Irregular metallic projections of several mm thickness, generally with sharp edges, parallel to the surface of the casting and having very rough surfaces. They are generally attached to the casting only at a few points, being otherwise loose. The surface of the casting beneath the defect shows a depression which is of the shape and thickness of the scab. True scabs can be detached by means of a chisel, however the areas of attachment to the casting remain evident and the underlying depressions persist.

A true scab (D 231) usually forms:
- on the upper horizontal mold surface (cope scab),
- on the lower horizontal mold surface (drag scab).

They occur less often on lateral walls.

Possible Causes

1. Cope Scab

1.1 Appearance of a low-strength wet condensation zone (sketch 1), followed by formation of a crust of dry sand whose expansion is restrained by compression stresses in the mold wall (sketch 2). The pressure forcing this crust against the backup sand, caused by the arrival of the liquid metal, causes the crust to break (sketch 3). The liquid metal infiltrates the space behind the crust forming a thin layer of metal which comprises the scab. If such infiltration does not occur, the defect will instead be a buckle (D 131).
2. Drag Scab

The stream of metal entering the mold cavity causes the rapid formation of a low-strength wet condensation zone (sketch 1). Then, with sufficiently high restraint in the mold wall due to compressive stresses, a crust of dry sand is produced whose formation is confined to the regions along the length of this zone.

2.1 - The crust does not separate completely from the backing sand. Because of the expansion of the silica, the crust shears toward the region adjacent to the mold wall (sketch 2). The edges of the crust are raised, causing the formation of rat tails (R) or, if the edges raise sufficiently to permit metal infiltration beneath the crust, the formation of scabs (S).

2.2 - The crust forms and raises between two parallel streams of liquid metal (sketches 1 and 2), and then becomes compressed by the continued flow of metal into the mold. If the crust does not break, there will merely be a slight surface depression on the casting. If the crust breaks without metal penetration, the defect will be a buckle (D 131); if penetration does occur, a scab will form (sketch 3).

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Figure 168

Figure 169

Drag scabs may appear in conjunction with rat tails.
Remedies
1. Increase of green strength by:
   — addition of more binder (clay, bentonite);
   — addition of more western (sodium) bentonite;
   — cooling of the system sand;
   — better mulling of the sand;
   — use of a coarser sand.
2. Reduction of compressive stresses:
   — more rapid, even filling of the mold;
   — avoiding excessive sand moisture;
   — use of additives which by softening or combustion, compensate for the expansion of the silica; sand, pitch, asphalt. (Use precaution, however, with additives such as wood flour and cellulose which tend to lower green strength);
   — total or partial replacement of the silica sand by a refractory, low-expansion sand such as zircon (which does not, like silica, undergo abrupt allotrophic changes and expansions on heating).
3. Venting of the mold; increase in sand permeability.
4. Remedies generally not recommended:
   — tilting the mold;
   — covering mold areas susceptible to scabbing with sheet metal;
   — scab-nailing of the cope.
D 232
COPE SPALL, BOIL SCAB, EROSION SCAB

Massive, rough, irregular layers of excess metal over localized or widespread areas of the surface, generally several mm in thickness and with edges of irregular shape having the appearance of a fractured mold. There may be evidence of multiple crusts of sand, superimposed one upon another, more or less parallel to the mold surface. The projecting layers of metal often appear caved by the inclusion of crusts of sand, particularly on the cope surface of the casting. These projections can be removed only by machining or grinding (assuming that the sand inclusions present can be tolerated).

This defect occurs primarily on the cope or drag face of the casting.

Causes
The mechanics of formation of this type of defect are as follows:
1. At the cope surface or along vertical or inclined mold walls:
   1.1-Formation of a low-strength wet condensation zone (sketch 1). Rupture of the dried crust into several pieces due to its restrained expansion (sketch 2). During continued filling of the mold, these pieces of sand crust float and lodge at the cope surface (sketch 3, p 216). Fins (A 112) or rat tails (D 132) may also be present.