All ferrous alloys, sometimes with copper-base; green sand castings.

Smooth-edged grooves on the surface of a casting, usually in branching patterns, having a depth on the order of 2 mm (0.08 in.).

The defect occurs on all surfaces, but usually on horizontal cope and drag faces.

Causes

This defect is the beginning of a scab; the expansion of the silica causes the mold wall to distort inwardly and fracture, but without subsequent penetration of the metal into the adjacent cavity below (scab).

Causes and remedies will be found listed under those for scabs (see D 231 and examples).

Green sand castings; ferrous and nonferrous.

A shallow defect which usually appears only on horizontal drag surfaces of the casting. It consists of an irregular groove up to 5 mm (0.2 in.) deep with a sharp-angled edge below which sand may be lodged.

Rat tails most often extend from gate locations and somewhat less frequently are interconnected in a branching pattern (Figure 145 a). For sands with a strong tendency to this type of defect, rat tails may be accompanied by buckles (D 131) and scabs (D 231).

Scabs (defect D 113) are sometimes found parallel to shallow rat tails or may overlap them. The difference in level between these and the adjoining, sound surface of the casting is barely perceptible (Figure 145 b).
Possible Causes
Same as for scabs (D 230).

Heat from the stream of molten metal causes the formation of a wet condensation zone in the sand just below the surface. Expansion of the silica causes buckling and detachment of the crust of sand at the wet layer. Because of its increased volume, the crust extends inward at the edges of the stream (sketches 1 and 2 below).

Since the edges of the projecting scale of sand are not flattened by the metal after the mold fills, they form grooves known as rat tails (sketch 3 and Figure 145 a).

![Figure 145](image)

- a -
- b -

Note: It is not always the length, but more especially the depth of the rat tails which characterize the tendency of a sand to produce this defect.

Remedies
See defect D 230. It is especially important to add seacoal to the sand.

FLOW MARKS, CROW'S FEET

Irregularly distributed depressions, elongated or rounded in form, which generally follow the course of the liquid metal in filling deep spots in the mold or located at areas remote from the gates. They often appear in conjunction with surface porosity. Before cleaning, the depressions are filled with oxide scale.

Defect appearance before cleaning

Figure 146