CARBON FLOTATION

Ductile iron.

The material has poor mechanical properties. Fractures of castings thicker than 25 mm (1 in.) show rather large, dark black edges located in cope sections of the casting. In the zone where graphite has accumulated by flotation, microscopic examination discloses exploded nodules, as well as enrichment in sulfides and oxides of magnesium.

Possible Causes
— Carbon equivalent is too high with regard to casting section thickness.
— Magnesium treatment and inoculation were performed at too low a temperature - less than 1450°C (2642°F).
— Too much delay between treatment and pouring.
— Cooling rate in the mold is too slow.

<table>
<thead>
<tr>
<th>Slightly Hypereutectic</th>
<th>Hypereutectic</th>
<th>Very Hypereutectic</th>
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<tbody>
<tr>
<td>CE = 4.45</td>
<td>CE = 4.85</td>
<td>CE = 5.00</td>
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(x 10)

Floatation of graphite nodules as a function of carbon equivalent.

Remedies
— Limit the carbon equivalent as a function of the casting thickness. For example:
  10 mm (0.4 in.) thickness: CE = 4.5 max
  30 mm (1.2 in.) thickness: CE = 4.3 max
— Conduct magnesium treatment and inoculation in an optimum temperature range, namely between 1480 and 1510°C (2696 and 2750°F).
— Pour no later than 10 minutes after treatment.
— Maintain pouring temperature between 1400 and 1360°C (2552 and 2480°F).
— Be sure that mold cooling and solidification rates are as rapid as possible.

Figure 267
G 263 - Ductile Iron

Figure 266
Casting showing carbon flotation.

Figure 268
Sample casting of graduated cylindrical section sizes, poured horizontally. Structure is normal and sound.

Figure 269
Same as above, except that the heavier section thicknesses show carbon flotation, defect G 263.