Window U-Value from Glass, Frame and Edge (Area-Weighted)

Overall window U-value from the glazing and frame U-values and the glass edge linear thermal transmittance, weighted by areas and edge length.

Method: Area-weighted window thermal transmittance; ISO 10077-1; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Window width (overall)	1.2300	m
Window height (overall)	1.4800	m
Frame face width (uniform)	110.00	mm
Glazing centre U-value	1.1000	W/(m²·K)
Frame U-value	1.4000	W/(m²·K)
Edge linear thermal transmittance	0.060000	W/(m·K)
Inside–outside temperature difference	20.000	K

Calculated results

Parameter	Value	Unit
Glazed area	1.2726	m²
Frame area	0.54780	m²
Glass edge perimeter	4.5400	m
Window U-value	1.3399	W/(m²·K)
Heat loss through the window	48.784	W

Notes for this case

• The window's U-value is the area-weighted average of glass and frame plus the extra heat flow at the glass edge, where the spacer bridges the panes: U_w = (A_gU_g + A_fU_f + l_gΨ_g)/(A_g + A_f) (the method of ISO 10077-1). Small windows have a larger frame share and edge length per area, so their U_w is worse than the glass figure suggests; warm-edge spacers reduce Ψ_g from about 0.08 to 0.04 W/m·K.

Formula and method

$$U_w = \frac{A_g U_g + A_f U_f + l_g \Psi_g}{A_g + A_f}$$

Variables

W	Window width (overall)	m
H	Window height (overall)	m
b_f	Frame face width (uniform)	m
U_g	Glazing centre U-value	W/(m²·K)
U_f	Frame U-value	W/(m²·K)
Ψ_g	Edge linear thermal transmittance	W/(m·K)
ΔT	Inside–outside temperature difference	K
A_g	Glazed area	m²
A_f	Frame area	m²

l_g	Glass edge perimeter	m
U_w	Window U-value	W/(m²·K)
$\dot{Q}$	Heat loss through the window	W

Method and standards

Window U-value.

Assumptions and limits

- Uniform frame width; one glazed pane unit.

References

Area-weighted window thermal transmittance, ISO 10077-1, Thermal performance of windows, doors and shutters: Calculation of thermal transmittance, Part 1 (method equation)

Report details

Report reference	FCC-Z66K-VMNS (the same inputs always give the same reference)
Generated	23 November 2026, 17:50 UTC
Calculator	Window U-Value from Glass, Frame and Edge (Area-Weighted)
Method last reviewed	17 November 2026
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/hvac/loads/window-u-value-area-weighted

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.