Ice Cream Overrun from Mix and Product Weights

Overrun of ice cream from the weight of equal volumes of mix and frozen product, with the air volume and density of the ice cream.

Method: Overrun from weights of equal volumes; Tetra Pak; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Mix weight per litre	1,100.0	kg/m³
Ice cream weight per litre	550.00	kg/m³

Calculated results

Parameter	Value	Unit
Overrun	100.00	%
Air share of the ice cream volume	50.000	%
Litres of mix per litre of ice cream	0.50000	

Notes for this case

• Overrun is the extra volume from air whipped in during freezing: (V_ice cream − V_mix)/V_mix. Weighing a litre of mix and a litre of ice cream gives it directly as (ρ_mix − ρ_ice cream)/ρ_ice cream. Premium ice cream has 20–50 % overrun, standard 80–100 %, and soft serve 30–50 %. Regulations often set a minimum weight per litre.

Formula and method

$$OR = \frac{\rho_m - \rho_i}{\rho_i}, \quad \phi_a = 1 - \frac{\rho_i}{\rho_m}$$

Variables

ρ_m	Mix weight per litre	kg/m³
ρ_i	Ice cream weight per litre	kg/m³
OR	Overrun	-
ϕ_a	Air share of the ice cream volume	-
V_m/V_i	Litres of mix per litre of ice cream	-

Method and standards

Overrun.

Assumptions and limits

- Air mass negligible.

References

Overrun from weights of equal volumes, Tetra Pak, Dairy Processing Handbook (Tetra Pak Processing Systems, Lund)

Report details

Report reference	FCC-4VNV-NDD0 (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/chemical/food-dairy/ice-cream-overrun

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.