

Circumscribing Circle Diameter and Minimum Wall Thickness

The circumscribing circle diameter sets how hard a shape is to hold and how much container it needs. The tables below give the minimum wall thickness for a given CCD and press size for soft and for hard aluminium alloys, and the extrudability of the alloys the numbers apply to.

Reference only. This is a reference summary of published practice and it is not a specification of ours. The values are reproduced from the source. What a particular press produces depends on the press, the shape, the alloy and the run. Final design is confirmed on the job.

What the circumscribing circle diameter sets

Minimum wall thickness against CCD and press size, soft and medium alloys

Alloy	Section type	<25	<50	<75	<100	<150	<200	<250	<300	<350	<400	<450
Al99-99.5	A	0.8	1	1.2	1.5	2	2.5	2.5	3	4	4	5
AlMgSi0.5	B	0.8	1	1.2	1.5	2	2.5	2.5	3	4	4	5
AlMg1	C	1	1	1.5	2	2.5	2.5	2.5	4	5	5	6
AlMn	C	1	1	1.5	2	2.5	2.5	2.5	4	5	5	6
AlMgSi1	A	1	1.2	1.2	1.5	2	2.5	3	4	4	5	6
AlSi0.5Mg	B	1	1.2	1.5	2	2	2.5	3	4	4	5	6
AlZnMg1	B	1	1.2	1.5	2	2	2.5	3	4	4	5	6
AlZnMg1	C	2	1.5	2	2	3	4	4	5	5	6	6
Press size, MN	...	10	10	10	10	25	25-35	35	50	50	80	80

Relationship between minimum wall thickness, circumscribing circle diameter and press size for different soft and medium grade alloys. The wall thickness values are in millimetres and the press sizes are in meganewtons. Source layout preserved.

The same relationship for hard alloys

Alloy	Section type	<25	<50	<75	<100	<150	<200	<250	<300	<350	<400	<450
AlMg3	A	1	1	1.2	1.5	2	2.5	3	4	4	5	6
AlMg5	A	1	1	1.2	1.5	2	2.5	3	4	4	5	6
AlCuMg1	A	1.2	1.2	1.2	1.5	2	3	5	5	6	7	8
AlCuMg2	A	1.2	1.2	1.2	1.5	2	3	5	5	6	7	8
AlCuMg2	B	2	2	3	4	5	5	6	8	10	10	12
AlZn5MgCu	A	2	2	2.5	3	3	5	6	8	12	12	14
Press size, MN	...	10	10	10	10	10-25	25-35	35-50	50	50-80	80	80

Relationship between minimum wall thickness, circumscribing circle diameter and press size for various harder grade alloys. Where the table gives only section type A for a grade, the hollow version of that shape is extruded over a mandrel and needs a thicker wall again. Source layout preserved.

Extrudability decides which alloy goes on which press

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Alloy	Type	Major alloying elements	Relative extrudability
1060	Non-heat-treatable	Al (99.6)	150
1100	Non-heat-treatable	Al(99), Cu	150
3003	Non-heat-treatable	Mn, Cu	100
5052	Non-heat-treatable	Mg	80
5154	Non-heat-treatable	Mg	50
5254	Non-heat-treatable	Mg	50
5454	Non-heat-treatable	Mg, Mn	50
6061	Heat treatable	Mg, Si, Cu	60
6063	Heat treatable	Mg, Si	100
6066	Heat treatable	Mg, Si, Cu, Mn	40
6101	Heat treatable	Mg, Si	100
6463	Heat treatable	Mg, Si	100
2014	Heat treatable	Cu, Si, Mn, Mg	20
2024	Heat treatable	Cu, Mg, Mn	15
5083	Non-heat-treatable	Mg, Mn, Cr	20
5086	Non-heat-treatable	Mg, Mn, Cr	25
5456	Non-heat-treatable	Mg, Mn, Cr	20
7001	Heat treatable	Zn, Mg, Cu, Cr	7
7075	Heat treatable	Zn, Mg, Cu, Cr	10
7079	Heat treatable	Zn, Mg, Cu, Mn, Cr	10

Relative extrudability of the alloys covered by the two wall thickness tables. For the soft and medium grade alloys a rating of 50 to 150 is easy to extrude and 30 to 50 is moderately difficult. For the hard alloys a rating of 25 or below is difficult.

Where this leaves a die steel order

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