Return Activated Sludge Ratio

Return activated sludge ratio and flow from a solids balance on the clarifier (MLSS and return sludge concentration) or from the 30-minute settled volume.

Method: Clarifier solids balance R = X/(X_r − X) (growth and effluent solids neglected)

Input parameters

Unit system: SI

Parameter	Value	Unit
Influent flow	2,000.0	m³/d
MLSS	3,000.0	mg/L
Return sludge concentration	10,000	mg/L
Settled volume after 30 min (mL/L)	300.00	

Calculated results

Parameter	Value	Unit
Return ratio X/(X_r − X)	42.857	%
Return flow	857.14	m³/d
Return ratio from settled volume	42.857	%

Formula and method

$$R = \frac{X}{X_r - X}, \quad R_{SV} = \frac{SV_{30}}{1000 - SV_{30}}$$

Variables

Q	Influent flow	m³/s
X	MLSS	kg/m³
X_r	Return sludge concentration	kg/m³
SV_{30}	Settled volume after 30 min (mL/L)	-
R	Return ratio X/(X_r − X)	-
Q_r	Return flow	m³/s
R_{SV}	Return ratio from settled volume	-

Method and standards

Solids balance.

Assumptions and limits

- Steady state.

References

- Clarifier solids balance R = X/(X_r − X) (growth and effluent solids neglected)

Report details

Report reference	FCC-9QNH-1SG0 (the same inputs always give the same reference)
Generated	17 November 2026, 19:45 UTC
Calculator	Return Activated Sludge Ratio
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 November 2026
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/return-sludge-ratio

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.