Tyre Pressure Change with Temperature

Hot tyre gauge pressure from a cold setting and temperature change at constant volume, and the cold pressure that gives a target hot pressure.

Method: Ideal gas at constant volume

Input parameters

Unit system: SI

Parameter	Value	Unit
Cold gauge pressure	2.3000	bar
Cold tyre temperature	15.000	°C
Hot tyre temperature	45.000	°C
Atmospheric pressure	101.33	kPa
Target hot gauge pressure	2.5000	bar

Calculated results

Parameter	Value	Unit
Hot gauge pressure	2.6450	bar
Pressure rise	0.34495	bar
Rise relative to the cold gauge pressure	14.998	%
Cold gauge pressure for the target	2.1687	bar

Notes for this case

• Gay-Lussac at constant volume on absolute pressure: $p_2 = (p_1 + p_a)T_2/T_1 - p_a$. Set pressures cold; a hot tyre reading above the placard value is normal, so never bleed a hot tyre down to the cold figure.

Formula and method

$$p_2 = (p_1 + p_a)\frac{T_2}{T_1} - p_a$$

Variables

p_1	Cold gauge pressure	Pa
T_1	Cold tyre temperature	K
T_2	Hot tyre temperature	K
p_a	Atmospheric pressure	Pa
$p_{2,t}$	Target hot gauge pressure	Pa
p_2	Hot gauge pressure	Pa
Δp	Pressure rise	Pa
$\Delta p / p_1$	Rise relative to the cold gauge pressure	-
$p_{1,t}$	Cold gauge pressure for the target	Pa

Method and standards

Constant-volume gas law.

Assumptions and limits

- Constant tyre volume; dry air or nitrogen.

References

Ideal gas at constant volume

Report details

Report reference	FCC-PNYR-274Y (the same inputs always give the same reference)
Generated	23 November 2026, 17:51 UTC
Calculator	Tyre Pressure Change with Temperature
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/automotive/tyres-wheels/tyre-pressure-temperature

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.