Membrane Resistance and Fouling Resistance from Flux

Clean membrane resistance coefficient from the clean-water flux, and the total and fouling resistances from a later flux, using the resistance-in-series model.

Input parameters

Unit system: SI

Parameter	Value	Unit
Clean-water flux	300.00	L/(m²·h)
Transmembrane pressure for the clean test	1.0000	bar
Water viscosity at the test temperature	1.0000	mPa·s
Flux in operation	60.000	L/(m²·h)
Transmembrane pressure in operation	1.2000	bar
Water viscosity in operation	1.3070	mPa·s

Calculated results

Parameter	Value	Unit
Membrane resistance coefficient	1.2000e+12	1/m
Total resistance in operation	5.5088e+12	1/m
Fouling resistance	4.3088e+12	1/m
Share of resistance from fouling	78.217	%

Notes for this case

- J = ΔP/(μκ): resistances in series, κ_T = κ_m + κ_f (cake, pore blocking, adsorption).

Formula and method

$$J = \frac{\Delta P}{\mu \kappa}, \quad \kappa_m = \frac{\Delta P_0}{\mu J_0}, \quad \kappa_f = \kappa_T - \kappa_m$$

Variables

J_0	Clean-water flux	m/s
ΔP_0	Transmembrane pressure for the clean test	Pa
μ	Water viscosity at the test temperature	Pa·s
J	Flux in operation	m/s
ΔP	Transmembrane pressure in operation	Pa
μ_2	Water viscosity in operation	Pa·s
κ_m	Membrane resistance coefficient	1/m
κ_T	Total resistance in operation	1/m
κ_f	Fouling resistance	1/m
κ_f/κ_T	Share of resistance from fouling	-

Method and standards

Resistance-in-series model of membrane filtration.

Assumptions and limits

- Pressure-driven flow through porous membranes; no osmotic effect.

Report details

Report reference	FCC-M07Z-1EVS (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-resistance-fouling

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.