C 331
COLD SHUT
(AT CHILL OR INSERT)
UNFUSED CHAPLET

A discontinuity which is localized in the vicinity of the inserted piece (chaplet, insert tube, internal chill, etc.).

Possible Cause
Poor fusion between the metal insert and the casting because of premature solidification or excessive cooling of the liquid metal coming in contact with the insert.

Remedies
— Higher pouring temperature.
— Improve alloy fluidity.
— Change gating to permit more rapid filling of the mold.
— Verify necessary size and location of metal insert.
In applying these measures it is obviously necessary to avoid the complete fusion of the metal inserts.

C 411
CONCHOIDAL OR ROCK-CANDY FRACTURE

Cast Steel

The fractured surface of the casting shows smooth, slightly curved facets like that of rock candy.

Possible Cause
This defect occurs in steel castings when the aluminum and nitrogen contents are too high, causing aluminum nitride to precipitate at grain boundaries (particularly in heavy sections and low alloy steels).

Remedies
Limit the addition of aluminum to the value sufficient to deoxidize the steel. Also, fix the nitrogen by titanium or zirconium additions (with due regard for deleterious effects on mechanical properties).

(Example on following page)
INTERGRANULAR CORROSION

Deterioration in mechanical properties caused by a network of fissures extending entirely through the cast section.

Swelling of the casting, often with warpage and surface cracks. The defect may only appear after a prolonged period of time following casting.

Possible Causes

Use of a zinc alloy which does not conform to specifications, containing impurities such as tin, lead and cadmium.

The alloy undergoes grain boundary separation.

Remedies

Use only those alloys made from high-purity zinc and of controlled composition. Magnesium content of the alloy should be within the limits of the specification (preferably at the high side).

C 411 - Steel

Conchoidal fracture of a steel casting containing too much aluminum and nitrogen.

(Examples following pages)