Haul Road Rolling, Grade and Total Resistance

Rolling and grade resistance of a haul truck, total resistance and effective grade, with rolling resistance entered or estimated from tyre penetration.

Input parameters

Unit system: SI

Parameter	Value	Unit
Gross machine weight	550.00	t
Rolling resistance from	Entered percentage	
Rolling resistance (percent of weight)	3.0000	%
Tyre penetration	1.0000	in
Grade (+ uphill, − downhill)	8.0000	%
Speed (for the power needed)	12.000	km/h

Calculated results

Parameter	Value	Unit
Rolling resistance	16,500	kgf
Grade resistance	44,000	kgf
Total resistance	60,500	kgf
Effective grade	11.000	%
Power at the wheels to overcome it	1,977.7	kW

Notes for this case

- The usable rim pull must exceed the total resistance for the truck to move at this speed.

Formula and method

$$RR = RR\% \cdot GMW, \quad GR = i \cdot GMW, \quad TR = RR + GR, \quad EG = RR\% + i$$

Variables

GMW	Gross machine weight	kg
$\mathrm{rolling}$	Rolling resistance from	-
$RR\%$	Rolling resistance (percent of weight)	-
p	Tyre penetration	m
i	Grade (+ uphill, − downhill)	-
V	Speed (for the power needed)	m/s
RR	Rolling resistance	N
GR	Grade resistance	N
TR	Total resistance	N
EG	Effective grade	-
P	Power at the wheels to overcome it	W

Method and standards

Rolling plus grade resistance.

Assumptions and limits

- Small-angle form: grade percent ≈ tan θ ≈ sin θ.

Report details

Report reference	FCC-2AXK-YPB4 (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/mine-design/haul-rolling-grade-resistance

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.