Potential Causes of Casting Defects

TECHNICAL TIP

Porosity

- Pattern is improperly sprued (sprues may be too thin, too long or not attached in the proper location; causing shrinkage porosity).
- Not enough metal reservoir to eliminate shrinkage porosity.
- Metal contains gas.
- Mold is too hot.
- Too much moisture in the flux.
- Too much remelt being used (always use at least 50% new metal).
- Metal is overheated.
- Poor mold burnout.

Fins or Flash on Castings

- Flask was disturbed while investment was setting.
- Base was removed too soon.
- Flask was allowed to partially dry before dewaxing.
- Incorrect dewaxing or a furnace malfunction.
- Flask burned out and was allowed to cool below 500°F (260°C) before casting or reheating; or flask was allowed to cool between dewax and placement in preheated oven.
- Flask was improperly handled or dropped.
- Speed was set too high on centrifugal casting machine.
- Patterns were placed on one plane (they should be staggered on the top row).
- Incorrect water/powder ratio was used.
- Not enough investment was placed over the patterns.
- Flask was placed too close to the heat source in the burnout oven.
- Flasks were not held at a low burnout temperature long enough.

Inclusion (Foreign Particles) in Castings

- Patterns were improperly sprued to the wax base or tree, or not filleted; causing investment to break at sharp corners during casting.
- Flask was not sufficiently cured before placing into the burnout oven.
- Improper dewaxing cycle was used.
- Flask was not cleaned from prior cast.
- Loose investment in sprue hole.
- Molten metal contains excess flux or foreign oxides.
- Crucible disintegrating or poorly fluxed.
- Improperly dried graphite crucible.
- Investment was not mixed properly or long enough.
- Contaminants in the wax pattern.
- Flask was not held at a low burnout temperature long enough.
- Flask was placed too close to the heat source in the burnout oven.

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Potential Causes of Casting Defects

TECHNICAL TIP

Rough Castings

- Poor pattern quality.
- Flask was not sufficiently cured before placing into the burnout oven.
- Flask was held in steam dewax too long.
- Metal, flask, or both, were too hot.
- Patterns were improperly sprued.
- Flask was placed too close to the heat source in the burnout oven.

Bubbles or Nodules on Casting

- Vacuum pump is leaking air.
- Vacuum pump has water in the oil.
- Vacuum pump is low on oil.
- Investment not mixed properly or long enough.
- Invested flasks were not vibrated during vacuum cycle.
- Vacuum extended past working time.

Spalling (An Area of the Mold Wall Flakes into the Cavity)

- Flask was placed into a furnace at low temperature (below 300°F [150°C]) for an extended period.
- Flask was placed too close to the heat source in the burnout oven.
- Sharp corners are struck by metal at high centrifugal velocities.
- Improper burnout cycle was used.

Non-Fill or Incomplete Castings

- Metal was too cold when cast.
- Mold was too cold when cast.
- The burnout was not complete.
- Pattern was improperly sprued, creating turbulence when casting in a centrifugal casting machine.
- Centrifugal casting machine had too high revolution per minute.

Growth-Like Rough Casting That Resists Removal in Pickling Solution

- Burnout temperature was too high.
- Mold temperature was too high when casting.
- Metal temperature was too high when casting.

Shiny Castings

- Carbon residue was left in the mold, creating a reducing condition on the mold surface.

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