Log Volume by Smalian, Huber and Hoppus, with Board Feet

Volume of a log from its end and middle diameters and length by Smalian's and Huber's formulas and the Hoppus (quarter-girth) measure, with board feet.

Method: Smalian; Huber and Hoppus log measurement

Input parameters

Unit system: SI

Parameter	Value	Unit
Small-end diameter	300.00	mm
Large-end diameter	400.00	mm
Mid-length diameter	350.00	mm
Log length	4.0000	m

Calculated results

Parameter	Value	Unit
Smalian volume	0.39270	m³
Huber volume	0.38485	m³
Hoppus (quarter-girth) volume	0.30226	m³
Board feet (from Huber volume)	163.09	

Notes for this case

• Smalian's formula averages the two end areas and tends to overestimate a log's volume; Huber's uses the mid-length area and is usually closer for paraboloid-shaped logs. The Hoppus (quarter-girth) measure, still used in timber trade in parts of Asia, squares a quarter of the mid girth and gives about 78.5 % (π/4) of the true volume, allowing for slabs lost in sawing. One board foot is 144 cubic inches (2.36 dm³).

Formula and method

$$V_S = \frac{A_1 + A_2}{2} L, \quad V_H = A_m L, \quad V_Q = \left(\frac{g}{4}\right)^2 L$$

Variables

d_1	Small-end diameter	m
d_2	Large-end diameter	m
d_m	Mid-length diameter	m
L	Log length	m
V_S	Smalian volume	m³
V_H	Huber volume	m³
V_Q	Hoppus (quarter-girth) volume	m³
BF	Board feet (from Huber volume)	-

Method and standards

Log volume.

Assumptions and limits

- Circular cross-sections.

References

Smalian, Huber and Hoppus log measurement

Report details

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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/irrigation-farm/log-volume-smalian-hoppus

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.