Swimming Pool Filtration: Turnover, Pump Flow and Filter Area

Recirculation flow of a swimming pool from its volume and turnover period, the sand filter area at a filtration rate and the number of turnovers per day.

Method: Turnover and filtration-rate sizing

Input parameters

Unit system: SI

Parameter	Value	Unit
Pool volume	375.00	m³
Turnover period	6.0000	h
Filtration rate	25.000	m/h
Number of filters	1.0000	

Calculated results

Parameter	Value	Unit
Recirculation flow	62.500	m³/h
Total filter area	2.5000	m²
Diameter of each filter	1,784.1	mm
Turnovers per day	4.0000	

Notes for this case

• The whole pool volume should pass through the filters in the turnover period: about 4–6 h for private and hotel pools, 2–4 h for busy public pools and 0.5–1 h for spas and children's pools. The pump flow is volume over turnover time; the filter area is that flow over the filtration rate (about 10–25 m/h for medium-rate sand filters, up to 50 m/h for high-rate). Size the pump for the filter, pipework and heater losses at that flow.

Formula and method

$$Q = \frac{V}{t_t}, \quad A = \frac{Q}{v_f}, \quad d = \sqrt{\frac{4A}{n\pi}}$$

Variables

V	Pool volume	m³
t_t	Turnover period	s
v_f	Filtration rate	m/s
n	Number of filters	-
Q	Recirculation flow	m³/s
A	Total filter area	m²
d	Diameter of each filter	m
N_d	Turnovers per day	-

Method and standards

Pool filtration.

Assumptions and limits

- Uniform circulation.

References

Turnover and filtration-rate sizing

Report details

Report reference	FCC-MK62-5XXV (the same inputs always give the same reference)
Generated	23 November 2026, 17:42 UTC
Calculator	Swimming Pool Filtration: Turnover, Pump Flow and Filter Area
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
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/civil/hydraulics/pool-filtration-turnover

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.