Pump Wet-Well Volume for Allowable Starts per Hour

Minimum effective sump or wet-well volume so a constant-speed pump stays within its allowable starts per hour, with alternating pumps.

Method: Cycle-time relation V = QT_c/4 (Sanks, Pumping Station Design, ch. 12)

Input parameters

Unit system: SI

Parameter	Value	Unit
Pump capacity	100.00	m³/h
Allowable starts per hour	6.0000	
Pumps alternating as duty	1.0000	
Wet-well plan area	6.0000	m²

Calculated results

Parameter	Value	Unit
Minimum cycle time per pump	10.000	min
Effective volume required	4.1667	m³
Depth between start and stop	0.69444	m

Notes for this case

• Worst case is inflow equal to half the pump capacity: cycle time = 4V/Q. Alternating n pumps lets each start less often. Add volume below the stop level for submergence and above for alarms.

Formula and method

$$T_c = \frac{3600}{Z}, \quad V = \frac{QT_c}{4n}$$

Variables

Q	Pump capacity	m³/s
Z	Allowable starts per hour	-
n	Pumps alternating as duty	-
A	Wet-well plan area	m²
T_c	Minimum cycle time per pump	s
V	Effective volume required	m³
Δh	Depth between start and stop	m

Method and standards

Pump cycling.

Assumptions and limits

- Constant-speed pumps; on/off control.

References

• Cycle-time relation V = QT_c/4 (Sanks, Pumping Station Design, ch. 12)

Report details

Report reference	FCC-HXHS-HCRA (the same inputs always give the same reference)
Generated	17 November 2026, 19:50 UTC
Calculator	Pump Wet-Well Volume for Allowable Starts per Hour
Method last reviewed	13 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/civil/hydraulics/wet-well-volume-starts

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.