Flotation Cell and Bank Volume from Retention Time

Total and per-cell flotation volume from the dry feed rate, laboratory time and scale-up factor, gas holdup, pulp solids and ore density (Wood's method).

Method: Wills and Finch; Wills' Mineral Processing Technology; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Dry solids feed rate	1,000.0	t/h
Availability	100.00	%
Laboratory flotation time	5.0000	min
Scale-up factor on time (2–2.5)	2.5000	
Gas holdup (air in the pulp)	15.000	%
Solids by mass in the pulp	35.000	%
Ore density	3.0000	g/cm³
Number of cells in the bank	7.0000	

Calculated results

Parameter	Value	Unit
Pulp volume per tonne of solids	2.1905	m³/t
Plant retention time	12.500	min
Pulp expansion factor	1.1765	
Total effective bank volume	536.88	m³
Effective volume per cell	76.697	m³

Notes for this case

- Effective volume excludes the impeller, stator and internal launders; take the next standard cell size up and recheck the number of cells against the minimum bank length.

Formula and method

$$NV_{eff} = \frac{FTEP}{60}, \quad T = t_{lab} f_s, \quad E = \frac{1}{1 - GH}, \quad P = \frac{1}{\rho_s} + \frac{100}{x} - 1$$

Variables

F	Dry solids feed rate	kg/s
a	Availability	-
t_{lab}	Laboratory flotation time	s
f_s	Scale-up factor on time (2–2.5)	-
GH	Gas holdup (air in the pulp)	-
x	Solids by mass in the pulp	-
ρ_s	Ore density	kg/m³
N	Number of cells in the bank	-
P	Pulp volume per tonne of solids	m³/kg
T	Plant retention time	s
E	Pulp expansion factor	-
NV_{eff}	Total effective bank volume	m³

V_{eff}	Effective volume per cell	m³

Method and standards

Wood's cell sizing method.

Assumptions and limits

- Mixed cells; scale-up factor from experience.

References

- Wills and Finch
- Wills' Mineral Processing Technology
- 8th ed. (Butterworth-Heinemann, 2016)
- ch. 12
- eq. 12.54 (Wood, 2002) and Example 12.2

Report details

Report reference	FCC-1Y1Z-T5WG (the same inputs always give the same reference)
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Calculator	Flotation Cell and Bank Volume from Retention Time
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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/mining-minerals/flotation-cell-bank-volume

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.