

## YOU NEED QUALITY INVESTMENT CASTINGS IN DAYS, NOT MONTHS. AMERICAN CASTING DELIVERS:

- ▶ Latest 3D Printing technology and materials
- ▶ Cycle and lead times measured in days.
- ▶ More Flexibility with unique, lean manufacturing methods
- ▶ Consistent Quality: AS9100/ISO9001 certified systems

## DESIGN CONSIDERATIONS FOR INVESTMENT CASTING:

\*NOTE - guidelines listed are for information only.\*

### Part Size (specific to American Casting Company):

- ▶ Max Part Size - 16" Cube
- ▶ Max Part Weight - ~30 LB
- ▶ Air Melt Capacity 50#
- ▶ Vacuum Melt Capacity 50#

### Number of Gates:

Gates are the contacts on a part where the runners of liquid metal feed into a part cavity within a mold. A goal for good casting design is a part that can be produced with a single gate contact. Multiple gates can be used however; less gate contacts will reduce product finishing costs.

### Wall Thickness: By alloy type:

Alloy Group	Min Wall
Low Carbon & Low Alloy Steel	0.060"
Stainless Steel - PH & 400 Series	0.060"
Stainless Steel - 300 Series	0.040"
Cobalt & Nickel base Alloys	0.030"

### Blind Holes:

Hole Diameter	Max Depth
.0625"-.125"	.5 x hole diameter
.125"-.500"	1 x hole diameter
>.500"	2 x hole diameter

### Through Holes:

Hole Diameter	Max Depth
.0625"-.125"	2 x hole diameter
.126"-.250"	3 x hole diameter
.251"-.500"	4 x hole diameter
>.500"	6 x hole diameter

### Linear Tolerances:

Feature Size	Tolerance: std/premium
<1"	+/- .005" / .003"
>1"	add .003" per inch

Radii: 0.030" - .060" min recommended. Low limit of 0.010".

Flatness and Straightness: Tolerances of 0.003" to 0.005" / inch

Concentricity and True Position: A tolerance of 0.005" per inch of distance between two features is normal.

Angles: Angle tolerances of +/- 1/2 degree are normal.

Surface Finish: Normal finish is 125 RMS, and 90 RMS premium.

Datum Target Points: Since cast surfaces are not perfectly flat and square, dimensional inspection and set-up for secondary operations is best done using target points to establish primary, secondary and tertiary datums.

Letters/Part Numbers/Logos: Preferred height of .010"-.020" letters. Radii on the font corners is preferred.

Gate Remnant: After removal of gating system a remnant pad of .015 - .030" is preferred

Draft: No draft allowance is needed for investment casting.

## DRAWING CHECKLIST FOR INVESTMENT CASTINGS:

\*NOTE - Please feel free to call one of our product engineers to review any design guidelines or casting drawing questions.\*

When preparing casting drawings, it is helpful if the items below are addressed.

- 1 Casting Process (ex. Investment Casting).
- 2 Cast Material Specification (ASTM, SAE, AMS, etc).
- 3 Also, specific selections from the main specification:
  - a. Alloy, Class, Grade, Mechanical Properties
- 4 Heat Treat Requirements not defined in the Material Specification or requirements that vary from the spec.
- 5 Casting weight in pounds, or volume in cubic inches.
- 6 Dimensional tolerances.
- 7 Fillet and Corner Radii (min or max with tolerance)
- 8 Surface Finish requirements.(ex. MIN 125 RMS)
- 9 Surface defects - Specify allowances (size, type, quantity, special zone requirements).
- 10 Machining Stock- Specify which surfaces are to be machined and amount of machine stock needed.
- 11 Gate Remnants - Specify maximum height for those that may be left on specified surfaces. Also, a general specification of maximum remnant height allowed.
- 12 Tooling Point Locations and Datum structure.
- 13 Holes - Specify Cast or Machined for all holes.
- 14 Cast Identification - Locations should be specified to avoid excessive tooling cost. Raised characters are preferred. There are lower limits on size for characters
- 15 Weld Repair - May be necessary for repair of defects, depending upon design requirements. Call out the weld repair procedure and/or specification.
- 16 Inspection and Testing (Visual, Dimensional, Radiographic, Dye Penetrant, Mag Particle, Chemical Analysis, Mechanical Tests, Special First Article Tests, etc.) Include applicable specification numbers.
- 17 Hot Isostatic Pressing (Hipping) requirement if any.
- 18 Surface Cleaning (abrasive blasting, passivating, etc.)
- 19 Surface Finishing (paint, powder coat, anodize, etc.) Specify thicknesses and procedures. Provide specifications numbers.
- 20 Special identification / part number marking.
- 21 Special packaging requirements

### ALLOYS POURED:

Mild Steels & Low Alloy Steels (1020, 8620, 4130)  
Stainless Steel - 300 Series (303, 304, 310, 316, 347)  
Stainless Steel - 400 Series (410, 416)  
Stainless Steel - Precipitation Hardening (17-4, 15-5)  
Implantable CoCrMo (ASTM F75)  
Aerospace Cobalt Based Alloys (Co21, Co25, Co31)  
Nickel Based Alloys (Inconel 625 & 718)  
Copper Based Alloys (Silicon Bronze, Yellow Brass)

Visit our website for the detailed list of alloys:

[WWW.AMERICANCASTINGCO.COM/MATERIALS](http://WWW.AMERICANCASTINGCO.COM/MATERIALS)

Please feel free to contact us with any questions:

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**AMERICAN**  
CASTING COMPANY