Settling Tank: Detention Time, Overflow Rate and Weir Loading

Detention time, surface overflow rate and weir loading of a rectangular or circular settling tank from flow and tank dimensions.

Method: Detention time V/Q; surface overflow rate Q/A; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Flow	400.00	m³/h
Tank shape	Circular	
Length (rectangular)	30.000	m
Width (rectangular)	8.0000	m
Diameter (circular)	20.000	m
Side water depth	3.5000	m
Total outlet weir length (0: end width of a rectangular tank, perimeter of a circular one)	0	m

Calculated results

Parameter	Value	Unit
Surface area	314.16	m²
Volume	1,099.6	m³
Detention time	2.7489	h
Surface overflow rate	1.2732	m/h
Weir loading	152.79	m³/(d·m)

Notes for this case

- With no weir length given: the end width of a rectangular tank, the perimeter of a circular one.

Formula and method

$$t_d = \frac{V}{\dot{V}}, \quad v_o = \frac{\dot{V}}{A}, \quad q_w = \frac{\dot{V}}{L_w}$$

Variables

$\dot{V}$	Flow	m³/s
shape	Tank shape	-
L	Length (rectangular)	m
W	Width (rectangular)	m
D	Diameter (circular)	m
H	Side water depth	m
L_w	Total outlet weir length (0: end width of a rectangular tank, perimeter of a circular one)	m
A	Surface area	m²
V	Volume	m³
t_d	Detention time	s
v_o	Surface overflow rate	m/s

q_w	Weir loading	m³/(s·m)

Method and standards

Definitions.

Assumptions and limits

- Uniform flow.
- With zero flow the detention time is not defined and is not shown.

References

- Detention time V/Q
- surface overflow rate Q/A
- weir loading Q/L_w (Metcalf & Eddy; water treatment texts)

Report details

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Release checks	2 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/sedimentation-detention-weir

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.