Parshall Flume Flow from Upstream Head

Open-channel flow through a Parshall flume from throat width and upstream head under free-flow conditions, with the flume's submergence check.

Method: Parshall flume free-flow equation Q = 0.372W(H_a/0.3048)^(1.569W^0.026) (US Bureau of Reclamation, Water Measurement Manual)

Input parameters

Unit system: SI

Parameter	Value	Unit
Throat width	600.00	mm
Upstream head	300.00	mm
Downstream head (for submergence)	120.00	mm

Calculated results

Parameter	Value	Unit
Free-flow discharge	784.01	m³/h
Head exponent	1.5483	
Submergence ratio	40.000	%

Notes for this case

• Valid for standard flumes with throat 0.3–2.4 m. Measure H_a at two-thirds of the converging section length upstream of the crest.

Formula and method

$$Q = 0.372W\left(\frac{H_a}{0.3048}\right)^{1.569W^{0.026}} \quad \text{(SI)}$$

Variables

W	Throat width	m
H_a	Upstream head	m
H_b	Downstream head (for submergence)	m
Q	Free-flow discharge	m³/s
n	Head exponent	-
H_b/H_a	Submergence ratio	-

Method and standards

USBR free-flow equation.

Assumptions and limits

- Standard Parshall dimensions; free flow.

References

• Parshall flume free-flow equation Q = 0.372W(H_a/0.3048)^(1.569W^0.026) (US Bureau of Reclamation, Water Measurement Manual)

Report details

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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/instrumentation/flow/parshall-flume-flow

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.