Yeast Cell Count, Viability and Pitching Volume

Yeast cells per mL from a haemocytometer count, viability and budding, and the slurry to pitch a fermenter to a target count (Alcohol Textbook ch. 10).

Method: Jacques; Lyons and Kelsall (eds.); ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Mean cells per large (1 mm²) square	60.000	
Dilution factor	50.000	
Dead (stained) cells counted	6.0000	
Live cells counted	294.00	
Budding cells counted	90.000	
Fermenter volume	500.00	m³
Target count in the fermenter, million cells/mL Alcohol Textbook: at least 50 million/mL at set, 150–200 million at the height of fermentation.	50.000	
Chamber depth (mm)	0.10000	

Calculated results

Parameter	Value	Unit
Cells in the sample, million/mL	30.000	
Viability	98.000	%
Budding share	30.000	%
Slurry to pitch	850,340	L

Notes for this case

- The slurry is more than a tenth of the fermenter volume: it dilutes the mash noticeably, so the real count will be lower than the target.
- Count = cells per square × dilution / (1 mm² × chamber depth). The Alcohol Textbook asks for 98–99 % viability in propagation and 300–500 million cells/mL before transfer.

Formula and method

$$C = \frac{\bar{N} f_d}{1\ \mathrm{mm}^2 \times z}, \quad v = \frac{N_l}{N_l + N_d}, \quad V_s = \frac{C^* V_f}{C v}$$

Variables

$\bar{N}$	Mean cells per large (1 mm²) square	-
f_d	Dilution factor	-
N_d	Dead (stained) cells counted	-
N_l	Live cells counted	-
N_b	Budding cells counted	-
V_f	Fermenter volume	m³
C^*	Target count in the fermenter, million cells/mL	-
z	Chamber depth (mm)	-
C	Cells in the sample, million/mL	-
v	Viability	-

b	Budding share	-
V_s	Slurry to pitch	m³

Method and standards

Haemocytometer arithmetic.

Assumptions and limits

- Even distribution in the chamber.
- The pitch volume ignores the volume the slurry itself adds to the fermenter (small when V_s is much less than V_f; flagged above a tenth).
- Budding cells are among the live cells; more budding than live cells is flagged.

References

• Jacques
• Lyons and Kelsall (eds.)
• The Alcohol Textbook
• 4th ed. (Nottingham University Press, 2003)
• ch. 10 (Kelsall and Lyons)
• yeast counts and viability
• Haemocytometer: count per 1 mm² square over a chamber depth of 0.1 mm gives cells per 0.1 µL

Report details

Report reference	FCC-B36H-XVHR (the same inputs always give the same reference)
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Calculator	Yeast Cell Count, Viability and Pitching Volume
Method last reviewed	13 November 2026
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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/sugar-ethanol/ethanol/yeast-cell-count-pitch

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.