-QQ-A-250/2**; ASTM B209; WW-T-700/2**; ASTM B210	All	Strain-hardened (full hard)	95-100 HRH; 66-75 HRE; 68-73 HR15T
5052-H34	A95052	QQ-A-225/7**; AMS-QQ-A-225/7**; ASTM B211; QQ-A-250/8**; AMS-QQ-A-250/8; WW-T-700/4**; AMS-WW-T-700/4**; AMS4017	All	Strain-hardened and stabilized (1/2 hard)	95 HRH Min*; 65-72 HR15T*
5052-H36	A95052	QQ-A-225/7**; AMS-QQ-A-225/7**; ASTM B211; QQ-A-250/8**; AMS-QQ-A-250/8; WW-T-700/4**; AMS-WW-T-700/4**	All	Strain-hardened and stabilized (3/4 hard)	73-80 HRE*; 71-75 HR15T*
5052-H38	A95052	QQ-A-225/7**; AMS-QQ-A-225/7**; ASTM B211; QQ-A-250/8**; AMS-QQ-A-250/8; WW-T-700/4**; AMS-WW-T-700/4**	All	Strain-hardened and stabilized (full hard)	80-87 HRE*; 75-79 HR15T*

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3

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Documents
SHEET 2

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CHART C – HEAT TREATABLE ALUMINUM ALLOYS

ALLOY	UNS DESIGNATION	SPECIFICATIONS	FORM	CONDITION	HARDNESS (ROCKWELL)
2014-0	A92014	QQ-A-200/2**; AMS-QQ-A-200/2; QQ-A-250/3**; AMS-QQ-A-250/3; AMS4028**	All	Annealed	95 HRH Max
2014-T6 2014-T6XX	A92014	QQ-A-250/3**; AMS-QQ-A-250/3; QQ-A-200/2**; AMS-QQ-A-200/2; QQ-A-367**; AMS-QQ-A-367; AMS4121; AMS4135**; AMS4133; AMS4153; QQ-A-225/4**; AMS-QQ-A-225/4	All bare products	Sol. heat-treated and artificially aged	78 HRB Min; 102 HRE Min
2024-0	A92024	QQ-A-250/4**; AMS-QQ-A-250/4; WW-T-700/3**; AMS-WW-T-700/3**; QQ-A-200/3**; AMS-QQ-A-200/3; QQ-A-225/6**; AMS-QQ-A-225/6; AMS4035; AMS4087; MIL-T-5063**	All bare products	Annealed	95 HRH Max
2024-0	A92024	QQ-A-250/5**; AMS-QQ-A-250/5; AMS4040	All clad products	Annealed	90 HRH Max
2024-T3, T3XX, T3XXX, T4, T42	A92024	QQ-A-250/4**; AMS-QQ-A-250/4; WW-T-700/3**; AMS-WW-T-700/3**; AMS4037; AMS4086; AMS4088; QQ-A-200/3**; AMS-QQ-A-200/3; QQ-A-225/6**; AMS-QQ-A-225/6; MIL-T-5063**; AMS4120; AMS4152; AMS4164; AMS4165	All bare products	Sol. heat-treated and cold worked or sol. heat-treated and naturally aged	69-81 HRB; 95-104 HRE; 111-118 HRH
2024-T3, T4	A92024	QQ-A-250/5**; AMS-QQ-A-250/5; AMS4034**; AMS4041	Clad products .063 & under	Sol. heat-treated and cold worked or sol. heat-treated and naturally aged	52-71 HRB; 91-100 HRE; 109-116 HRH
			Clad products .064-.091 incl.		52-71 HRB; 93-103 HRE; H109 Min
2219-0	A92219	AMS4031; QQ-A-250/30**; AMS-QQ-A-250/30	All	Annealed	22 HRB Max; 70 HRE Max; 95 HRH Max
2219-T6	A92219	QQ-A-250/30**; AMS-QQ-A-250/30	Bare sheet and plate	Sol. heat-treated and artificially aged	62 HRB Min
2219-T6	A92219	ASTM B209	Clad products .061 & under	Sol. heat-treated and artificially aged	61 HRB Min
			Clad products .062 & up		60 HRB Min
2219-T8	A92219	QQ-A-250/30**; AMS-QQ-A-250/30	Bare sheet and plate	Sol. heat-treated, cold worked, and artificially aged	62 HRB Min
2219-T8	A92219	ASTM B209	Clad products .061 & under	Sol. heat-treated, cold worked, and artificially aged	64 HRB Min
			Clad products .062 & up		63 HRB Min
2219-T6, T62	A92219	AMS2658	Extrusions	Sol. heat-treated and artificially aged	62 HRB Min
2219-T3511	A92219	AMS4163	Extrusions	Sol. heat-treated and cold worked	60 HRB Min
2219-T8511	A92219	AMS4162	Extrusions	Sol. heat-treated, cold worked, and artificially aged	71 HRB Min

