SLAG-BLOWHOLE DEFECT

All ferrous alloys.

Non-metallic inclusions which are usually associated with blowholes within the inclusions as well as in the mass of the casting. The inclusions are distributed throughout the casting but occur most often on the cope surface, or lodged at reentrant angles and against cores.

Chemical analysis shows high contents of S and large percentages of oxides of Si, Mn and Fe, with CaO content virtually zero.

Microscopic, or even visual, examination frequently discloses colorless grains of a pure silica phase, which must not be confused with a sand inclusion (see Fig. 235).

Possible Cause

Complex reactions which occur within the liquid alloy itself among its various constituents (C, Mn, S, Al, Ti, etc.) or between the alloy and its oxides, the atmosphere, ladle linings or the mold and its coatings.

These reactions often arise as a result of the conditions of melting the metal, and may indeed originate from the quality of the primary materials used or the manner in which they were produced. See also defect B 113.

Remedies

- Use primary materials containing a minimum of internal oxide inclusions or external oxidation such as rust.
- Avoid low Si and high Mn contents; where possible, maintain the ratio: Si ≥ Mn + 0.5%.
- Limit the Al and Ti contents of the melt.
- Keep the sulfur below 0.1%.
- Melt and tap at high temperature.
- Maintain correct mold pouring temperature.
- Pour rapidly with a non-turbulent gating system.

G 122 - Cast Iron, Green Sand

Fragment of a cylinder wall of cast iron about 25 mm (1 in.) thick, showing slag-blowhole defects.
G 122 - Cast Iron, Green Sand

Slag-blowhole defect beneath the core of a heavy gray iron casting.

G 122 - Steel, Dry Sand

Areas of porous slag inclusions on the surface of a steel casting (color: white, greenish-white to whitish-gray).

Sand inclusions of irregular shape, usually compact, in the vicinity of the cope surface of the casting. Often they are visible on the rough casting, but may appear only upon machining. In general, there are other locations on the casting where massive metallic projections (defect sub-group A 220) appear.

Also, as above but with cavities 2 to 6 mm (0.08 to 0.24 in.) thick which are more or less exposed and with sand inclusions adjacent to them. This defect always appears in conjunction with defects of sub-group D 230 (scabs).

Possible Causes
- Pieces detached from the mold or the cores (sub-group A 220).
- Lack of care in molding (sub-group F 230).
- Erosion or crush (defects A 212, A 213).
- Crust formation and detachment of the sand due to expansion of the silica (defect sub-group D 230, scabs).

Remedies
See corrective measures listed under sub-groups A 220 and D 230; also under defects A 212 and A 213.

(Ed. note: See also D 121, surface roughness)

(Examples, following pages)