

**5052
2.5Mg-0.25Cr**

Specifications

AMS. See Table 55.
 ASTM. See Table 55.
 SAE. J454
 UNS number. A95052
 Government. Sheet and plate: QQ-A-250/8. Foil: MIL-A-81596. Rolled or cold finished wire, rod, and bar: QQ-A-225/7. Drawn, seamless tube: WW-T-700/4. Rivet wire and rod: QQ-A430. Rivets: MIL-R-24243
 Foreign. Canada: CSA GR20. France: NF A-G2.5C. Italy: UNI P-ALMg2.5. Germany: DIN ALMg2.5. ISO: ALMg2.5

Chemical Composition

Composition limits. 0.25 max Si; 0.40 max Fe; 0.10 max Cu; 0.10 max Mn; 2.2 to 2.8 Mg; 0.15 to 0.35 Cr; 0.10 max Zn; 0.05 max others (each); 0.15 max others (total); rem Al

Applications

Typical uses. Aircraft fuel and oil lines, fuel tanks, miscellaneous marine and transport applications, sheet metal work, appliances, street light standards, rivets and wire. Applications where good workability, very good resistance to corrosion,

high fatigue strength, weldability, and moderate static strength are desired

(10.1 × 10⁶ psi); shear, 25.9 GPa (3.75 × 10⁶ psi); compression, 70.7 GPa (10.3 × 10⁶ psi)

Mechanical Properties

Tensile properties. See Tables 56 and 57.

Shear yield strength. Approximately 55% of tensile yield strength
Compressive yield strength. Approximately the same as tensile yield strength

Hardness. See Table 56.

Poisson's ratio. 0.33

Elastic modulus. Tension, 69.3 GPa

Mass Characteristics

Density. 2.68 Mg/m³ (0.097 lb/in.³) at 20 °C (68 °F)

Thermal Properties

Liquidus temperature. 649 °C (1200 °F)

Solidus temperature. 607 °C (1125 °F)

Coefficient of thermal expansion. Linear:

Table 56 Typical mechanical properties of alloy 5052

Temper	Tensile strength(a)		Yield strength(a)		Elongation, % (a)		Hardness, HB(b)	Shear strength		Fatigue strength(c)	
	MPa	ksi	MPa	ksi	1.6 mm (1/16 in.) thick	12.5 mm (1/2 in.) diam		MPa	ksi	MPa	ksi
O	195	28	90	13	25	27	47	125	18	110	16
H32	230	33	195	28	12	16	60	140	20	115	17
H34	260	38	215	31	10	12	68	145	21	125	18
H36	275	40	240	35	8	9	73	160	23	130	19
H38	290	42	255	37	7	7	77	165	24	140	20

(a) Strengths and elongations unchanged or improved at low temperatures. (b) 500-kg load; 10-mm diam ball. (c) At 5 × 10⁸ cycles; R. R. Moore type test.

Table 57 Typical tensile properties of alloy 5052 at various temperatures

Temper	Temperature		Tensile strength		Yield strength(a)		Elongation, %
	°C	°F	MPa	ksi	MPa	ksi	
O	-196	-320	303	44	110	16	46
	-80	-112	200	29	90	13	35
	-28	-18	193	28	90	13	32
	24	75	193	28	90	13	30
	100	212	193	28	90	13	36
	149	300	159	23	90	13	50
	204	400	117	17	76	11	60
H34	260	500	83	12	52	7.5	80
	316	600	52	7.5	38	5.5	110
	371	700	34	5	21	3	130
	-196	-320	379	55	248	36	28
	-80	-112	276	40	221	32	21
	-28	-18	262	38	214	31	18
	24	75	262	38	214	31	16
H38	100	212	262	38	214	31	18
	149	300	207	30	186	27	27
	204	400	165	24	103	15	45
	260	500	83	12	52	7.5	80
	316	600	52	7.5	38	5.5	110
	371	700	34	5	21	3	130
	-196	-320	414	60	303	44	25
H38	-80	-112	303	44	262	38	18
	-28	-18	290	42	255	37	15
	24	75	290	42	255	37	14
	100	212	276	40	248	36	16
	149	300	234	34	193	28	24

(a) 0.2% offset.

Table 55 Standard specifications for alloy 5052

Mill form	Specification No.	
	AMS	ASTM
Sheet and plate	4015	B209
Sheet, plate, bar and shapes (extruded)	4016, 4017	B221
Wire, rod, and bar (rolled or cold finished)	4114	B211
Tube		
Drawn	4069	B483
Drawn, seamless	4070	B210
Hydraulic	4071	...
Extruded	...	B221
Extruded, seamless	...	B241
Condenser	...	B234
Condenser with integral fins	...	B404
Welded	...	B313, B547
Rivet wire and rod	...	B316
Foil	4004	...

