CVT Pulley Ratio Range from Belt Length and Centre Distance

Driven pulley radius and ratio at the minimum and maximum drive pulley radii of a belt CVT with a fixed belt length and centre distance, and the ratio spread.

Method: Open-belt geometry

Input parameters

Unit system: SI

Parameter	Value	Unit
Centre distance	160.00	mm
Belt pitch length	640.00	mm
Drive pulley minimum pitch radius	30.000	mm
Drive pulley maximum pitch radius	70.000	mm

Calculated results

Parameter	Value	Unit
Driven radius in low	68.843	mm
Lowest gear ratio	2.2948	
Driven radius in overdrive	28.396	mm
Overdrive ratio	0.40565	
Ratio spread	5.6569	

Notes for this case

• Open-belt length L = 2√(C² − Δ²) + π(r₁ + r₂) + 2Δ·asin(Δ/C), Δ = r₂ − r₁, solved for r₂ at each drive radius. Ratio i = r₂/r₁ (driven slower above 1). Car CVTs reach spreads of about 6–7; the driven pulley's own radius limits must also be respected.

Formula and method

$$L = 2\sqrt{C^2 - \Delta^2} + \pi(r_1 + r_2) + 2\Delta \sin^{-1}\frac{\Delta}{C}, \quad i = \frac{r_2}{r_1}$$

Variables

C	Centre distance	m
L_b	Belt pitch length	m
$r_{1,min}$	Drive pulley minimum pitch radius	m
$r_{1,max}$	Drive pulley maximum pitch radius	m
$r_{2,low}$	Driven radius in low	m
i_{low}	Lowest gear ratio	-
$r_{2,od}$	Driven radius in overdrive	m
i_{od}	Overdrive ratio	-
φ	Ratio spread	-

Method and standards

CVT geometry.

Assumptions and limits

- Inextensible belt; pitch radii; no slip.

References

Open-belt geometry

Report details

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Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/automotive/transmission/cvt-pulley-ratio-range

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.