Volatile Solids Reduction in a Digester (Van Kleeck)

Volatile solids destruction from the volatile fractions of feed and digested sludge (Van Kleeck), total solids reduction and digested solids from the feed solids.

Input parameters

Unit system: SI

Parameter	Value	Unit
Volatile fraction of feed solids	75.000	%
Volatile fraction of digested solids	58.000	%
Feed dry solids	12,000	kg/d

Calculated results

Parameter	Value	Unit
Volatile solids reduction	53.968	%
Total solids reduction	40.476	%
Digested dry solids	7,142.9	kg/d
Volatile solids destroyed	4,857.1	kg/d

Notes for this case

- Van Kleeck assumes the fixed (ash) solids pass through unchanged, with no grit build-up or supernatant withdrawal. Class B biosolids need at least 38 % volatile solids reduction.

Formula and method

$$R_{VSS} = \frac{W_{VS,f} - W_{VS,d}}{W_{VS,f} - W_{VS,f} W_{VS,d}}, \quad M_d = M_f \frac{1 - W_{VS,f}}{1 - W_{VS,d}}$$

Variables

$W_{VS,f}$	Volatile fraction of feed solids	-
$W_{VS,d}$	Volatile fraction of digested solids	-
M_f	Feed dry solids	kg/s
R_{VSS}	Volatile solids reduction	-
R_{TSS}	Total solids reduction	-
M_d	Digested dry solids	kg/s
$VS_{destroyed}$	Volatile solids destroyed	kg/s

Method and standards

Van Kleeck volatile solids reduction.

Assumptions and limits

- Fixed solids conserved.

Report details

Report reference	FCC-C1JZ-KG8J (the same inputs always give the same reference)
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Calculator	Volatile Solids Reduction in a Digester (Van Kleeck)
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/volatile-solids-reduction-van-kleeck

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.