Greenhouse Heating Load

Heating load of a greenhouse from cover area, cover U-value, air leakage and the inside and outside design temperatures, per square metre of floor.

Method: Greenhouse heat balance: cover conduction and air leakage

Input parameters

Unit system: SI

Parameter	Value	Unit
Floor area	1,000.0	m²
Cover (glazing) area	1,600.0	m²
Cover U-value	6.0000	W/(m²·K)
Air changes per hour	1.0000	1/h
Greenhouse volume	4,000.0	m³
Inside design temperature	18.000	°C
Outside design temperature	-5.0000	°C

Calculated results

Parameter	Value	Unit
Conduction through the cover	220.80	kW
Air leakage	30.851	kW
Total heating load	251.65	kW
Load per floor area	251.65	W/m²

Notes for this case

• A greenhouse loses heat mostly through its cover: about 6 W/(m²·K) for single glass or film, 4 for double inflated film, lower with thermal screens. Air leakage through gaps adds N V ρ c_p ΔT; older glass houses leak 1–2 air changes per hour. Size the heater for the design night temperature with no sun; wind and a clear sky raise the losses further.

Formula and method

$$\dot{Q} = UA_c(T_i - T_o) + NV\rho c_p(T_i - T_o)$$

Variables

A_f	Floor area	m²
A_c	Cover (glazing) area	m²
U	Cover U-value	W/(m²·K)
N	Air changes per hour	1/s
V	Greenhouse volume	m³
T_i	Inside design temperature	K
T_o	Outside design temperature	K
$\dot{Q}_c$	Conduction through the cover	W
$\dot{Q}_i$	Air leakage	W
$\dot{Q}$	Total heating load	W
$\dot{Q}/A_f$	Load per floor area	W/m²

Method and standards

Greenhouse heating.

Assumptions and limits

- Steady night conditions; no solar gain.

References

Greenhouse heat balance: cover conduction and air leakage

Report details

Report reference	FCC-6NHM-PWY0 (the same inputs always give the same reference)
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Calculator	Greenhouse Heating Load
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Software release	FireCAD Calc, release of 22 November 2026
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/irrigation-farm/greenhouse-heating-load

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.