

DBT Sanctioned materials

Mechanical Properties, Order & Supply Information

Airframe:

Ally sheet: 2014a-T3[#] - 0.4, 0.5, 0.6, 0.7, 0.9, 1.0 mm
supplied as ~ 1m x 0.3m sheets - on order

Airframe assembly:

Ally Pop rivets[#]: Ø 3/32" (2.4mm) and Ø 1/82" (3.2mm)
Adhesive[#]: Epoxy (Araldite) or Acrylic (Loctite/ 3M Scotch-Weld)
Standard quantities supplied, further on order

Forward and rear false structure and flaps:

Ally sheet: 2014a-T3 - 0.4mm - standard quantity supplied
Styrofoam 700A - standard quantity supplied

[#] Properties and costs given in appendix

Mechanisms

"Standard" stock materials include:

3D printed plastic (typically ABS plastic)

Ally 5251-H22 sheet and angles of various sizes - on request only

Plastic mechanisms parts (cogs, worm gears and racks etc.) - various limited stock

Rods, ally, steel, other - various limited stock.

Fasteners - nuts and bolts from main student workshop (some limited supplies also in Aero mezzanine workshop store).

Note, Teams can also source their own mechanisms parts and propose to the unit organisers for supply.

Jig & Tooling:

Jig Block-board: 25mmx1700x305mm, 25x610x305mm - supplied as standard

Stainless steel jig brackets of various sizes - supplied as standard.

Tooling MDF board: 9x610x305 - laser cut to specified tooling shape

Ally sheet: 5251-H22 - 0.6, 0.9, 1.2mm - limited stock - on request only

Ally Angle: 5251-H22 - various sizes - on request only

Appendix

Properties of materials

Ally sheet 2014a-T3 (Wilson's) Sanctioned for DBT Airframe

2014a-T3 aluminium alloy sheet in 0.4mm, 0.5mm and 0.6mm nominal gauges

Density	ρ	2800	kg/m ³
Youngs Modulus	E	73000	N/mm ²
Ultimate Tensile Strength	σ_{ult}	385 [#]	N/mm ²
Ultimate shear strength	τ_{ult}	222 [*]	N/mm ²
Ultimate Bearing Strength	σ_{br}	#	N/mm ²
0.2% Tensile proof stress	$\sigma_{0.2\%}$	245	N/mm ²
Elongation (min)	ϵ_{ULT}	13	%

Standard delivered sheet sizes: nominally ~ 1000x330mm

Cost: All gauges £10:00 / sheet

Delivery: One week from submission of order

Note! Late orders at double cost

Note! Useable material/item refund available at half standard cost

* Shear strength estimated from Ult tensile strength $\div \sqrt{3}$ when value not directly available. I.e. based on the Energy of Distortion failure criterion

Bearing strength estimated from Ult tensile strength $\times 1.5$

Fasteners - Dome-head Aluminium/Steel Pop Rivets
Sanctioned for DBT wing assembly

Diameter: Ø 1/8", 3.2mm , Various Shank lengths: from 6mm up
Single shear allowable load: 0.65kN

Cost: £10.00 per 1000pk

Diameter: Ø 3/32", 2.4mm, various shank lengths from 5mm up
Single shear allowable load: 0.35kN

Cost: £10.00 per 1000pk

One pack supplied as standard/ extra on request at standard price

* Full pro-rata refund for rivets.

Adhesives

Sanctioned for DBT wing assembly

Epoxy (Araldite) - ally/foam

Adhesive shear strength, $\tau_a^*_{ULT}$, = 10 N/mm².

Acrylic (Loctite/ 3M Scotch-Weld) - ally/ally

Adhesive shear strength, $\tau_a^*_{ULT}$, = 10 N/mm².

Hot melt thermoplastic adhesive adhesive - ally/foam

Glue stick spec tba

Ally sheet/angles 5251-H22 (Durbins)

*** Sanctioned for mechanism brackets, tooling and wind tunnel fairings only**

Aluminium Alloy Sheet

5251-H22 aluminium alloy sheet in 0.6mm, 0.9mm and 1.2mm nominal gauges as supplied.

Density	ρ	2700	kg/m ³
Youngs Modulus	E	70000	N/mm ²
Ultimate Tensile Strength	σ_{ult}	210	N/mm ²
Ultimate shear strength	τ_{ult}	125	N/mm ²
Ultimate Bearing Strength	σ_{br}	315	N/mm ²
0.2% Tensile proof stress	$\sigma_{0.2\%}$	165	N/mm ²

Small amounts supplied on request, only limited stocks

Ally sheet/angles 6082 - T6 (Durbins)

*** Sanctioned for mechanism brackets, tooling and wind tunnel fairings only**

Aluminium Angle

6082-T6 aluminium alloy

Density	ρ	2700	kg/m ³
Youngs Modulus	E	70000	N/mm ²
Ultimate Tensile Strength	σ_{ult}	340	N/mm ²
Ultimate shear strength	τ_{ult}	210	N/mm ²
Ultimate Bearing Strength	σ_{br}	*	N/mm ²
0.2% Tensile proof stress	$\sigma_{0.2\%}$	310	N/mm ²
Elongation (min)	ϵ_{ULT}	11	%

Small amounts supplied on request, only limited stocks