Tyre Size: Diameter, Revolutions per km and Speedometer Error

Overall diameter and revolutions per km of two metric tyre sizes, and the speedometer error when the second replaces the first.

Method: Metric tyre designation: D = rim × 25.4 + 2 × width × aspect/100 (ETRTO convention)

Input parameters

Unit system: SI

Parameter	Value	Unit
Original tyre width (mm)	205.00	
Original aspect ratio (%)	55.000	
Original rim diameter (inch)	16.000	
New tyre width (mm)	225.00	
New aspect ratio (%)	45.000	
New rim diameter (inch)	17.000	
Rolling-to-overall diameter factor	0.97000	

Calculated results

Parameter	Value	Unit
Original overall diameter	631.90	mm
New overall diameter	634.30	mm
Original revolutions per km	519.31	
New revolutions per km	517.35	
Speedometer error (reading − true)/true	-0.37837	%

Notes for this case

- Positive error means the speedometer over-reads. Keep the new overall diameter within about ±3 % of the original.

Formula and method

$$D = 25.4 D_r + 2W\frac{AR}{100}, \quad N = \frac{1000}{\pi k D}, \quad e = \frac{D_1}{D_2} - 1$$

Variables

W_1	Original tyre width (mm)	-
AR_1	Original aspect ratio (%)	-
D_{r1}	Original rim diameter (inch)	-
W_2	New tyre width (mm)	-
AR_2	New aspect ratio (%)	-
D_{r2}	New rim diameter (inch)	-
k	Rolling-to-overall diameter factor	-
D_1	Original overall diameter	m
D_2	New overall diameter	m
N_1	Original revolutions per km	-
N_2	New revolutions per km	-
e	Speedometer error (reading − true)/true	-

Method and standards

Tyre geometry.

Assumptions and limits

- Metric radial sizes.

References

- Metric tyre designation: D = rim × 25.4 + 2 × width × aspect/100 (ETRTO convention)

Report details

Report reference	FCC-VXKZ-DZB3 (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/automotive/tyres-wheels/tyre-size-speedometer

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.