Paper Grammage, Caliper, Density and Bulk

Apparent density and bulk of paper or board from grammage and caliper, with North American basis weights per 3000 ft² and per ream (25 × 38, 17 × 22 in).

Method: Smook; Handbook for Pulp & Paper Technologists; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Grammage (basis weight)	80.000	g/m²
Caliper (thickness)	0.10000	mm

Calculated results

Parameter	Value	Unit
Apparent density	800.00	kg/m³
Bulk	1.2500	L/kg
Basis weight, lb per 3000 ft²	49.156	
Basis weight, lb per ream 25 × 38 in	54.049	
Basis weight, lb per ream 17 × 22 in	21.278	

Formula and method

$$\rho_a = \frac{G}{t}, \quad B = \frac{t}{G}, \quad BW = G \times A_{ream}$$

Variables

G	Grammage (basis weight)	kg/m²
t	Caliper (thickness)	m
ρ_a	Apparent density	kg/m³
B	Bulk	m³/kg
BW_{3000}	Basis weight, lb per 3000 ft²	-
$BW_{25\times38}$	Basis weight, lb per ream 25 × 38 in	-
$BW_{17\times22}$	Basis weight, lb per ream 17 × 22 in	-

Method and standards

Definitions; ream areas from the sheet sizes.

Assumptions and limits

- Conditioned paper.

References

• Smook
• Handbook for Pulp & Paper Technologists
• 3rd ed. (Angus Wilde, 2002)
• ch. 22 (paper properties: basis weight, caliper, density and bulk)

Report details

Report reference	FCC-XRR6-Y9SK (the same inputs always give the same reference)
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Calculator	Paper Grammage, Caliper, Density and Bulk
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/chemical/pulp-paper/basis-weight-caliper-density

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.