PREMIER QUALITY INVESTMENT CASTINGS DELIVERED IN DAYS, NOT MONTHS.

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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:
<table>
<thead>
<tr>
<th>Alloy Group</th>
<th>Min Wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Carbon &amp; Low Alloy Steel</td>
<td>0.060”</td>
</tr>
<tr>
<td>Stainless Steel – PH &amp; 400 Series</td>
<td>0.060”</td>
</tr>
<tr>
<td>Stainless Steel - 300 Series</td>
<td>0.040”</td>
</tr>
<tr>
<td>Cobalt &amp; Nickel base Alloys</td>
<td>0.030”</td>
</tr>
</tbody>
</table>

Blind Holes:
<table>
<thead>
<tr>
<th>Hole Diameter</th>
<th>Max Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>.0625” - .125”</td>
<td>.5 x hole diameter</td>
</tr>
<tr>
<td>.125”- .500”</td>
<td>1 x hole diameter</td>
</tr>
<tr>
<td>&gt;.500”</td>
<td>2 x hole diameter</td>
</tr>
</tbody>
</table>

Through Holes:
<table>
<thead>
<tr>
<th>Hole Diameter</th>
<th>Max Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>.0625” - .125”</td>
<td>2 x hole diameter</td>
</tr>
<tr>
<td>.125”- .250”</td>
<td>3 x hole diameter</td>
</tr>
<tr>
<td>.251”- .500”</td>
<td>4 x hole diameter</td>
</tr>
<tr>
<td>&gt;.500”</td>
<td>6 x hole diameter</td>
</tr>
</tbody>
</table>

Linear Tolerances:
<table>
<thead>
<tr>
<th>Feature Size</th>
<th>Tolerance: std/premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1”</td>
<td>+/- .005” / .003”</td>
</tr>
<tr>
<td>&gt;1”</td>
<td>add .003” per inch</td>
</tr>
</tbody>
</table>

Radius: 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.

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