Railway Grade Compensation on Curves

Degree of a railway curve from its radius and the grade compensation (per cent per degree) to keep the train resistance on a curve within the ruling gradient.

Method: Indian railway practice for grade compensation on curves

Input parameters

Unit system: SI

Parameter	Value	Unit
Ruling gradient	0.66667	%
Curve radius	875.00	m
Compensation per degree	Broad gauge, 0.04 % per degree	

Calculated results

Parameter	Value	Unit
Degree of curve	2.0000	
Grade compensation	0.080000	%
Allowable gradient on the curve	0.58667	%
Allowable gradient as 1 in n	170.45	

Notes for this case

• A curve adds resistance, so on gradients the grade is eased on curves to keep the total within the ruling gradient. The degree of curve is the angle subtended by a 30.5 m chord, about 1750/R. Indian practice compensates 0.04 % per degree on broad gauge, 0.03 % on metre gauge and 0.02 % on narrow gauge. Check the railway's current standards for the line.

Formula and method

$$D = \frac{1750}{R}, \quad c = kD, \quad i_a = i_r - c$$

Variables

i_r	Ruling gradient	-
R	Curve radius	m
k	Compensation per degree	-
D	Degree of curve	-
c	Grade compensation	-
i_a	Allowable gradient on the curve	-
n	Allowable gradient as 1 in n	-

Method and standards

Grade compensation.

Assumptions and limits

- 30.5 m chord degree.

References

Indian railway practice for grade compensation on curves

Report details

Report reference	FCC-AAKC-APQQ (the same inputs always give the same reference)
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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/civil/roads/railway-curve-grade-compensation

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.