102/Aluminum

Table 58 Typical mechanical properties of alloy 5056

Temper	Tensile strength(a)		Yield strength(a)		Elongation(a)(b), %	Hardness(c), HB	Shear strength		Fatigue strength(d)	
	MPa	ksi	MPa	ksi			MPa	ksi	MPa	ksi
O.....	290	42	152	22	35	65	179	26	138	20
H18.....	434	63	407	59	10	105	234	34	152	22
H38.....	414	60	345	50	15	100	221	32	152	22

(a) Strengths and elongations are unchanged or improved at low temperatures. (b) 12.5-mm (½-in.) diam; round specimen. (c) 500-kg load; 10-mm diam ball. (d) At 5×10^8 cycles, R. R. Moore type test.

Table 59 Typical tensile properties of alloy 5056

Temperature range	Average coefficient		Temper	Temperature		Tensile strength(a)		Yield strength(a)		Elongation, %
	°C	°F		°C	°F	MPa	ksi	MPa	ksi	
-50-+20	-58-+68	22.1	O.....	24	75	290	42	150	22	35
				149	300	214	31	117	17	55
20-100	68-212	23.8	H38.....	204	400	152	22	90	13	65
				260	500	110	16	69	10	80
20-200	68-392	24.8	O.....	316	600	76	11	48	7	100
				371	700	41	6	28	4	130
20-300	68-572	25.7	H38.....	24	75	414	60	345	50	15
				149	300	262	38	214	31	30
				204	400	179	26	124	18	50
				260	500	110	16	69	10	80
				316	600	76	11	48	7	100
				371	700	41	6	28	4	130

Volumetric: $69 \times 10^{-6} \text{ m}^3/\text{m}^3\text{-K}$ ($3.83 \times 10^{-5} \text{ in.}^3/\text{in.}^3\text{-}^\circ\text{F}$) at 20 °C (68 °F)

Specific heat. 900 J/kg·K (0.215 Btu/lb·°F) at 20 °C (68 °F)

Thermal conductivity. 137 W/m·K (79.2 Btu/ft·h·°F) at 20 °C (68 °F)

Electrical Properties

Electrical conductivity. Volumetric, O and H38 tempers: 35% IACS at 20 °C (68 °F)

Electrical resistivity. O and H38 tempers: 49.3 nΩ·m at 20 °C (68 °F); temperature coefficient, 0.1 nΩ·m per K at 20 °C (68 °F)

Electrolytic solution potential. -0.85 V vs 0.1N calomel electrode in an aqueous solution containing 53 g NaCl plus 3 g H₂O₂ per litre

Fabrication Characteristics

Annealing temperature. 343 °C (650 °F); holding at temperature not required

Hot working temperature. 260 to 510 °C (500 to 950 °F)

5056, Alclad 5056 5.0Mg-0.1Mn-0.1Cr

Specifications

AMS. Rolled or cold finished wire, rod and bar: 4182. Foil: 4005
ASTM. Rivet wire and rod: B316. Rolled or cold finished wire, rod and bar: B211. Alclad, rolled or cold finished wire, rod and bar: B211
SAE. J454

UNS number. A95056

Government. Rivet wire and rod: QQ-A430. Foil: MIL-A-81596

Foreign. Austria: AlMg5. Canada: CSA-GM50R. United Kingdom: BS N6 2L58. Germany: DIN AlMg5. ISO: AlMg5

Chemical Composition

Composition limits. 5056: 0.30 max Si; 0.40 max Fe; 0.10 max Cu; 0.05 to 0.20 Mn; 4.5 to 5.6 Mg; 0.20 max Cr; 0.10 max Zn; 0.05 max others (each); 0.15 max others (total); rem Al. Alclad 5056: 6253 cladding—Si, 45 to 65% of Mg content; 0.50 max Fe; 0.10 max Cu; 1.0 to 1.5 Mg; 0.15 to 0.35 Cr; 1.6 to 2.4 Zn; 0.05 max others (each); 0.15 max others (total); rem Al

Applications

Typical uses. Rivets for use with magnesium alloy and cable sheathing; zipper stock, nails; also Alclad wire is extensively used in fabrication of insect screens and other applications where wire products with good resistance to corrosion are required

Mechanical Properties

Tensile properties. See Tables 58, 59 and 60. Elongation, O temper:

Table 60 Mechanical-property limits for alloy 5056—rolled or cold finished wire, rod, and bar

Temper	Tensile strength (min)	
	MPa	ksi
Bare Product		
O.....	315 (max)	46 (max)
H111.....	305	44
H12.....	315	46
H32.....	305	44
H14.....	360	52
H34.....	345	50
H18.....	400	58
H38.....	380	55
H192.....	415	60
H392.....	400	58
Alclad 5056		
H192.....	360	52
H392.....	345	50
H393.....	370(a)	54

(a) Yield strength (min), 325 MPa (47 ksi).

20% in 2 in. or 4d, where d is diameter of reduced section of tension test specimen

Shear yield strength. Approximately 55% of tensile yield strength
Compressive yield strength. Ap-