Storm Water Runoff by the Rational Method

Peak storm water runoff from a catchment by the rational method Q = C i A, and the runoff volume over the storm, for drain and sump sizing.

Method: Rational method

Input parameters

Unit system: SI

Parameter	Value	Unit
Runoff coefficient Share of rain that runs off: high for roofs and paving, low for lawns and open ground.	85.000	%
Rainfall intensity for the design storm	50.000	mm/h
Catchment area	2.0000	ha
Storm duration	1.0000	h

Calculated results

Parameter	Value	Unit
Peak runoff	0.23611	m³/s
Runoff volume over the storm	850.00	m³

Notes for this case

- The rational method suits small catchments; use the intensity for a duration equal to the time of concentration, from local rainfall data.

Formula and method

$$Q = C\,i\,A$$

$$V = Q\,t$$

Variables

C	runoff coefficient	-
i	rainfall intensity	m/s
A	catchment area	m²
t	storm duration	s
Q	peak runoff	m³/s
V	runoff volume	m³

Method and standards

The rational method takes peak runoff as the share C of rainfall intensity falling on the catchment area. In SI units with i in m/s and A in m², Q comes out in m³/s.

Assumptions and limits

- Small catchments; uniform rain over the area.
- The volume V = Q t holds the peak rate for the whole storm. For the volume, enter the intensity for a storm of duration t (from the IDF data); using the time-of-concentration intensity with a longer duration overstates the volume.

References

- Rational method

Report details

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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/civil/hydraulics/rainwater-runoff

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.