



ENGINEERING DESIGN GUIDE

Alloys & Mechanical Properties

Alloy	Temper	UTS (ksi)	Yield (ksi)	Elongation (%)	Modulus (msi)	Density (g/cc)	Conductivity (W/mK)	Thermal Expansion (ppm/°C)	Heat Capacity (cal/gK)
Aluminum 357	T5	42	29	7	10.5	2.68	152	21.6	0.23
Aluminum 357	T6	48	38	10	10.5	2.68	152	21.6	0.23
Aluminum 366	T5	44	39	5	10.5	2.68	152	21.6	0.23
Aluminum A356	T5	38	27	10	10.5	2.69	159	21.5	0.23
Aluminum A356	T6	46	35	12	10.5	2.69	159	21.5	0.23

Dimensional Control

Linear dimensions up to 1" / 25.4mm	±0.002 / 0.05mm
Additional tolerance per additional inch/mm	+0.001 / 0.025mm
Additional tolerance across parting line	+0.004 / 0.102mm
Additional tolerance for moving die components	+0.010 / 0.254
Draft requirements	1° to 2° per side preferred. 1/2° based on application
Flatness tolerance up to 3" / 76.2mm	0.005 / 0.13mm
Additional flatness tolerance for each additional inch/mm	0.002 / 0.05mm
Surface Finish	~ 64 rms or better
Minimum Wall Thickness	0.060 / 1.5mm depending on geometry
Thick to thin tolerance	Reasonable

Part Size, Tooling & Order

Part Weight	5 grams – 5 lbs., geometry dependent
Part Projected Area	125 square inches max, geometry dependent
Tooling	Premium grade H-13 steel. No disposable cores; undercuts will be machined, not cored.
Economic Order Quantity	500-1,000 pieces typical

Tooling Detail

FILLETS / RIBS

- Intersecting surfaces forming junctions are best joined with fillets to avoid high stress concentrations in both the part and the die.
- Fillets projected in a direction normal to the parting line require draft – the deeper the pockets, the larger the draft.
- Sharp inside surface junctions, acute angle corner conditions and delicate, deep and closely spaced ribs will be reviewed closely.
- Ribs are often used to increase the stiffness of, or add strength to, a part.

EJECTOR PINS

- Moveable ejector pins must be used to eject a part uniformly from the die and will result in either a raised or depressed mark (±0.15"). Location should be discussed to optimize part forming and surface cosmetics.

FLASH

- Nominally +0.010/0.254mm. Secondary operations to remove flash may include de-gating, trimming, machining, tumbling, and/or blasting.

LETTERING / ORNAMENTATION

- Options include raised, depressed, or raised in depressed panel, although raised lettering will result in lower die construction and maintenance costs.

Secondary Processing

ONSITE

- T5 & T6 heat treatment
- CNC milling, turning, 3&4-axis, vertical & horizontal
- Surface preparation, polishing, vibratory tumbling
- Steel shot and glass bead blasting
- Light assembly

TIERED

- Anodizing: functional, cosmetic black
- Plating: chrome, electroless nickel
- Painting: powder coat, E-coat and wet