Membrane Fouling Index (MFI) from Normalised Specific Flux

Membrane fouling index from two points of normalised specific flux against specific throughput, and the throughput and time until a cleaning trigger is reached.

Input parameters

Unit system: SI

Parameter	Value	Unit
Specific throughput at point 1 (1 mm = 1 L/m²)	50.000	mm
Normalised specific flux at point 1	95.000	%
Specific throughput at point 2 (1 mm = 1 L/m²)	2,000.0	mm
Normalised specific flux at point 2	80.000	%
Normalised specific flux that triggers cleaning	50.000	%
Operating flux	80.000	L/(m²·h)

Calculated results

Parameter	Value	Unit
Membrane fouling index	0.10121	1/m
Intercept of 1/J′ at zero throughput	1.0476	
Specific throughput when the trigger is reached (1 mm = 1 L/m²)	9,410.0	mm
Further throughput after point 2 (1 mm = 1 L/m²)	7,410.0	mm
Time to the trigger at the operating flux	3.8594	d

Notes for this case

• 1/J′ = 1/J′₀ + MFI·V_sp, with J′ the specific flux (temperature- and pressure-corrected) divided by that of the new membrane. Using points from successive filter runs (start of each run) gives the hydraulically irreversible index; points within one run give the total index.

Formula and method

$$\frac{1}{J'_{sp}} = \frac{1}{J'_{sp,0}} + MFI \cdot V_{sp}, \quad MFI = \frac{1/J'_{sp,2} - 1/J'_{sp,1}}{V_{sp,2} - V_{sp,1}}$$

$$V_{sp,clean} = \frac{1/J'_{min} - 1/J'_{sp,0}}{MFI}, \quad t = \frac{V_{sp,clean} - V_{sp,2}}{J}$$

Variables

$V_{sp,1}$	Specific throughput at point 1 (1 mm = 1 L/m²)	m
$J'_{sp,1}$	Normalised specific flux at point 1	-
$V_{sp,2}$	Specific throughput at point 2 (1 mm = 1 L/m²)	m
$J'_{sp,2}$	Normalised specific flux at point 2	-
J'_{min}	Normalised specific flux that triggers cleaning	-
J	Operating flux	m/s
MFI	Membrane fouling index	1/m
$1/J'_{sp,0}$	Intercept of 1/J′ at zero throughput	-
$V_{sp,clean}$	Specific throughput when the trigger is reached (1 mm = 1 L/m²)	m
ΔV_{sp}	Further throughput after point 2 (1 mm = 1 L/m²)	m

t	Time to the trigger at the operating flux	s

Method and standards

Resistance-in-series fouling model linear in specific throughput.

Assumptions and limits

- Fouling resistance proportional to throughput.

Report details

Report reference	FCC-CS9F-SNKG (the same inputs always give the same reference)
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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/environmental/drinking-water/membrane-fouling-index-mfi

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.