



Titre: Crossflow microsand filtration in cooling tower systems to control fouling in heat exchanger devices. Supplément
Title:

Auteurs: Vaishali Ashok, Faezeh Absalan, Alain Silverwood, Étienne Robert, Dominique Claveau-Mallet, & Émilie Bédard
Authors:

Date: 2024

Type: Article de revue / Article

Référence: Ashok, V., Absalan, F., Silverwood, A., Robert, É., Claveau-Mallet, D., & Bédard, É. (2024). Crossflow microsand filtration in cooling tower systems to control fouling in heat exchanger devices. Journal of Building Engineering, 95, 110167 (11 pages). <https://doi.org/10.1016/j.jobe.2024.110167>
Citation:

 **Document en libre accès dans PolyPublie**
Open Access document in PolyPublie

URL de PolyPublie: <https://publications.polymtl.ca/58888/>
PolyPublie URL:

Version: Matériel supplémentaire / Supplementary material
Révisé par les pairs / Refereed

Conditions d'utilisation: CC BY
Terms of Use:

 **Document publié chez l'éditeur officiel**
Document issued by the official publisher

Titre de la revue: Journal of Building Engineering (vol. 95)
Journal Title:

Maison d'édition: Elsevier
Publisher:

URL officiel: <https://doi.org/10.1016/j.jobe.2024.110167>
Official URL:

Mention légale: © 2024 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).
Legal notice:

Crossflow microsand filtration in cooling tower systems: A sustainable approach to control fouling in heat exchanger devices

Vaishali Ashok¹, Faezeh Absalan¹, Alain Silverwood², Etienne Robert³, Dominique Claveau Mallet¹, Emilie Bédard¹

¹ Civil Geological and Mining Engineering Department, Polytechnic Montreal, Canada

² Xylem Water Solutions and Water Technology, Washington DC, USA

³ Mechanical Engineering Department, Polytechnic Montreal, Canada

Figure 1.S Pilot study circuit

Table 1.S Specifications of the hospital building plate heat exchanger sampled for this study

Table 2.S Physicochemical characteristics of the recirculating water inside the circuit measured through bi-weekly sampling at the purge (Figure 1) from April 2022 to May 2023, prior to HX cleaning.



Figure 1.S Pilot study circuit

Table 1.S Specifications of the hospital building plate heat exchanger sampled for this study

Brand	Armstrong (Model: S-48-1250-81)
Material	Zinc plated stainless steel 304
Size	29.5" x 62.8"
Gasket material	NBR-glued
Surface per unit (ft ²)	503.62
No. of plates	81
Heat exchanged (Btu/h)	4931697
Fluid circulated (gpm)	1300 gpm, 1100 gpm
LMTD (°F)	7.68
Design pressure (PSI)	150
Plate thickness (mm)	0.6
Design temperature (°F)	210

Table 2.S Physicochemical characteristics of the recirculating water inside the circuit measured through bi-weekly sampling at the purge (Figure 1) from April 2022 to May 2023, prior to HX cleaning. Values given in the parenthesis are minimum and maximum observed values during this study.

Parameters	Unit	Onsite HX Mean values* \pm SD (min-max) n=20
Temperature	°C	22.7 \pm 2.0 (17.9-27.5)
pH	pH units	8.5 \pm 0.2 (7.9-8.9)
Conductivity	μ S/cm	694 \pm 226 (365-1146)
Free chlorine	mg/L	0.48 \pm 0.99 (0 – 4.3)
Total chlorine	mg/L	0.68 \pm 1.19 (0 – 4.9)
Total dissolved solids	mg/L	458 \pm 149 (241-960)
Total suspended solids	mg/L	1.3 \pm 1.5 (0.0-9.2)
Total alkalinity	mg/L as CaCO ₃	198 \pm 7.1 (98-345)
Dissolved oxygen	mg/L	9.0 \pm 0.6 (8.3-11.2)
Chloride	mg Cl ⁻ /L	69 \pm 31 (27-119)
Sulphate	mg SO ₄ ²⁻ /L	44 \pm 20 (19-89)
Phosphate	mg PO ₄ ³⁻ /L	1.9 \pm 3.1 (0.2-19)
Calcium	mg Ca ²⁺ /L	66 \pm 24 (25-133)
Magnesium	mg Mg ²⁺ /L	24 \pm 13 (6-49)

*SD: standard deviation;

n = number of measurements;