Overhead Water Tank and Pump Sizing for a Building

Overhead tank capacity, pump flow, pump power and daily energy for a building from population, per-capita demand, storage period, pumping hours and head.

Method: Water demand and pumping balance

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of people served	200.00	
Water demand per person per day (litres)	135.00	
Storage in the overhead tank (share of a day's demand)	50.000	%
Pumping hours per day	6.0000	h
Total pump head (static lift plus friction)	30.000	m
Pump-set efficiency	55.000	%

Calculated results

Parameter	Value	Unit
Daily demand	27,000	L
Overhead tank capacity	13,500	L
Pump flow	75.000	L/min
Pump input power	0.66730	kW
Energy per day	4.0038	kWh

Notes for this case

• Daily demand is people × litres per head. The overhead tank stores a share of it (often half a day in residences, more where supply is intermittent), and the pump must lift the whole day's demand in the pumping hours available. Power is ρgQH over the pump-set efficiency; small domestic pump-sets reach only 40–60 %. Add the head of the tank's height above the sump, pipe friction and a few metres of margin.

Formula and method

$$Q_d = Nq, \quad V = f_s Q_d, \quad \dot{V}_p = \frac{Q_d}{t_p}, \quad P = \frac{\rho g \dot{V}_p H}{\eta}$$

Variables

N	Number of people served	-
q	Water demand per person per day (litres)	-
f_s	Storage in the overhead tank (share of a day's demand)	-
t_p	Pumping hours per day	s
H	Total pump head (static lift plus friction)	m
η	Pump-set efficiency	-
Q_d	Daily demand	m³
V	Overhead tank capacity	m³
$\dot{V}_p$	Pump flow	m³/s
P	Pump input power	W
E	Energy per day	J

Method and standards

Overhead tank.

Assumptions and limits

- Uniform demand; pumping hours as entered.

References

Water demand and pumping balance

Report details

Report reference	FCC-ARAQ-R250 (the same inputs always give the same reference)
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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/mechanical/pumps/overhead-tank-pump-sizing

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.