

Alfa Laval Guideline on water characteristics to avoid corrosion

Fusion-bonded plate heat exchangers

Introduction

This document provides guidelines for Fusion-bonded plate heat exchangers (FHE), also known as AlfaNova, in water duties.

Water contains a wide range of dissolved substances, and their amounts vary depending on factors like water type and geographic location. Not all substances affect the corrosion performance of the materials exposed to these waters, and this document aims at presenting the most crucial limits for the effective use of FHE units.

Corrosion resistance of stainless steel

A FHE consists of 100% stainless steel. The corrosion resistance of stainless steel is due to the formation of a protective oxide layer, known as the passive layer. In water installations, crevice corrosion is typically the most serious type of corrosion. The main parameters affecting crevice corrosion are chloride content, pH, and temperature. Table 1 shows the maximum level of chloride ions depending on pH and temperature which are allowed for FHEs to avoid crevice corrosion.

Water treatment (Chlorination)

In certain applications the water is subjected to antifouling treatment or anti bacteriological treatment. One of the most common treatments is chlorination. The total amount of active chlorine species is denoted free available chlorine, FAC. It is recommended that the FAC concentration is a maximum 0.3 ppm (mg/l) at the inlet of the heat exchanger.



Technical data

Table 1. Maximum level of chloride ion concentration, ppm (mg/l), to avoid crevice corrosion of SS316 FHE at pH 3 to 9. For pH in between use linear interpolation.

Temperatures °C (°F)	FHE / SS316			
	pH3 ppm	pH5 ppm	pH7 ppm	pH9 ppm
25 (77)	80	300	1000	6000
50 (122)	15	80	300	1500
80 (176)	8	30	100	600

Disclaimer

The assessment assumes moving water. It is important to remember that still or dirty water which can cause fouling or scaling also can harm the corrosion resistance. Enclosed water characteristics should hence not be taken as a guarantee against corrosion but should be viewed as recommendations for minimizing the risk of corrosion. Alfa Laval is not to be held responsible for damaged FHE due to corrosion.

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