Respiration Heat of Stored Fruit and Vegetables

Heat generated by respiring fresh produce in storage from its mass and temperature, using the commodity's published respiration coefficients (f, g).

Method: Becker; Misra and Fricke (1996); ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Product mass	20.000	t
Storage temperature	2.0000	°C
Respiration coefficient f	5.6871e-04	
Respiration exponent g	2.5977	

Calculated results

Parameter	Value	Unit
Specific respiration heat (mW/kg)	18.121	
Respiration heat load	0.36241	kW
Heat per day	31.312	MJ

Notes for this case

• Becker–Fricke correlation q = (10.7f/3600)(9t/5 + 32)^g W/kg with f and g from the commodity tables in ASHRAE Refrigeration (ch. 19). Respiration heat roughly doubles for each 10 K rise.

Formula and method

$$q = \frac{10.7 f}{3600}\left(\frac{9}{5}t + 32\right)^{g} \quad \mathrm{W/kg}$$

Variables

m	Product mass	kg
t	Storage temperature	K
f	Respiration coefficient f	-
g	Respiration exponent g	-
q	Specific respiration heat (mW/kg)	-
Q	Respiration heat load	W
E_d	Heat per day	J

Method and standards

Becker–Fricke correlation.

Assumptions and limits

- Fresh produce; t in °C.

References

• Becker
• Misra and Fricke (1996)
• Int. J. Refrig. 19: 2 (respiration correlation); ASHRAE Handbook—Refrigeration (2018)
• ch. 19

Report details

Report reference	FCC-3YXG-SAV4 (the same inputs always give the same reference)
Generated	17 November 2026, 19:50 UTC
Calculator	Respiration Heat of Stored Fruit and Vegetables
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/hvac/refrigeration/produce-respiration-heat

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.