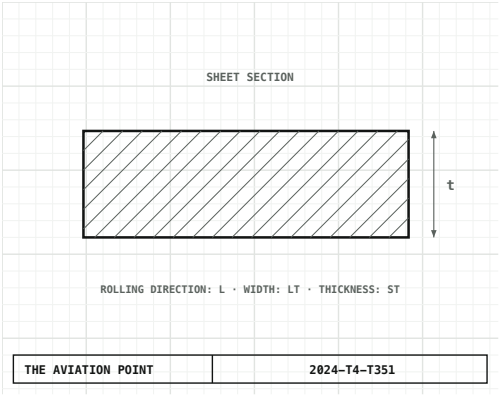
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2024-T4 / T351 — wrought aluminum alloy

The same alloy as 2024-T3 in two neighbouring tempers.



Schematic

Designation

Item	Value
Designation	2024-T4 / T351
Class	Aluminum
Type	wrought aluminum alloy

Composition

Element	Limit
Si	0.50
Fe	0.50
Cu	3.8–4.9
Mn	0.30–0.9
Mg	1.2–1.8
Cr	0.10
Zn	0.25
Ti	0.15
Al	Remainder

A single number is a maximum. Other elements: 0.05 each, 0.15 total, except where the Teal Sheets say otherwise. Source: Aluminum Association Teal Sheets (Aug 2018).

Specifications and forms

Specification	Form
AMS 4037	Bare sheet and plate
AMS 4035	Bare sheet and plate
AMS-QQ-A-250/4	Bare sheet and plate
AMS-QQ-A-250/5	Clad sheet and plate
AMS 4120, AMS-QQ-A-225/6	Bar, rod, wire
AMS 4152, AMS 4164, AMS 4165, AMS-QQ-A-200/3	Extrusion
AMS 4086, AMS-WW-T-700/3	Drawn tubing

Specifications as listed by MIL-HDBK-5J. Federal QQ-A specifications passed to SAE as AMS-QQ-A. Check the current revision.

Properties

Property	Value	Source
Temper T4	Solution heat-treated, naturally aged to a stable condition	AC 43.13-1B Table 4-4
Temper T351	Solution heat-treated, stretched 1 to 3 % permanent set	AC 43.13-1B Table 4-4
Density	0.100 lb/in³ (2.78 g/cm³)	MIL-HDBK-5J; Teal Sheets
Brinell hardness, 2024-T4	120 (500 kg load, 10 mm ball)	AC 43.13-1B Table 4-5
Arc welding / spot welding	C (limited) / B (special techniques)	MIL-HDBK-5J Table 3.1.3.4(a)
Stress corrosion, 2024-T3, T4 plate	L: A · LT: B · ST: D (lowest)	MIL-HDBK-5J Table 3.1.2.3.1(a)

The AC lists 2024 among aluminum alloys not to be welded (par. 4-89d). The handbook's C rating is a relative rating, not a permission.

Design allowables, 2024-T4 coiled sheet and T351 plate

Property, ksi	T4 A	T4 B	T351 A	T351 B
Ftu, L	62	64	64	66
Ftu, LT	62	64	64	66

Reference data. The aircraft manufacturer's documentation (SRM / IPC) takes precedence.

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Property, ksi	T4 A	T4 B	T351 A	T351 B
Fty, L	40	42	48	50
Fty, LT	40	42	42	44
Fcy, L	40	42	39	41
Fcy, LT	40	42	45	47
Fsu	37	38	38	39
Fbru, e/D = 1.5	93	96	97	100
Fbru, e/D = 2.0	118	122	119	122
Fbry, e/D = 1.5	56	59	72	76
Fbry, e/D = 2.0	64	67	86	90

T4: coiled sheet, 0.010–0.249 in, AMS-QQ-A-250/4, Table 3.2.3.0(b2), p. 3-72. T351: plate, 0.250–0.499 in, AMS 4037 and AMS-QQ-A-250/4, Table 3.2.3.0(b1), p. 3-71. S, A and B are the MIL-HDBK-5J statistical bases. L is the longitudinal grain direction, LT the long transverse. Bearing values are dry-pin values.

Minimum bend radius, inches (AMT Handbook Chart 204)

Alloy and temper	0.020"	0.032"	0.040"	0.063"	0.125"	0.190"
2024-T3, 2024-T4	.09	.12	.16	.22	.50	1.00
2024-T6	.09	.12	.16	.25	.62	1.00

Selected thicknesses from FAA-H-8083-31B Chart 204, p. 4-61. Chart 204 and AC Table 4-6 do not agree everywhere: where they differ, use the larger radius or the SRM.

Bend radii (AC 43.13-1B Table 4-6)

Alloy and temper	0.016"	0.032"	0.064"	0.128"	0.182"	0.258"
2024-O	0	0 – 1t	0 – 1t	0 – 1t	0 – 1t	0 – 1t
2024-T3	1½t – 3t	2t – 4t	3t – 5t	4t – 6t	4t – 6t	5t – 7t

Recommended radii for 90-degree bends, as multiples of sheet thickness t. Alclad sheet may go slightly tighter than bare (Table 4-6 note 1). The drawing or SRM governs.

Weight by thickness

Thickness, in	mm	lb/ft²	kg/m²
0.016	0.41	0.230	1.12
0.020	0.51	0.288	1.41
0.025	0.64	0.360	1.76
0.032	0.81	0.461	2.25
0.040	1.02	0.576	2.81
0.050	1.27	0.720	3.52
0.063	1.60	0.907	4.43
0.071	1.80	1.022	4.99
0.080	2.03	1.152	5.62
0.090	2.29	1.296	6.33
0.100	2.54	1.440	7.03
0.125	3.17	1.800	8.79

Computed for density 0.100 by our sheet weight calculator. Kilograms and millimetres converted.

Notes

- **Not a source of design allowables.** Values are for reference. MMPDS and the SRM govern a repair.
- **Not a substitution approval.** A different alloy or temper needs approved data.
- **Not for welding.** AC par. 4-89d lists 2024 among alloys not to be welded.

SOURCES · FAA AC 43.13-1B CHG 1, Chapters 4 and 7 · FAA-H-8083-31B, AMT Handbook — Airframe, Volume 1, Chapter 4 · MIL-HDBK-5J, Chapter 3 · Aluminum Association, International Alloy Designations, rev. Aug 2018 · MMPDS

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