

# BS 1161 : 1977

## Aluminium alloy sections for structural purposes

### Sizes and Tolerances

The dimensional tolerances shall comply with the following tables

- Table 1. Tolerances on length, width, depth and thickness
- Table 2. Tolerances on open ends of channels and I sections
- Table 3. Tolerances on straightness
- Table 4. Tolerances on twist

For the purpose of establishing tolerances on width, depth and thickness, sections shall be divided into a series of equivalent rectangles that overlap where they intersect, an angle for example, being divided into two

rectangles. For determining the tolerances, the greater dimension of each such rectangle shall be the same as the corresponding outside dimension a or b and the thickness of each rectangle shall be that for the corresponding leg, flange or web as if it were of uniform thickness

A maximum tolerance on concavity and convexity of 0.05mm per 10mm shall apply over the width of the section

The geometrical properties are based on sections with normal (unspecified) corner radi as **Table 5**

**Table 1. Tolerances on length, width, depth and thickness**

* Length														† Width or depth		· Thickness	
300 mm up to and inc. 1000mm	Over 1000 mm up to and inc. 1.5m	Over 1.5m up to and inc. 5m	Over 5m up to and inc. 7m	Over 7m up to and inc. 10m	Over 10m	Width or depth		Tolerance	Up to and inc. 1.6mm	Over 1.6 mm up to and inc. 3 mm	Over 3 mm up to and inc. 6 mm	Over 6 mm up to and inc. 10 mm	Over 10 mm up to and inc. 15 mm				
± mm	± mm	± mm	± mm	± mm	± mm	mm	mm	± mm	± mm	± mm	± mm	± mm	± mm				
2.0	2.5	2.5	3.5	4.0	6.5	30		0.32	0.22	0.24	0.26	0.28	0.30				
						Over	Up to and inc.										
						30	40	0.40	0.24	0.26	0.28	0.30	0.33				
						40	60	0.45									
2.0	2.5	3.5	4.0	5.5	7.5	60	80	0.50	0.28	0.30	0.32	0.34	0.37				
						80	100	0.65									
3.0	3.5	4.0	5.0	6.5	8.0	100	120	0.80	0.32	0.34	0.36	0.39	0.42				
						120	140	0.90	-	0.36	0.40	0.45	0.50				
3.5	4.0	5.0	6.5	8.0	9.5	140	160	1.0									
						160	180	1.1									
4.5	5.0	6.5	8.0	9.5	11.0	180	200	1.2	-	-	0.50	0.55	0.60				
						200	240	1.3									

\* Tolerances on length are measured at a room temperature of 16° C. They provide for out-of-squareness of cut to the extent of 1°. Total tolerances (I.e. the sum of the plus and minus limits) may be applied unilaterally by agreement between the supplier and the purchaser

**Table 2. Tolerances on open ends of channels and I sections**

Overall depth of channel or I beam dimension <i>a</i>		Minimum thickness		Either internal or external tolerances at top of gap for width <i>b</i> of:				
over	Up to and including	Over	Up to and including	30 mm	Over 30 mm up to and inc. 40 mm	Over 40 mm up to and inc. 60 mm	Over 60 mm up to and inc. 80 mm	Over 80 mm up to and inc. 100 mm
mm	mm	mm	mm	mm	mm	mm	mm	mm
40	60	-	3	0.70	0.81	0.97	1.18	1.39
		3	6	0.66	0.75	0.89	1.06	1.24
		6	-	0.61	0.68	0.77	0.91	1.04
60	80	-	3	0.75	0.86	1.02	1.23	1.44
		3	6	0.71	0.80	0.94	1.11	1.29
		6	-	0.66	0.73	0.82	0.96	1.09
80	100	-	6	0.90	1.01	1.17	1.38	1.59
		6	-	0.86	0.95	1.09	1.26	1.44
100	120	-	6	1.05	1.16	1.32	1.53	1.74
		6	-	1.01	1.10	1.24	1.41	1.59
120	140	-	6	1.15	1.26	1.42	1.63	1.84
		6	-	1.11	1.20	1.34	1.51	1.69
140	140	-	6	1.25	1.36	1.52	1.73	1.94
		6	-	1.21	1.30	1.44	1.61	1.79
160	180	-	6	1.35	1.46	1.62	1.83	2.04
		6	-	1.31	1.40	1.54	1.71	1.89
180	200	-	6	1.45	1.56	1.72	1.93	2.14
		6	-	1.41	1.50	1.64	1.81	1.99
200	240	-	6	1.55	1.66	1.82	2.03	2.24
		6	-	1.51	1.60	1.74	1.91	2.09

**Table 3. Tolerances on straightness**

Diameter of circumscribing circle	Departure from straightness over any length of 1000 m
mm	mm
Up to and inc. 100	1.5
Over 100	
As extruded (M)	2.0
All other conditions	2.5

**Table 4. Tolerances on twist**

Diameter of circumscribing circle	Angle of twist per 300 mm run	Total angle of twist per length
mm		Max.
40 up to and inc. 80	½°	3°
Over 80		
Lengths up to and inc. 8000	¼°	2°
Lengths over 8000	¼°	3°