3.4 System Construction

3.4.1 Design

To obtain a high resistance to corrosion of stainless steels in waters, the design must provide the maximum practical flow but with a minimum flow of about 1 m/s in order to reduce the likelihood of pitting and to minimise the deposition of sediments. In addition, it is important to avoid crevices wherever possible. If crevices cannot be avoided they should be made as wide as possible. Metal/metal crevices are generally less critical than metal/plastic crevices. An increased risk of corrosion due to crevices may be compensated by selection of a more corrosion resistant material e.g. a stainless steel from group 2 in Table 1 instead of group 1. Horizontal pipes should be sloped sufficiently to allow ease of draining. When sludges are to be handled, it is important to avoid any dead legs and pockets where sludge could adhere and lead to deposit build up.

Completely roofed purification plant in Valbarsa (I)
Photo: Centro Inox, Milan (I)

Stainless steels are frequently combined with other materials in waste water installations and hence the question of compatibility arises [22]. When two different metallic materials are in electrical contact while immersed in an electrically conducting liquid, electrochemical reactions occur which may cause corrosion of the less noble material. This is called galvanic corrosion or bimetallic corrosion. In most cases, stainless steel is the nobler partner and will not suffer corrosion. The less noble partner may be, for example, the zinc coating on galvanised steel. The ratio of the exposed areas of the two metals in such a couple is very important in determining the extent of galvanic corrosion. To avoid bimetallic corrosion, the two metals have to be electrically insulated from each other or other active or passive measures taken [15].

Micro-strainers for the removal of finely suspended solids from the secondary clarifier's effluent
Photo: Hans Huber, Berching (D)

When pipes have to be connected by flanges or fittings, it is important to select gasket and sealing materials which will not release any chlorides [4]. As a rule, components made from stainless steel must not come into contact with leachable chloride-containing materials of construction. Attack by chlorine or chloride containing atmospheres or vapours also has to be avoided [4]. Insulating substances are not allowed to have chloride contents of more than 0.05 %. In mineral wool, the content of water soluble chlorides shall not exceed 6 mg/kg [4]. Acoustic damping components of fixing elements for piping systems have to be free of water soluble chlorides [4].