Appendix K : Thermal bridging

Interim basis from 1 October 2010 until this Appendix is revised following the introduction of Accreditation Schemes for construction details:

Values calculated using option 2) below are treated as accredited and the addition of 0.02 or 25% is not applied.

Thermal bridges that occur at junctions between building elements are included in the calculation of transmission heat losses.

The quantity which describes the heat loss associated with a thermal bridge is its linear thermal transmittance, Ψ. This is a property of a thermal bridge and is the rate of heat flow per degree per unit length of the bridge, that is not accounted for in the U-values of the plane building elements containing the thermal bridge[1].

The transmission heat transfer coefficient associated with non-repeating thermal bridges is calculated as:

$$H_{TB} = \sum (L \times \Psi) \qquad \text{(K1)}$$

where L is the length of the thermal bridge, in metres, over which Ψ applies.

If details of the thermal bridges are not known, use

$$H_{TB} = y \sum A_{exp} \qquad \text{(K2)}$$

where A_{exp} is the total area of external elements calculated at worksheet (31), m^2, and y = 0.15.

There are three possibilities for specifying the thermal bridging:

1) All detailing conforms with Accredited Construction Details or another government-approved source involving independent assessment of the construction method. In this case
   - use values from the 'accredited' column of Table K1 for Accredited Construction Details, or
   - use the values provided by the approved source

   in equation (K1) along with the length of each junction.

   Here 'Accredited Construction Details' means:
   - For England & Wales and for Northern Ireland: Accredited Construction Details, as listed on www.planningportal.gov.uk/england/professionals/en/1115314255826.html
   - For Scotland: Accredited Construction Details (Scotland) www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/publications/pubtech/techaccconstrdetails

2) Ψ values have been calculated by a person with suitable expertise and experience in accordance with BRE IP 1/06, *Assessing the effects of thermal bridging at junctions and around openings*, and BR 497, *Conventions for calculating linear thermal transmittance and temperature factors*, but have not been subject to independent assessment of the construction method. In this case the Ψ values are increased by 0.02 or 25% (whichever is the larger)[2] and used in equation (K1) along with the length of each junction.

3) If neither of the above applies use y = 0.15 in equation (K2).

It is possible to use both 1) and 2) together for different junctions within a given calculation, subject to those to which 2) applies being increased by 0.02 or 25% (whichever is the larger).

Where data via 1) or 2) are available for most junctions but not for all junctions, the values in the 'default' column of Table K1 can be used for those for which a linear thermal transmittance is not available.

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[1] Repeating thermal bridges that occur throughout a building element, for example timber studs or joists, are taken into account in the U-value of the element and so are not included here.

[2] This increase does not apply in Scotland, where the values are used as calculated.

It is also permissible to use a value of y that has been calculated for a particular house design from individual Ψ values[3], where each Ψ-value has been obtained via 1) or 2) above, and those Ψ values to which 2) applies have been increased by 0.02 or 25% (whichever is the larger). Use this y value in equation (K2). Documentary evidence as to the calculation of the y value must be available. Such a y value is applicable only to a dwelling of the size, configuration and construction for which it was calculated.

Table K1 : Values of Ψ for different types of junctions

	Junction detail	**Accredited** Ψ (W/m·K)	**Default** Ψ (W/m·K)
Junctions with an external wall	Steel lintel with perforated steel base plate	0.50	1.00 (applies to both lintel rows)
	Other lintels (including other steel lintels)	0.30	
	Sill	0.04	0.08
	Jamb	0.05	0.10
	Ground floor	0.16	0.32
	Intermediate floor within a dwelling	0.07	0.14
	Intermediate floor between dwellings (in blocks of flats) [a]	0.07	0.14
	Balcony within a dwelling [b]	0.00	0.00 *
	Balcony between dwellings [a] [b]	0.02	0.04 *
	Eaves (insulation at ceiling level)	0.06	0.12
	Eaves (insulation at rafter level)	0.04	0.08
	Gable (insulation at ceiling level)	0.24	0.48
	Gable (insulation at rafter level)	0.04	0.08
	Flat roof	0.04	0.08
	Flat roof with parapet	0.28	0.56
	Corner (normal)	0.09	0.18
	Corner (inverted – internal area greater than external area)	-0.09	0.00
	Party wall between dwellings [a]	0.06	0.12
Junctions with a party wall [a]	Ground floor	0.08	0.16
	Intermediate floor within a dwelling	0.00	0.04
	Intermediate floor between dwellings (in blocks of flats)	0.00	0.04
	Roof (insulation at ceiling level)	0.12	0.24
	Roof (insulation at rafter level)	0.02	0.04

[a] Value of Ψ is applied to each dwelling

[b] This is an externally supported balcony (the balcony slab is not a continuation of the floor slab) where the wall insulation is continuous and not bridged by the balcony slab

* Value valid only if balcony support does not penetrate the wall insulation. If it does so penetrate, either a Ψ-value must be calculated for the junction, or the SAP calculation uses the default overall thermal bridging of y = 0.15

[3] A y-value is calculated as the sum of (L × Ψ) for all junctions divided by the total area of external elements (which includes exposed elements but not party wall).