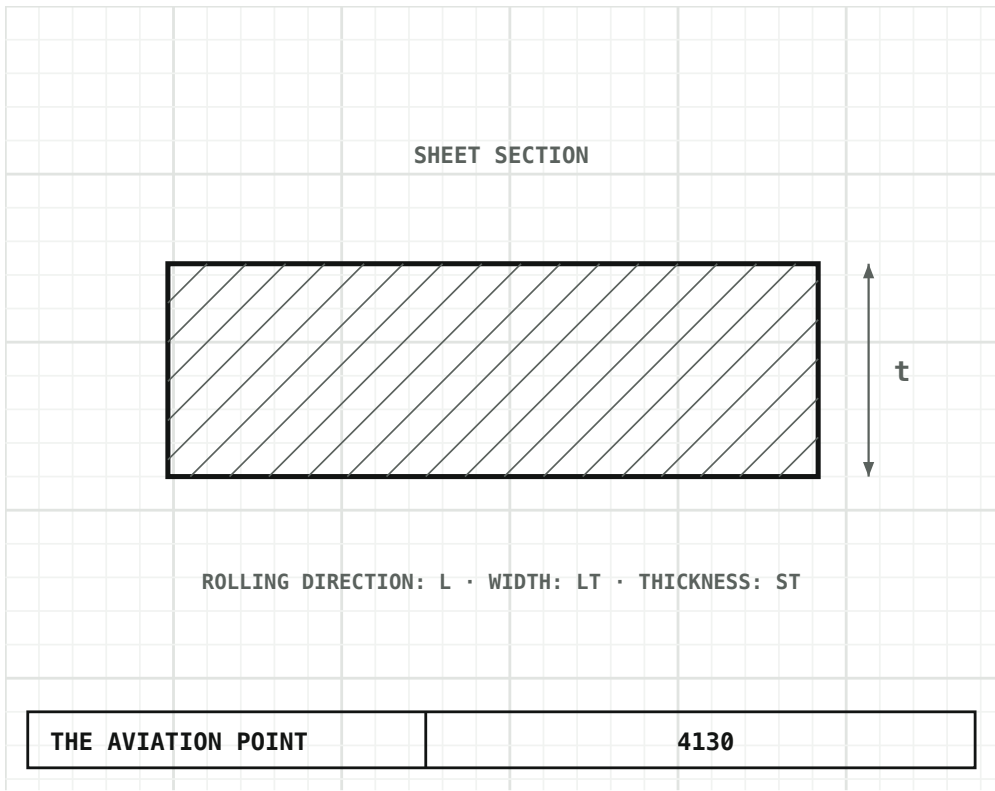
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4130 — chromium-molybdenum steel

The tubular fuselage and engine-mount steel.



Schematic

Designation

Item	Value
Designation	4130
Class	Steel and stainless
Type	chromium-molybdenum steel

Composition

Item	Limit	Source
Composition	Chromium 0.80–1.10 %, molybdenum 0.15–0.25 %, carbon 0.28–0.33 %	AC 43.13-1B CHG 1, Chapter 4, Section 1, designation of “4130”; Table 4-2

Properties

Property	Value	Source
Interchangeable tubing	Welded to MIL-T-6731 and seamless to MIL-T-6736	AC 43.13-1B CHG 1, par. 4-3a
Sheet, strip and plate specification	AMS 6345, normalized or otherwise heat treated	SAE AMS6345 (title)
Normalizing	Heat to about 150–225 °F above the critical range, cool in still air; soak about ¼ hour per inch of thickness	AC 43.13-1B CHG 1, par. 4-1c
TIG welding, wall under 0.120 in	Preheat not necessary; post-weld stress relief still recommended	FAA-H-8083-31, Chapter 5, TIG Welding 4130 Steel Tubing

Table 4-6 (bend radii) covers aluminum only, so there is no bend radius for 4130 on this page. The drawing or SRM gives it.

