Tolerances for aluminium castings

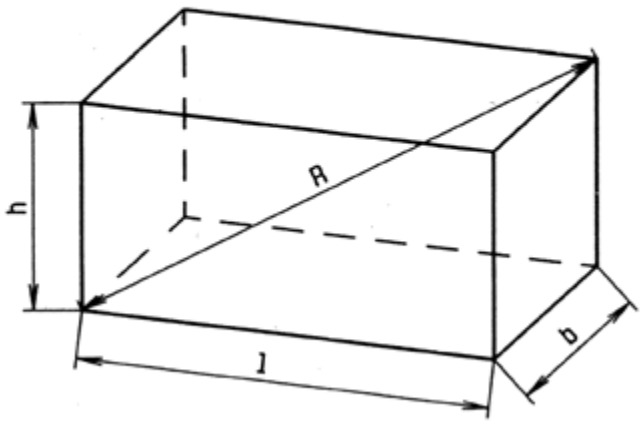
As is generally known, all series products are subject to procedural and technical tolerances.
In the aluminium casting technique these tolerances result from the moulds, the alloys and the casting procedure.

Tolerances for Pressure Die-Castings (DIN 1688, Page 4)

In pressure-die cast parts in light metal alloys the deviations in dimensions are mainly dependent on:

1. the exactitude of the dimensions and function of the mould, which in turn is characterised by the degree of exactitude of
2. the position of the mould division, characterised by the subdivision into shape-related and non-related dimensions (see DIN 1680, Page 1)
3. the shape or size of the casting, characterised by the spatial diagonals and
4. the nominal dimensions.

$$R = \sqrt{l^2 + b^2 + h^2}$$



Determining the Spatial Diagonals
The spatial diagonal R is that between the extreme points of the casting.
It is calculated from the nominal dimensions of the prismatic body, which delimits the casting, whatever its shape.

Table 1

Tolerances of dimensions not related to the shape, linear dimensions (lengths, widths, heights, central distances, diameters, roundings)

Spatial diagonal area [1])	Degree of exactitude	Shape dependency	Nominal dimensions													
			up to 18	18 to 30	30 to 50	50 to 80	80 to 120	120 to 180	180 to 250	250 to 315	315 to 400	400 to 500	500 to 630	630 to 800	800 to 1000	1000 to 1250
Up to 50	GTA 13	shape-related	± 0,14	± 0,17	± 0,2											
		not shape-related	± 0,24	± 0,27	± 0,3											
50 to 180	GTA 13/5	shape-related	± 0,17	± 0,2	± 0,25	± 0,3	± 0,35	± 0,4								
		not shape-related	± 0,32	± 0,35	± 0,4	± 0,45	± 0,5	± 0,55								
180 to 500	GTA 14	shape-related	± 0,22	± 0,26	± 0,31	± 0,37	± 0,44	± 0,5	± 0,6	± 0,65	± 0,7	± 0,8				
		not shape-related	± 0,42	± 0,46	± 0,51	± 0,57	± 0,64	± 0,7	± 0,8	± 0,85	± 0,9	± 1				
500	GTA 14/5	shape-related	± 0,25	± 0,35	± 0,4	± 0,45	± 0,55	± 0,65	± 0,75	± 0,8	± 0,85	± 0,95	± 1,1	± 1,2	± 1,4	± 1,6
		not shape-related	± 0,55	± 0,65	± 0,7	± 0,75	± 0,85	± 0,95	± 1	± 1,1	± 1,1	± 1,2	± 1,4	± 1,5	± 1,7	± 1,9

Table 2

Tolerances of Dimensions not related to the Shape for Thickness (wall thickness, ledges, ribs)

Spatial diagonal area [1])	Degree of' exactitude	Shape dependency	Nominal dimensions		
			to 3	3 to 6	6 to 10
Up to 50	GTA 13	shape related	± 0,15	± 0,2	± 0,2
		not shape related	± 0,25	± 0,3	± 0,3
50 to 180	GTA 13/5	shape related	± 0,2	± 0,25	± 0,3
		not shape related	± 0,35	± 0,4	± 0,45

180 to 500	GTA 14	shaperelated	± 0,25	± 0,3	± 0,35
		not shaperelated	± 0,45	± 0,5	± 0,55
500	GTA 14/5	shaperelated	± 0,3	± 0,4	± 0,45
		not shaperelated	± 0,55	± 0,65	± 0,7

Shape-related dimensions are those in the same part of the tool;
Not shape-related dimensions are those created by the interaction of mobile tool components, e.g. wall thicknesses and base thicknesses or dimensions affected by additives or extenders.

Tolerances for Chill Castings (DIN 1688 T.3)

In the case of raw castings made of light metal alloys in the chill casting process all deviations in dimensions are essentially dependent on:

1. the exactitude of the dimensions of the mould, characterised by the degree of exactitude
2. the position of the mould division, cores, extenders, characterised by the subdivision into shape-related and not shape-related dimensions (see DIN 1680 Part 1)
3. the nominal dimensions.

Table 1

Deviations in lengthwise dimensions (lengths, widths, heights, central distances, diameters, roundings)

Degree of exactitude	Shape dependency	Nominal dimensions												
		up to 18	18 to 30	30 to 50	50 to 80	80 to 120	120 to 180	180 to 250	250 to 315	315 to 400	400 to 500	500 to 630	630 to 800	800 to 1000	1000 to 1250
GTA 15/5	shape-related	± 0,45	± 0,5	± 0,6	± 0,75	± 0,85	± 1	± 1,2	± 1,3	± 1,4	± 1,6	± 1,7	± 2	± 2,3	± 2,6
	not shape-related	± 0,55	± 0,65	± 0,8	± 0,95	± 1,1	± 1,3	± 1,5	± 1,6	± 1,8	± 2	± 2,2	± 2,5	± 2,8	± 3,3

Table 2

Deviations in Thicknesses (wall thicknesses, ledges, ribs)

Degree of exactitude	Shape dependency	Nominal dimensions		
		up to 6	6 to 10	10 to 18
GTA 15/5	Shape related	± 0,6	± 1,2	± 1,8
	not shape related	± 0,8	± 1,5	± 2,2

Shape-related dimensions are those in the same parts of the tool.

Not shape-related dimensions are those created by the interaction of mobile tool components, e.g. wall thicknesses and base thicknesses, or dimensions that are affected by additives or extenders.