Equalisation Tank Volume from a Daily Flow Pattern

Equalisation tank volume to deliver a steady average outflow from six blocks of inflow over the day, from the largest swing of cumulative inflow minus outflow.

Method: Mass-diagram method: storage = max − min of cumulative (inflow − average) (Metcalf & Eddy)

Input parameters

Unit system: SI

Parameter	Value	Unit
Block 1: inflow	40.000	m³/h
Block 2: inflow	60.000	m³/h
Block 3: inflow	120.00	m³/h
Block 4: inflow	140.00	m³/h
Block 5: inflow	90.000	m³/h
Block 6: inflow	50.000	m³/h
Length of each block	4.0000	h
Allowance for dead volume and margin	20.000	%

Calculated results

Parameter	Value	Unit
Average outflow	83.333	m³/h
Storage needed	400.00	m³
Tank volume with allowance	480.00	m³

Notes for this case

- The six blocks cover one day and the pattern is taken to repeat daily; use shorter blocks if flow changes faster.

Formula and method

$$V_s = \max_k \sum_{i \le k} (Q_i - \bar{Q}) t_b - \min_k \sum_{i \le k} (Q_i - \bar{Q}) t_b$$

Variables

Q_1	Block 1: inflow	m³/s
Q_2	Block 2: inflow	m³/s
Q_3	Block 3: inflow	m³/s
Q_4	Block 4: inflow	m³/s
Q_5	Block 5: inflow	m³/s
Q_6	Block 6: inflow	m³/s
t_b	Length of each block	s
k	Allowance for dead volume and margin	-
$\bar{Q}$	Average outflow	m³/s
V_s	Storage needed	m³
V	Tank volume with allowance	m³

Method and standards

Mass diagram.

Assumptions and limits

- The six-block pattern (6 t_b long) repeats; with 4-hour blocks that is a daily pattern, with other block lengths the cycle is 6 t_b.

References

• Mass-diagram method: storage = max − min of cumulative (inflow − average) (Metcalf & Eddy)

Report details

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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/equalisation-tank-volume

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.