Drop-Weight Breakage: t10 from Specific Energy (A and b)

Breakage index t10 for a specific comminution energy from the JK drop-weight parameters A and b, the hardness index A × b, and the energy for a target t10.

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

Input parameters

Unit system: SI

Parameter	Value	Unit
Maximum t10 (parameter A)	65.000	%
Parameter b	0.85000	t/kWh
Specific comminution energy	1.0000	kWh/t
Target t10	20.000	%

Calculated results

Parameter	Value	Unit
Breakage index t10 at E_cs	37.218	%
Hardness index A × b	55.250	
Energy for the target t10	0.43262	kWh/t

Notes for this case

• t10 is the percentage passing one tenth of the original particle size after breakage. A high A × b means an ore that breaks easily (low work index).

Formula and method

$$t_{10} = A\left(1 - e^{-bE_{cs}}\right), \quad E_{cs} = -\frac{1}{b}\ln\left(1 - \frac{t_{10}}{A}\right)$$

Variables

A	Maximum t10 (parameter A)	-
b	Parameter b	kg/J
E_{cs}	Specific comminution energy	J/kg
t_{10}^{*}	Target t10	-
t_{10}	Breakage index t10 at E_cs	-
$A \times b$	Hardness index A × b	-
E_{cs}^{*}	Energy for the target t10	J/kg

Method and standards

JK breakage function.

Assumptions and limits

- Single-particle impact breakage.

References

• Wills and Finch
• Wills' Mineral Processing Technology
• 8th ed. (Butterworth-Heinemann, 2016)
• ch. 5
• eq. 5.9 (Napier-Munn et al., 1996)

Report details

Report reference	FCC-3K7T-DKJJ (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/mining-minerals/drop-weight-t10-energy

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.