Kennedy's Critical Velocity and Canal Check

Kennedy's critical velocity for a canal depth and critical velocity ratio, the actual velocity in a trapezoidal section, and their ratio.

Method: Kennedy's equation V_0 = 0.55mD^0.64 (SI) (Garg, Irrigation Engineering and Hydraulic Structures (Khanna))

Input parameters

Unit system: SI

Parameter	Value	Unit
Flow depth	1.8000	m
Critical velocity ratio	1.0000	
Discharge	54,000	m³/h
Bed width	10.000	m
Side slope H:V	0.50000	

Calculated results

Parameter	Value	Unit
Critical velocity	0.80119	m/s
Actual mean velocity	0.76453	m/s
Velocity ratio	0.95423	

Formula and method

$$V_0 = 0.55 m D^{0.64}, \quad V = \frac{Q}{(B + zD)D}$$

Variables

D	Flow depth	m
m	Critical velocity ratio	-
Q	Discharge	m³/s
B	Bed width	m
z	Side slope H:V	-
V_0	Critical velocity	m/s
V	Actual mean velocity	m/s
V/V_0	Velocity ratio	-

Method and standards

Kennedy's equation.

Assumptions and limits

- Alluvial canals.
- V/V_0 within ±5 % of 1 is treated as non-silting, non-scouring; outside that band silting or scouring is flagged (an engineering tolerance, not part of Kennedy's equation).

References

- Kennedy's equation V_0 = 0.55mD^0.64 (SI) (Garg, Irrigation Engineering and Hydraulic Structures (Khanna))

Report details

Report reference	FCC-1AGE-997M (the same inputs always give the same reference)
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Calculator	Kennedy's Critical Velocity and Canal Check
Method last reviewed	13 November 2026
Software release	FireCAD Calc, release of 17 November 2026
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/hydraulics/kennedy-critical-velocity

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.