



## Alloy / Typical 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	5-7	10.5	2.68	152	21.6	0.23
Aluminum 357	T6	48	38	8-10	10.5	2.68	152	21.6	0.23
Aluminum A356	T5	38	27	8-10	10.5	2.69	159	21.5	0.23
Aluminum A356	T6	46	35	10-12	10.5	2.69	159	21.5	0.23
Aluminum 319	T5	45	35	3	10.7	2.79	109	21.6	0.23
Aluminum 319	T6	59	45	5	10.7	2.79	109	21.6	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	~ 32 rms or better
Minimum Wall Thickness (part dependent)	0.040 / 1.00mm
Order Quantity	Typically > 1,000 units (10,000 – 500,000+ common)
Size Range	10 grams – 3 kilograms/7 lbs (geometry dependent)

## Tool 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.
- 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 (±0.005-0.015"). Location and specification should be discussed to optimize part forming and surface cosmetics.

### FLASH

- Nominally +0.010"/0.25mm. Secondary operations to remove flash may include degating, sanding, trimming, precision removal, tumbling, or vibratory deburring.

### LETTERING / ORNAMENTATION

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

## Finishing Options

- CNC machining
- Heat treatment
  - T4 – Solution heat-treated and naturally aged
  - T5 – Cooled from the forming process and artificially aged
  - T6 – Solution heat-treated, quenched and artificially aged
- Anodizing – functional
- Coatings – cosmetic / wear-resistant,
- Plating – chromium, nickel,
- Painting