COMPARISONS OF DIFFERENT CROSS SECTIONS TO BE USED TO BUILD CHASSIS FRAME

Factors to keep in mind before selecting the cross sections:

>Strength

>Ergonomics

>Availability and cost

Initial calculations:

>The chassis is considered as a beam that is simply supports on the wheels

Loads acting on the chassis:

Static loading

Kerb weight : 150Kg= 1500N

With payload of riders: 160Kg= 1600N

Total load with riders : 310Kg= 3100N

LOCATION of this load acting is assumed to be slightly offsetted from the CG of the battery because it constitutes to the maximum volume of

Most dense component in the vehicle.

Different cross sections to be used to design the chassis:

>circular

>rectangle

>c section

Other stiffer structures like (I section) are not used here because the standard sections are

Not suitable for our needs and the chassis frame would be over designed.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Standard Profile Aluminium Extrusions - Aluminium Rectangular Tube** | | | | | | | |
| **Aluminium Rectangular Tube** | **Imperial (inches)** | | | **Metric (mm)** | | | |
| **Die Number** | **A** | **B** | **T** | **A** | **B** | **T** | **Kg/m** |
| [2234RHS - Serrations](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_2234_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 12.73 | 9.13 | 1.30 | 0.164 |
| [7219RHS - INT/EXT Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_7219_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 15.43 | 9.86 | 1.24 | 0.151 |
| [6177RHS - Rad on end face](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_6177_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 16.05 | 4.90 | 1.40 | 0.133 |
| [8736RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_8736_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 16.20 | 9.00 | 1.50 | 0.181 |
| [9444RHS - Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_9444_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 17.00 | 15.00 | 1.50 | 0.233 |
| [3124RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_3124_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 18.00 | 8.50 | 1.50 | 0.191 |
| [6816RHS - INT Rad](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_6816_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 19.00 | 9.00 | 2.00 | 0.288 |
| [2419RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_2419_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 19.00 | 11.00 | 1.50 | 0.220 |
| [8064RHS - INT/EXT Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_8064_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 19.05 | 9.52 | 1.24 | 0.175 |
| [5011RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_5011_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 19.05 | 9.53 | 1.21 | 0.172 |
| [2555RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_2555_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 19.40 | 5.40 | 1.20 | 0.142 |
| [6610RHS - INT/EXT Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_6610_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 22.00 | 15.00 | 1.40 | 0.235 |
| [7139RHS - INT/EXT Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_7139_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 22.10 | 9.96 | 1.24 | 0.189 |
| [5041RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_5041_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 23.88 | 57.15 | 3.33 | 1.420 |
| [4841RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_4841_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 24.00 | 22.00 | 2.20 | 0.464 |
| [1679RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_1679_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 25.00 | 14.00 | 1.50 | 0.292 |
| [2283RHS - Rad on one corner](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_2283_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 25.00 | 16.00 | 0.25 | 0.261 |
| [3743RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_3743_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 25.00 | 20.00 | 3.00 | 0.634 |
| [6240RHS - Full rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_6240_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 25.40 | 7.87 | 0.91 | 0.140 |
| [5868RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_5868_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 25.40 | 8.00 | 1.00 | 0.165 |
| [2452RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_2452_Rectangular_Tube_Aluminium_Extrusion.html) | 1 | 3/8 | 18G | 25.40 | 9.53 | 1.20 | 0.202 |
| [2648RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_2648_Rectangular_Tube_Aluminium_Extrusion.html) | 1 | 1/2 | 18G | 25.40 | 12.70 | 1.22 | 0.236 |
| [4790RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_4790_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 25.40 | 12.70 | 1.60 | 0.290 |
| [4998RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_4998_Rectangular_Tube_Aluminium_Extrusion.html) | 1 | 1/2 | 1/16 | 25.40 | 12.70 | 1.62 | 0.306 |
| [8273RHS - INT/EXT Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_8273_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 25.40 | 12.70 | 1.98 | 0.337 |
| [8719RHS - INT/EXT Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_8719_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 25.40 | 12.70 | 1.22 | 0.218 |
| [4061RHS - INT/EXT Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_4061_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 25.40 | 19.05 | 1.22 | 0.300 |
| [4894RHS - INT/EXT Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_4894_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 25.53 | 14.86 | 1.27 |  |
