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Specifying windows, doors and skylights under H1

The thermal performance required of all new windows and doors increased on 3 November 2022. There are further increases coming in 2023.

Anyone using H1/AS1 and H1/VM1 for building consent applications can no longer use the 4th edition documents but must use 5th edition amendment 1.

For housing only, the minimum R-value for vertical windows and doors is now R0.37 for all climate zones (see Table 1). There will be further increases on two separate dates:

- On 1 May 2023, the minimum will increase to R0.46 for climate zones 3 and 4 and to R0.50 for climate zones 5 and 6.
- On 2 November 2023, the minimum will increase to R0.46 for climate zones 1 and 2.

For buildings up to 300 m² *that are not housing*, the minimum R-values for vertical windows and doors that now apply are R0.37 in zones 1 and 2, R0.46 in zones 3 and 4 and R0.50 in zones 5 and 6. As with housing, the requirement in zones 1 and 2 will increase on 2 November 2023 to R0.46.

Calculating R-values

The requirements for working out the construction R-value of windows, doors and skylights are given in Appendix E of H1/AS1 and H1/VM1. Table E.1.1.1 in Appendix E of H1/AS1 is to be used for housing only. For other building types, use the method described in H1/VM1.

The construction options for insulating glazing units (IGUs) – double or triple glazing – in Table E.1.1.1 are:

- framing material – uPVC, aluminium, thermally broken aluminium and timber
- glazing – double or triple pane – single glazing is not an option
- spacer type – aluminium or thermally improved
- glass – low-E (low-emissivity) with four performance levels or clear glazing
- gas filling – dry air, argon or krypton
- U-values (in W/m²K) – for the thermal transmittance of the centre of the glazing unit only (U-values are the inverse of R-values)
- R-values (in m²K/W) – for thermal resistance of complete windows, accounting for both the glazing and the frame.

When specifying windows and doors, the first considerations will be size, type and

Table 1: Minimum construction R-values for windows, doors and skylights in housing, and buildings up to 300 m².

			Climate zone					
			1	2	3	4	5	6
From 3 November 2022	Housing	Windows and doors	R0.37	R0.37	R0.37	R0.37	R0.37	R0.37
		Skylights	R0.37	R0.37	R0.37	R0.37	R0.37	R0.37
	Buildings up to 300 m²	Windows and doors	R0.37	R0.37	R0.46	R0.46	R0.50	R0.50
		Skylights	R0.46	R0.46	R0.54	R0.54	R0.62	R0.62
From 1 May 2023	Housing, and buildings up to 300 m²	Windows and doors	R0.37	R0.37	R0.46	R0.46	R0.50	R0.50
		Skylights	R0.46	R0.46	R0.54	R0.54	R0.62	R0.62
From 2 November 2023	Housing, and buildings up to 300 m²	Windows and doors	R0.46	R0.46	R0.46	R0.46	R0.50	R0.50
		Skylights	R0.46	R0.46	R0.54	R0.54	R0.62	R0.62

purpose – fixed window, opening window, single doors and bifold door. The next decision is thermal performance.

To check for compliance, determine the construction R-values for vertical windows and glazing in doors in housing using Table E.1.1.1 in Appendix E of H1/AS1.

This table gives deemed window R-values for each of four frame types (aluminium, thermally broken aluminium, uPVC and timber) and a range of glazing options. (The numbers were calculated by BRANZ.)

Skylights

Until 1 May 2023, skylights in housing have the same minimum R0.37 requirement as windows and doors (Table 1).

Starting on 1 May 2023, the minimum R-value for skylights in housing rises to R0.46 in zones 1 and 2, R0.54 in climate zones 3 and 4 and R0.62 in climate zones 5 and 6.

For buildings up to 300 m² other than housing, these higher R-values for skylights already apply.

Guidance for calculating the construction R-value of skylights is given in Appendix E of H1/AS1 and H1/VM1. There is no table showing construction R-values of generic skylights. H1/AS1 and H1/VM1 require skylight R-value calculations to consider the effects of horizontal or angled glazing on the heat transfer since a vertical window used as a skylight will not perform as well and usually has a lower R-value.

The values in Table E.1.1.1 in H1/AS1 were developed to represent the thermal performance values for skylight frame and glazing combinations. However, the values in the table can be used to provide an indication of what skylight R-values are likely to be. Designers and specifiers should check that R-values claimed by suppliers have been determined in accordance with H1/AS1 or H1/VM1 and that they do not represent vertical installation.

Solar heat gain and overheating

While the increase in R-values for insulation addresses conductive heat flow, there is currently no regulation for radiation of heat through glazing into homes from the sun.

The amount of heat that can pass through glazing by radiation is measured by the solar heat gain coefficient (SHGC). *Build* covered SHGC for windows in *Build* 189, *Solar heat gain coefficients for windows*, pages 36–37.

Architects and designers should ensure that the windows and skylights they specify strike a balance between letting in desirable solar heat gain in winter while not contributing to a house overheating in summer.