Stockpile Volume and Mass: Conical and Windrow Piles

Volume and mass of a conical stockpile or a long windrow (prismatic pile with conical ends) from its height or base and the angle of repose of the material.

Method: Solid geometry of cones and prisms (definitions)

Input parameters

Unit system: SI

Parameter	Value	Unit
Pile shape	Conical	
Pile height	10.000	m
Angle of repose	35.002	°
Windrow length of the straight part	100.00	m
Bulk density	850.00	kg/m³

Calculated results

Parameter	Value	Unit
Base radius (or half-width)	14.280	m
Volume	2,135.6	m³
Mass	1,815.2	t
Base area	640.67	m²

Notes for this case

- Live (reclaimable) stock is less than total: for a cone reclaimed through one bottom outlet, often 20–30 % of the pile.

Formula and method

$$R = \frac{H}{\tan \alpha}, \quad V_{cone} = \frac{\pi R^2 H}{3}, \quad V_{windrow} = \frac{\pi R^2 H}{3} + RHL$$

Variables

shape	Pile shape	-
H	Pile height	m
α	Angle of repose	rad
L	Windrow length of the straight part	m
ρ_b	Bulk density	kg/m³
R	Base radius (or half-width)	m
V	Volume	m³
M	Mass	kg
A_b	Base area	m²

Method and standards

Solid geometry.

Assumptions and limits

- Smooth regular piles on flat ground.

References

- Solid geometry of cones and prisms (definitions)

Report details

Report reference	FCC-TSNP-ZBEG (the same inputs always give the same reference)
Generated	17 November 2026, 19:48 UTC
Calculator	Stockpile Volume and Mass: Conical and Windrow Piles
Method last reviewed	13 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	2 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/mechanical/material-handling/stockpile-volume

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.