Overhead Conductor Sag and Tension

Sag of an overhead conductor between level supports from its weight per metre, span and tension, by the parabola and the catenary, with conductor length.

Method: Parabolic approximation and catenary of a uniform flexible conductor (textbook)

Input parameters

Unit system: SI

Parameter	Value	Unit
Weight of the conductor per unit length	9.5000	N/m
Span between supports	250.00	m
Horizontal tension	15.000	kN

Calculated results

Parameter	Value	Unit
Sag by the parabola w L² / (8 T)	4.9479	m
Sag by the catenary	4.9505	m
Conductor length in the span	250.26	m
Tension at the supports T + w S_c	15.047	kN

Notes for this case

- Level supports, no wind or ice. Add wind and ice loads to the weight per metre as your line code requires.

Formula and method

$$S = \frac{wL^2}{8T}, \quad S_c = \frac{T}{w}\left(\cosh\frac{wL}{2T} - 1\right), \quad l_c = \frac{2T}{w}\sinh\frac{wL}{2T}$$

Variables

w	Weight of the conductor per unit length	N/m
L	Span between supports	m
T	Horizontal tension	N
S	Sag by the parabola w L² / (8 T)	m
S_c	Sag by the catenary	m
l_c	Conductor length in the span	m
T_{max}	Tension at the supports T + w S_c	N

Method and standards

Statics of a hanging conductor.

Assumptions and limits

- Supports at the same level.
- A sag over a tenth of the span is flagged (the parabola is then inadequate); wL/(2T) above 5 is rejected as an unrealistically slack conductor.

References

- Parabolic approximation and catenary of a uniform flexible conductor (textbook)

Report details

Report reference	FCC-DHFW-C3C2 (the same inputs always give the same reference)
Generated	17 November 2026, 19:45 UTC
Calculator	Overhead Conductor Sag and Tension
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 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/electrical/cables/conductor-sag-tension

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.