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3



Documents
SHEET 3

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CHART C – HEAT TREATABLE ALUMINUM ALLOYS (CONTINUED)

ALLOY	UNS DESIGNATION	SPECIFICATIONS	FORM	CONDITION	HARDNESS (ROCKWELL)
2219-T852	A92219	QQ-A-367**; AMS-QQ-A-367; AMS4144	Hand Forgings	Sol. heat-treated, cold worked, and artificially aged	58 HRB Min
6061-0	A96061	QQ-A-200/8**; AMS-QQ-A-200/8; QQ-A-225/8**; AMS4115; QQ-A-250/11**; AMS4025; WW-T-700/6**; AMS-WW-T-700/6; AMS4080; AMS4079; AMS4160	All bare products	Annealed	75 HRH Max
6061-T6 T6XX, T6XXX	A96061	QQ-A-200/8**; AMS-QQ-A-200/8; QQ-A-225/8**; AMS4117; QQ-A-250/11**; AMS4027; WW-T-700/6**; AMS-WW-T-700/6; MIL-T-7081**; AMS4083; AMS4047**; AMS4082; AMS4150	All bare products	Sol. heat-treated and artificially aged	85-97 HRE
6063-0	A96063	QQ-A-200/9**; AMS-QQ-A-200/9**; ASTM B221; ASTM B241/B241M	Wire, rod, bar shapes and tube; extruded	Annealed	70 HRH Max
6063-T6	A96063	QQ-A-200/9**; AMS-QQ-A-200/9**; ASTM B221; ASTM B241/B241M	Wire, rod, bar shapes and tube; extruded	Sol. heat-treated and artificially aged	70 HRE Min
7049-T73	A97049	QQ-A-367**; AMS-QQ-A-367	Forgings	Sol. heat-treated and stabilized	81 HRB Min
7049-T73	A97049	AMS4157; AMS4159	Extrusions	Sol. heat-treated and stabilized	81 HRB Min
7050-0	A97050	QQ-A-430	Rivet wire and rod	Annealed	22 HRB Max*
7050-T7351	A97050	AMS4050	Bare plate	Sol. heat-treated and stabilized	81 HRB Min
7050-T73511, T736, T73652 T74511	A97050	AMS4341; AMS4107; AMS4342; AMS4108	Extrusions; die and hand forgings	Sol. heat-treated and stabilized	82 HRB Min
7050-T7651, T76511	A97050	AMS4201; AMS4340	Bare plate; extrusions	Sol. heat-treated and stabilized	84 HRB Min
7075-0	A97075	QQ-A-200/11**; AMS-QQ-A-200/11; QQ-A-225/9**; AMS-QQ-A-225/9; QQ-A-250/12**; AMS-QQ-A-250/12; QQ-A-250/13**; AMS-QQ-A-250/13; AMS4044; AMS4048	All	Annealed	95 HRH Max
7075-T6, T6XX, T6XXX	A97075	QQ-A-200/11**; AMS-QQ-A-200/11; QQ-A-225/9**; AMS-QQ-A-225/9; QQ-A-250/12**; AMS-QQ-A-250/12; QQ-A-367**; AMS-QQ-A-367; AMS4045; AMS4122; AMS4139**; AMS4126; AMS4154	All bare products	Sol. heat-treated and artificially aged	84-94 HRB; 104-114 HRE

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3

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