Seepage from a Flow Net (Under a Dam or Sheet Pile)

Seepage per metre length under a dam, weir or sheet pile from permeability, head difference and the numbers of flow channels and equipotential drops of a flow net.

Method: Flow net seepage q = k H N_f/N_d; critical gradient γ'/γ_w (Das; Craig)

Input parameters

Unit system: SI

Parameter	Value	Unit
Coefficient of permeability	5.0000e-06	m/s
Head difference upstream to downstream	6.0000	m
Number of flow channels	4.0000	
Number of equipotential drops	12.000	
Length of the structure	50.000	m
Size of the last square at the exit	1.2000	m
Submerged to water unit weight ratio	1.0000	

Calculated results

Parameter	Value	Unit
Seepage per metre	0.86400	m³/(d·m)
Total seepage	43.200	m³/d
Exit gradient (H/N_d)/l_e	0.41667	
Safety against piping i_c/i_e	2.4000	

Notes for this case

- The critical gradient i_c is γ'/γw, about 1 for most soils.

Formula and method

The formula is shown on the calculator page: https://calc.firecad.com/civil/geotechnical/flow-net-seepage

Variables

k	Coefficient of permeability	m/s
H	Head difference upstream to downstream	m
N_f	Number of flow channels	-
N_d	Number of equipotential drops	-
B	Length of the structure	m
l_e	Size of the last square at the exit	m
\gamma'/ \gamma_w	Submerged to water unit weight ratio	-
q	Seepage per metre	m³/(s·m)
Q	Total seepage	m³/s
i_e	Exit gradient (H/N_d)/l_e	-
FS	Safety against piping i_c/i_e	-

Method and standards

Flow net theory.

Assumptions and limits

- Isotropic, steady flow. With zero head the piping safety factor is not shown.

References

- Flow net seepage q = k H N_f/N_d; critical gradient γ'/γ_w (Das; Craig)

Report details

Report reference	FCC-2D2A-W616 (the same inputs always give the same reference)
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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/geotechnical/flow-net-seepage

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.