Torque Converter Stall Speed and Wheel Tractive Force

Stall speed of a torque converter from its K-factor and engine torque, the turbine torque at stall from the torque ratio, and tractive force at the wheels.

Method: Torque converter capacity factor

Input parameters

Unit system: SI

Parameter	Value	Unit
K-factor (rpm per √(N·m))	150.00	
Engine torque near stall speed	250.00	N·m
Torque ratio at stall	2.0000	
Overall ratio (first gear × final drive)	14.000	
Rolling radius	330.00	mm
Gear efficiency	92.000	%

Calculated results

Parameter	Value	Unit
Stall speed	2,371.7	rpm
Turbine torque at stall	500.00	N·m
Tractive force at stall	19.515	kN
K-factor in rpm per √(lbf·ft)	174.66	

Notes for this case

• Converter capacity: n = K√T. At stall the engine settles where its torque curve meets K√T; enter the engine torque near that speed (iterate if needed). A higher stall speed lets the engine reach more torque at launch at the cost of heat and slip.

Formula and method

$$n_s = K\sqrt{T_e}, \quad T_t = TR \cdot T_e, \quad F_x = \frac{T_t i \eta}{r}$$

Variables

K	K-factor (rpm per √(N·m))	-
T_e	Engine torque near stall speed	N·m
TR	Torque ratio at stall	-
i	Overall ratio (first gear × final drive)	-
r	Rolling radius	m
η	Gear efficiency	-
n_s	Stall speed	1/s
T_t	Turbine torque at stall	N·m
F_x	Tractive force at stall	N
K_{US}	K-factor in rpm per √(lbf·ft)	-

Method and standards

Converter capacity.

Assumptions and limits

- Steady stall; K constant near stall.

References

Torque converter capacity factor

Report details

Report reference	FCC-9KTR-ZJ29 (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/automotive/transmission/torque-converter-stall

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.