Sludge Volume from Dry Solids, Solids Content and Specific Gravity

Wet sludge volume and mass from the dry solids, the solids content and the specific gravity of the solids (Metcalf & Eddy relation), for thickening and disposal.

Method: V = M_s/(ρ_w S_sl P_s); 1/S_sl = P_s/S_s + (1 − P_s) (Metcalf & Eddy, Wastewater Engineering)

Input parameters

Unit system: SI

Parameter	Value	Unit
Dry solids per day	1,500.0	kg/d
Solids content of the sludge	4.0000	%
Specific gravity of the dry solids	1.4000	
Solids content after dewatering	22.000	%

Calculated results

Parameter	Value	Unit
Specific gravity of the sludge	1.0116	
Sludge volume per day	37.071	m³/d
Wet sludge mass per day	37.500	t/d
Volume after dewatering	6.3896	m³/d

Formula and method

$$\frac{1}{S_{sl}} = \frac{P_s}{S_s} + (1 - P_s), \quad \dot{V} = \frac{M_s}{\rho_w S_{sl} P_s}$$

Variables

M_s	Dry solids per day	kg/s
P_s	Solids content of the sludge	-
S_s	Specific gravity of the dry solids	-
P_{s2}	Solids content after dewatering	-
S_{sl}	Specific gravity of the sludge	-
$\dot{V}$	Sludge volume per day	m³/s
$\dot{m}$	Wet sludge mass per day	kg/s
$\dot{V}_2$	Volume after dewatering	m³/s

Method and standards

Mass and volume balance.

Assumptions and limits

- No gas in the sludge.
- The dewatered solids content should be above the feed solids content; the page warns otherwise.

References

- V = M_s/(ρ_w S_sl P_s)
- 1/S_sl = P_s/S_s + (1 − P_s) (Metcalf & Eddy, Wastewater Engineering)

Report details

Report reference	FCC-8XY5-QKDT (the same inputs always give the same reference)
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Calculator	Sludge Volume from Dry Solids, Solids Content and Specific Gravity
Method last reviewed	12 November 2026
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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/sludge-volume-from-solids

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.