Tyre Rolling Radius, Revolutions per km and Wheel Speed

Unloaded diameter, loaded rolling radius, revolutions per kilometre and wheel speed of a metric tyre from its width, aspect ratio, rim size and a deflection factor.

Method: Tyre geometry from the size marking

Input parameters

Unit system: SI

Parameter	Value	Unit
Section width	205.00	mm
Aspect ratio	55.000	%
Rim diameter	16.000	in
Rolling radius / unloaded radius	0.97000	
Road speed	100.00	km/h

Calculated results

Parameter	Value	Unit
Unloaded diameter	631.90	mm
Rolling radius	306.47	mm
Revolutions per km	519.31	
Wheel speed	865.52	rpm

Notes for this case

• D = rim + 2 × width × aspect ratio; the loaded tyre rolls on an effective radius about 2–4 % below the unloaded one. The maker's revolutions per km, where published, is the best figure for speedometer work.

Formula and method

$$D = D_r + 2W \cdot AR, \quad r_r = k\frac{D}{2}, \quad n_{km} = \frac{1000}{2\pi r_r}$$

Variables

W	Section width	m
AR	Aspect ratio	-
D_r	Rim diameter	m
k	Rolling radius / unloaded radius	-
v	Road speed	m/s
D	Unloaded diameter	m
r_r	Rolling radius	m
n_{km}	Revolutions per km	-
n_w	Wheel speed	1/s

Method and standards

Tyre geometry.

Assumptions and limits

- Radial tyre at normal inflation.

References

Tyre geometry from the size marking

Report details

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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/automotive/tyres-wheels/tyre-rolling-radius-revs-per-km

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.