Septic Tank Volume and Soak Pit Size

Septic tank liquid and sludge volume and plan dimensions for a number of users, and the diameter of a soak pit from the soil infiltration rate.

Method: Septic tank detention and sludge storage; soak-away sizing

Input parameters

Unit system: SI

Parameter	Value	Unit
Users	20.000	
Wastewater per user	90.000	L/d
Detention time	24.000	h
Sludge per user per year	30.000	L
Desludging interval (years)	2.0000	
Liquid depth	1.5000	m
Length-to-width ratio	3.0000	
Soil infiltration rate	50.000	mm/d
Soak pit effective depth	3.0000	m

Calculated results

Parameter	Value	Unit
Liquid volume	1.8000	m^3
Sludge volume	1.2000	m^3
Tank working volume	3.0000	m^3
Tank width	0.81650	m
Tank length	2.4495	m
Infiltration area needed	36.000	m^2
Soak pit diameter	3.0464	m

Notes for this case

• V = N·q·t + N·r_s·n_y; plan from depth and L/W; soak pit wall plus floor area πD·h + πD²/4 = Nq/i. Add freeboard above the liquid; take percolation rates from a test pit, and check groundwater level and distance to wells.

Formula and method

$$V = Nqt + Nr_s n_y, \quad \pi D_p h_p + \frac{\pi D_p^2}{4} = \frac{Nq}{i}$$

Variables

N	Users	-
q	Wastewater per user	m^3/s
t	Detention time	s
r_s	Sludge per user per year	m^3
n_y	Desludging interval (years)	-
h	Liquid depth	m
L/W	Length-to-width ratio	-
i	Soil infiltration rate	m/s

h_p	Soak pit effective depth	m
V_l	Liquid volume	m³
V_s	Sludge volume	m³
V	Tank working volume	m³
W	Tank width	m
L	Tank length	m
A_s	Infiltration area needed	m²
D_p	Soak pit diameter	m

Method and standards

Septic sizing.

Assumptions and limits

- Domestic wastewater; uniform soil.

References

Septic tank detention and sludge storage; soak-away sizing

Report details

Report reference	FCC-BVED-F1NB (the same inputs always give the same reference)
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Calculator	Septic Tank Volume and Soak Pit Size
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Release checks	4 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/civil/hydraulics/septic-tank-soak-pit

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.