Sludge Age (SRT) and Waste Sludge Flow

Sludge age from aeration tank volume, MLSS and the solids wasted and lost in the effluent, and the waste sludge flow for a target sludge age.

Method: θ_c = V X/(Q_w X_r + Q_e X_e) (Metcalf & Eddy)

Input parameters

Unit system: SI

Parameter	Value	Unit
Aeration tank volume	1,500.0	m³
MLSS	3,000.0	mg/L
Waste sludge flow (from the return line)	35.000	m³/d
Return sludge concentration	10,000	mg/L
Effluent flow	2,000.0	m³/d
Effluent suspended solids	20.000	mg/L
Target sludge age	10.000	d

Calculated results

Parameter	Value	Unit
Solids in the aeration tank	4,500.0	kg
Present sludge age	11.538	d
Waste flow for the target	41.000	m³/d

Formula and method

$$\theta_c = \frac{VX}{Q_w X_r + Q_e X_e}, \quad Q_{w,t} = \frac{VX/\theta_t - Q_e X_e}{X_r}$$

Variables

V	Aeration tank volume	m³
X	MLSS	kg/m³
Q_w	Waste sludge flow (from the return line)	m³/s
X_r	Return sludge concentration	kg/m³
Q_e	Effluent flow	m³/s
X_e	Effluent suspended solids	kg/m³
θ_t	Target sludge age	s
M	Solids in the aeration tank	kg
θ_c	Present sludge age	s
$Q_{w,t}$	Waste flow for the target	m³/s

Method and standards

Solids balance.

Assumptions and limits

- Steady state.
- If no solids leave, the sludge age is not defined and is not shown. If the effluent solids alone exceed the loss the target allows, the waste flow is 0 and the page warns that the target cannot be met.

References

- θ_c = V X/(Q_w X_r + Q_e X_e) (Metcalf & Eddy)

Report details

Report reference	FCC-BY26-0VAC (the same inputs always give the same reference)
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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-age-wasting

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.