Seepage Flow by Darcy's Law

Seepage flow, discharge velocity and seepage velocity through a soil from permeability, hydraulic gradient (head loss over length), area and porosity.

Method: Darcy's law Q = k i A

Input parameters

Unit system: SI

Parameter	Value	Unit
Coefficient of permeability	1.0000e-05	m/s
Head loss	3.0000	m
Flow length	15.000	m
Flow cross-section	50.000	m²
Porosity	35.000	%

Calculated results

Parameter	Value	Unit
Hydraulic gradient Δh/L	0.20000	
Discharge (Darcy) velocity k i	2.0000e-06	m/s
Seepage velocity v/n	5.7143e-06	m/s
Seepage flow	8.6400	m³/d

Formula and method

$$i = \frac{\Delta h}{L}, \quad v = ki, \quad v_s = \frac{v}{n}, \quad Q = kiA$$

Variables

k	Coefficient of permeability	m/s
Δh	Head loss	m
L	Flow length	m
A	Flow cross-section	m²
n	Porosity	-
i	Hydraulic gradient Δh/L	-
v	Discharge (Darcy) velocity k i	m/s
v_s	Seepage velocity v/n	m/s
Q	Seepage flow	m³/s

Method and standards

Darcy's law.

Assumptions and limits

- Laminar, saturated, homogeneous.
- The seepage velocity uses the porosity entered. For contaminant travel time use the effective (connected) porosity, usually smaller than the total, which gives a faster travel.

References

- Darcy's law Q = k i A

Report details

Report reference	FCC-5EZN-V1S1 (the same inputs always give the same reference)
Generated	17 November 2026, 19:49 UTC
Calculator	Seepage Flow by Darcy's Law
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 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/geotechnical/darcy-seepage

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.