Design allowables — AISI 4130 sheet, strip, plate and tubing

Property	S basis	Unit
Ftu	95	ksi
Fty	75	ksi
Fcy	75	ksi
Fsu	57	ksi
Fbru, e/D = 1.5	—	ksi
Fbru, e/D = 2.0	200	ksi
Fbry, e/D = 1.5	—	ksi
Fbry, e/D = 2.0	129	ksi
Elongation, sheet, strip and plate, under 0.062 in (minimum)	8	%

Property	S basis	Unit
Elongation, sheet, strip and plate, over 0.062 to 0.125 in (minimum)	10	%
Elongation, sheet, strip and plate, over 0.125 to 0.187 in (minimum)	12	%
Elongation, tubing (L), full tube, wall up to 0.035 in (minimum)	10	%
Elongation, tubing (L), full tube, wall over 0.035 to 0.188 in (minimum)	12	%
E	29.0	10^3 ksi
Ec	29.0	10^3 ksi
G	11.0	10^3 ksi
Density	0.283	lb/in^3

Form: sheet, strip, plate and tubing; condition: normalized and tempered, stress relieved; specification: AMS 6360, AMS 6373, AMS 6374, AMS-T-6736 and AMS-S-18729; thickness or diameter 0.188 in and under. The handbook gives S basis only for 4130, with no A or B values and no L or LT direction, so there is no B column. Design values apply only to parts for which the Ftu has been substantiated by adequate quality control testing (handbook footnote b). Elongation is from Table 2.3.1.0(d), p. 2-21 (condition N). Source: MIL-HDBK-5J (31 Jan 2003), Table 2.3.1.0(c1), p. 2-17. MIL-HDBK-5J (2003) is superseded by MMPDS; check current MMPDS before design use. Density 0.283 lb/in^3 is about 7.83 g/cm^3 (converted); the sheet weight calculator uses the same figure.

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

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Heat treatment and conditions

Condition	Design strength	Source
Normalized and tempered, stress relieved (sheet, tube)	Ftu 95 / Fty 75 ksi up to 0.188 in	MIL-HDBK-5J, Table 2.3.1.0(c1)
Quenched and tempered tube, low level	Ftu 125 / Fty 100 ksi	MIL-HDBK-5J, Table 2.3.1.0(c2)
Quenched and tempered tube, middle level	Ftu 150 / Fty 135 ksi	MIL-HDBK-5J, Table 2.3.1.0(c2)
Quenched and tempered tube, high level	Ftu 180 / Fty 165 ksi, all walls	MIL-HDBK-5J, Table 2.3.1.0(c2)

Forms and thicknesses in stock

Distributor sheet	Listed	Thickness, in
4130 Steel Sheets	MIL-S-6345A · 0.025"–0.250"	.025, .032, .040, .050, .063, .071, .080, .090, .100, .125, .190, .250
4130 Steel Sheet	0.025"–0.250" · sheared sizes	.025, .032, .040, .050, .063, .071, .080, .090, .100, .125, .190, .250
4130 Alloy Steel Round Seamless	3/16"–2-3/4" OD · 1–24 ft	.028, .035, .049, .058, .065, .083, .095, .120, .125, .156, .188, .250
4130 Airframe Square & Rectangular Tubing MIL-T-6736 Normalized	MIL-T-6736 · 14 sizes · lb/ft	.035, .049, .065
4130 Streamline Tubing	13 sizes · round equivalents	.035, .049, .065

As distributors list them, not a statement of what a specification allows.

Notes

- **Not a source of design allowables.** The strength depends on heat treatment and form. Use MMPDS with the basis; the SRM governs a repair.
- **Not a substitute for an aluminum tube or the reverse.** Different weight, stiffness and corrosion behaviour. Material substitution in a structural repair is approved-data territory.
- **Weld repair of tube structure is a procedure, not a tip.** The AC and the SRM define acceptable repairs (AC 43.13-1B, Chapter 4).

SOURCES · FAA AC 43.13-1B CHG 1, Chapter 4 — Section 1, pars. 4-1 to 4-3, Table 4-2; par. 4-89 · FAA-H-8083-31, AMT Handbook — Airframe, Volume 1, Chapter 5 · SAE AMS6345, Steel, Sheet, Strip, and Plate 0.95Cr-0.20Mo, Normalized or Otherwise Heat Treated · MIL-HDBK-5J, Metallic Materials and Elements for Aerospace Vehicle Structures · MIL-HDBK-5J, Table 2.3.1.0, p. 2-17 · MIL-HDBK-5J, Table 2.3.1.0, p. 2-21 · FAA AC 43.13-1B CHG 1 · MIL-HDBK-5J, Metallic Materials and Elements for Aerospace Vehicle Structures · MMPDS · Distributor listings

SCAN · OPEN THIS DATA SHEET
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Reference data. The aircraft manufacturer's documentation (SRM / IPC) takes precedence.

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