

CORROSION

The original chainplates on the Seabreeze were made from a type of stainless steel that contained only modest quantities of chromium and nickel, and little or no molybdenum. They are prone to failure caused by corrosion when subjected to continued deck leaks. The situation is made worse when the deck penetration is sealed while water is trapped below it.

G. Butler and H. C. K. Ison explain the failure mechanism in *Corrosion and its Prevention in Waters*. They state on page 76:

“The corrosion resistance of the stainless steels is due to the formation of a very thin passivating film on the metal surface. Such a film forms spontaneously on exposure of the clean metal surface to dry air or more rapidly on immersion in an oxidising agent such as nitric acid. When such a surface is immersed in water containing oxygen, a dynamic equilibrium is set up between alternate breakdown and repair of the film. If, however, such film repair is prevented by lack of oxygen access severe corrosion can take place at a rate comparable with that of iron or mild steel. Such conditions can arise beneath debris, barnacles or in crevices (Pl. 9). In the use of stainless steels this behavior should always be borne in mind and the installation designed so as to minimize fouling of the metal surface and where possible to also provide for adequate cleaning of the surface. All possible crevices should be eliminated by design; e.g. by replacing riveted joints with welded ones. Where this is not possible the situation may be improved by sealing the joints, but this method is not completely reliable.

“The range of environments in which the stainless steels are able to remain passive is markedly broadened by increasing the chromium content and to a lesser extent by increasing the nickel. In this connection supplementary alloying with small amounts of molybdenum is also advantageous.

“When corrosion of stainless steel does occur it is usually localized. The presence of chloride increases the susceptibility to pitting attack particularly at grain boundaries. This tendency is large with higher carbon contents but it can be reduced by supplementary alloying with small amounts of molybdenum or silicon. Increase in pH decreases the number of pits and their rate of growth.”