| [4826RHS - INT Rad](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_4826_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 27.94 | 16.44 | 1.52/1.27 | 0.324 |
| [8393RHS - INT Rad](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_8393_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 28.00 | 18.00 | 2/1.2 | 0.366 |
| [9759RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_9759_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 28.00 | 20.00 | 3.00 | 0.683 |
| [0525RHS - Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_0525_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 30.00 | 20.00 | 2.25 | 0.525 |
| [9060RHS - INT/EXT Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_9060_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 31.00 | 20.00 | 3.18/2.49 | 0.657 |
| [A020RHS - Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_A020_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 31.75 | 15.88 | 1.62 | 0.389 |
| [7869RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_7869_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 32.00 | 10.00 | 1.5/2 | 0.336 |
| [2857RHS - INT/EXT Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_2857_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 32.00 | 20.50 | 1.44/2.69 |  |
| [6170RHS - Full rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_6170_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 34.24 | 21.54 | 1.24 | 0.307 |
| [4741RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_4741_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 34.85 | 15.80 | 1.63 | 0.455 |
| [6633RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_6633_Rectangular_Tube_Aluminium_Extrusion.html) | Int.Rad 0.40mm Ext.rad.2.03mm |  |  | 34.85 | 15.80 | 1.63 | 0.409 |
| [0892RHS - Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_0892_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 38.10 | 19.05 | 1.62 | 0.474 |
| [2265RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_2265_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 34.93 | 31.75 | 1.59 | 0.545 |
| [2282RHS - Rad on one corner](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_2282_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 35.00 | 25.00 | 1.25 | 0.390 |
| [6213RHS - Full rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_6213_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 37.90 | 24.90 | 2.00 | 0.652 |
| [4649RHS - INT Rad](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_4649_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 38.10 | 17.52 | 1.62 | 0.459 |
| [4740RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_4740_Rectangular_Tube_Aluminium_Extrusion.html) | 1 1/2 | 3/4 | 3/64 | 38.10 | 19.05 | 1.22 | 0.347 |
| [9773RHS - INT/EXT Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_9773_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 38.10 | 25.40 | 1.65 | 0.520 |
| [8774RHS - INT/EXT Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_8774_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 38.15 | 23.72 | 1.65 | 0.505 |
| [3808RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_3808_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 39.45 | 12.70 | 1.63/2.30 | 0.466 |
| [3846RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_3846_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 40.00 | 20.00 | 2.00 | 0.607 |
| [6469RHS - Full rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_6469_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 40.33 | 15.82 | 1.24 | 0.319 |
| [5773RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_5773_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 40.64 | 22.10 | 1.27 | 0.382 |
| [8986RHS - INT Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_8986_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 40.64 | 23.88 | 1.27 | 0.431 |
| [9277RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_9277_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 40.64 | 24.64 | 1.65/1.27 | 0.521 |
| [7322RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_7322_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 41.28 | 22.23 | 3.25 | 1.004 |
| [0639RHS - Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_0639_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 41.30 | 12.70 | 1.20 | 0.305 |
| [4701RHS - INT/EXT Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_4701_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 44.45 | 15.88 | 1.6/1.1 | 0.361 |
| [6410RHS - Unequal wall](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_6410_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 48.05 | 14.37 | 2.65 | 0.909 |
| [9740RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_9740_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 49.85 | 8.55 | 1.50 | 0.465 |
| [9739RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_9739_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 49.85 | 12.05 | 1.20 | 0.482 |
| [9102RHS - INT Rad](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_9102_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 57.15 | 25.40 | 2.03 | 0.886 |
| [9981RHS - INT/EXT Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_9981_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 60.00 | 26.25 | 1.50 | 0.660 |
| [8240RHS](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_8240_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 67.60 | 41.10 | 8.5/3.45 | 3.689 |
| [9608RHS - INT/EXT Rads](http://www.capalex.co.uk/standards/Individual_Dies_English/Die_9608_Rectangular_Tube_Aluminium_Extrusion.html) |  |  |  | 77.00 | 61.00 | 3.00 | 1.994 |



