Time for a Basin to Reaerate by Surface Transfer

Time for dissolved oxygen in a stored or slowly mixed basin to rise from an initial to a target value by surface reaeration, from K_L, area and depth.

Input parameters

Unit system: SI

Parameter	Value	Unit
Saturation dissolved oxygen	8.2600	mg/L
Initial dissolved oxygen	0	mg/L
Target dissolved oxygen	6.0000	mg/L
Liquid film coefficient	0.020000	m/h
Surface area	20,000	m²
Depth	1.5000	m

Calculated results

Parameter	Value	Unit
Interfacial area per volume	0.66667	1/m
Overall coefficient	0.013333	1/h
Time required	4.0502	d

Notes for this case

- The basin is assumed mixed so the bulk is uniform; a stagnant basin reaerates far more slowly by molecular diffusion. Shallow basins with large surfaces reaerate fastest.

Formula and method

$$\frac{C_s - C_t}{C_s - C_o} = e^{-K_L a t}, \quad a = \frac{A}{V} = \frac{1}{h}$$

Variables

C_s	Saturation dissolved oxygen	kg/m³
C_o	Initial dissolved oxygen	kg/m³
C_t	Target dissolved oxygen	kg/m³
K_L	Liquid film coefficient	m/s
A	Surface area	m²
h	Depth	m
a	Interfacial area per volume	1/m
$K_L a$	Overall coefficient	1/s
t	Time required	s

Method and standards

First-order gas absorption.

Assumptions and limits

- Uniform mixing; constant temperature.

Report details

Report reference	FCC-GQ2N-YABN (the same inputs always give the same reference)
Generated	23 November 2026, 17:50 UTC
Calculator	Time for a Basin to Reaerate by Surface Transfer
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
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/wastewater/surface-reaeration-time

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.