Spot Speed Study: Mean and 15th, 85th, 98th Percentiles

Mean, standard deviation and the 15th, 85th and 98th percentile speeds from up to ten spot speed observations, used for speed limits and design speed.

Method: Spot speed study percentiles (traffic engineering practice)

Input parameters

Unit system: SI

Parameter	Value	Unit
Speed 1	42.000	km/h
Speed 2	48.000	km/h
Speed 3	51.000	km/h
Speed 4	55.000	km/h
Speed 5	57.000	km/h
Speed 6 (0 = none)	60.000	km/h
Speed 7 (0 = none)	62.000	km/h
Speed 8 (0 = none)	65.000	km/h
Speed 9 (0 = none)	70.000	km/h
Speed 10 (0 = none)	78.000	km/h

Calculated results

Parameter	Value	Unit
Mean speed	58.800	km/h
Standard deviation	10.654	km/h
15th percentile	49.050	km/h
85th percentile	68.250	km/h
98th percentile	76.560	km/h

Notes for this case

- Spot speeds measured at a point are ranked and percentiles read from their cumulative distribution (here by linear interpolation between ranked values). The 85th percentile is the usual basis for the speed limit, the 15th for a minimum speed on highways, and the 98th for geometric design speed. Ten observations only illustrate the method: real studies use 50 or more vehicles in free-flowing traffic.

Formula and method

$$v_q = v_{(\lfloor i \rfloor)} + (i - \lfloor i \rfloor)\left(v_{(\lfloor i \rfloor + 1)} - v_{(\lfloor i \rfloor)}\right), \quad i = q(n-1)$$

Variables

v_1	Speed 1	m/s
v_2	Speed 2	m/s
v_3	Speed 3	m/s
v_4	Speed 4	m/s
v_5	Speed 5	m/s
v_6	Speed 6 (0 = none)	m/s
v_7	Speed 7 (0 = none)	m/s
v_8	Speed 8 (0 = none)	m/s
v_9	Speed 9 (0 = none)	m/s

v_{10}	Speed 10 (0 = none)	m/s
$\bar{v}$	Mean speed	m/s
σ	Standard deviation	m/s
v_{15}	15th percentile	m/s
v_{85}	85th percentile	m/s
v_{98}	98th percentile	m/s

Method and standards

Spot speed.

Assumptions and limits

- Free-flow conditions; linear interpolation.

References

Spot speed study percentiles (traffic engineering practice)

Report details

Report reference	FCC-2C5Q-AEHK (the same inputs always give the same reference)
Generated	23 November 2026, 18:08 UTC
Calculator	Spot Speed Study: Mean and 15th, 85th, 98th Percentiles
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 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/roads/spot-speed-percentile

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.