SAP Conventions

12 September 2013 (v5.0)

Conventions apply to all SAP versions throughout the UK except where otherwise indicated under 'Limitations'.

Conventions applied for design stage calculations submitted to building control may be carried through to the as-built stage.

This edition of the Conventions supersedes all previous editions and, where any Convention is in conflict with the published SAP specification, the Convention takes precedence.

Assessors should be familiar with the Appendices and Tables in the relevant version of the SAP document, as these conventions do not aim to duplicate the conventions therein but instead to provide further guidance and clarification.

In v5.0 Appendix 2 on documentary evidence has been added.

Note. This list of conventions will be extended as appropriate.

#	Limitations	Topic	Conventions	Issue date
			GENERAL	
1.01		Default values	SAP provides default values for many items, such as window U-values and boiler efficiency. Whenever specific product information is available, that should be used rather than default values. However when using any specific values there needs to be documentary evidence to support them, and such evidence should be made available to building control on request. For items using the database, the evidence required is that the specific named product, e.g. boiler, is the one being used.	Issued Sept 2010

#	Limitations	Topic	Conventions	Issue date
1.02	Not Scotland	Pressure test (as-built assessment)	The as-built assessment cannot be processed unless (a) pressure test data is provided, either for the dwelling concerned or on another of the same type in the same development, or (b) in England & Wales the special conditions of AD L1A 2010 paragraph 5.23, or AD L1A 2006 paragraph 63, apply, or (c) In Northern Ireland the special conditions of TB F1 2006 paragraph 2.54 apply, or (d) specific dispensation has been given by Building Control.	Issued Sept 2010 amended March 2011
1.03	Not Scotland	Regulations compliance report	As a minimum, building control should be provided with: - the regulations compliance report, and - listing of the input data list, and - PEA (if design stage, E&W only) or EPC (if as-built stage). They should also be supplied with any supporting information that they may request. The compliance report may show a fail under some headings; in these circumstances it is the decision of building control as to whether or not they approve the construction. Any differences between the as-designed specification and the as-built specification should be highlighted on the input data list. (Note. In Scotland, assessment of compliance with CO_2 emissions is at the design stage, prior to issue of building warrant. Production of a compliance report is not mandatory but should be considered good practice, where generated by the SAP software.)	Issued Sept 2010 amended March 2011

#	Limitations	Topic	Conventions	Issue date
1.04	England & Wales only	When to issue an EPC	The Predicted Energy Assessment (PEA) is appropriate for all developers selling dwellings off-plan. PEAs should be replaced with an EPC once the dwelling is physically complete. A dwelling is deemed 'physically complete' when all of the following conditions are met: a) Commissioning of the heating system has been satisfactorily completed, and b) Accredited details are signed off, and c) Air permeability is confirmed via pressure testing of representative dwellings, and d) The dwelling itself is complete and could be pressure tested. It is the developer's responsibility to use the PEA until a dwelling is physically complete, at which time they should feed information about changes from the design stage to the as-built stage to the OCDEA so that an EPC can be produced. You should not produce an EPC without such information. However, you may find you need to prompt the developer to produce the required information. Provide a copy of the EPC to the client (in electronic or paper form) as well as the RRN, to be passed to the building control body. (Note. In Scotland, on completion of building works, the EPC must also be affixed within the completed dwelling. A copy of the EPC must be provided to the verifier with the completion certificate for each new dwelling. The EPC must reflect any variations or additional information, such as air infiltration test results, arising during the construction phase).	Issued Sept 2010 amended March 2011
1.05		SAP version for EPCs	EPCs are always produced using the latest SAP version. If the dwelling concerned was assessed for building regulation compliance using an earlier SAP version the data is transferred to a SAP calculator that uses the current SAP version for EPC production. In unusual cases where the dwelling has been occupied since completion but before the EPC is issued, a SAP EPC is appropriate if it is established that the dwelling has not been meaningfully altered since completion or if the details of any alteration are known and can be incorporated in the assessment. Otherwise it should be treated as an existing dwelling and assessed via RdSAP.	Issued Sept 2010 Amended Sept 2012

#	Limitations	Topic	Conventions	Issue date
1.07	SAP 2009 England & Wales only	Design water use	For new build in England & Wales it is now required that the dwelling is designed to use not more than 125 litres/person/day for compliance with E&W Part G. SAP assessors may assume that building control will establish compliance with E&W Part G and tick the applicable box in SAP software for new dwellings in England & Wales. In other countries, and for any existing dwelling, this option does not apply.	Issued Sept 2010 amended March 2011
1.08		Flats v. houses	A house or bungalow has both a heat loss ground floor and an exposed roof. A dwelling without a heat loss floor cannot be a house and must be treated as a flat or maisonette. Generally a flat or maisonette does not have both a heat loss ground floor and a heat loss roof (although there are some exceptions such as a ground floor flat with an extension or when the footprint of a flatted development is 'stepped'). In some cases a different designation is used for issue ENE 2 of the Code for Sustainable homes, for example in a low-rise flatted development with an unheated corridor through the middle the dwellings may be treated as semi-detached for ENE 2. In such circumstances it is necessary to undertake two SAP calculations, one for the CSH and one for the EPC. For the EPC the dwellings must be designated such that the appropriate description appears at the top of the EPC.	Issued Sept 2011 Amended Sept 2012
1.09		Database version	SAP calculations must always be done using the latest version of the database (PCDF), at both as-designed and as-built stages.	Issued Sept 2011
1.10	Not Scotland	Software version	SAP calculations must always be done using the latest version of approved SAP software (for SAP 2005 or SAP 2009 as appropriate) at both as-designed and as-built stages. The only exception is where the as-designed calculation was done using an earlier software version and building control allows the use of that version for the as-built calculation.	Issued Sept 2011
1.11	Scotland only	Software version	New build SAP calculations produced in support of standard 6.1 (carbon dioxide emissions) should be carried out using the version of SAP current at the date the building warrant application is lodged. This as-designed calculation may continue to use the same version of the software for the duration of the warrant process, including any amendment to the original warrant. Where a newer version of SAP is available, use of this in respect of standard 6.1 is at the discretion of the applicant. For the issue of an EPC on completion of the dwelling, the version of SAP current at the date of completion must be used (see item 1.05).	Issued Sept 2011

#	Limitations	Topic	Conventions	Issue date
			DIMENSIONS	
2.01		Average storey height	Where there are rooms extending into the roof space, the average storey height is needed for the volume calculation. This is the average height of the habitable area (plus the thickness of the intermediate floor if it is the upper storey of a house).	Issued Sept 2010
2.02		Storey height of flats over garages	In the case of a flat over an unheated garage (or similar) where the entrance to the flat is on the ground floor with a heated stairway leading to the main part of the flat (see Figure 1 at the end of these conventions), an exception is made to the rule in 2.01: a) The intermediate floor thickness is added to the ground floor height (dimension X in Figure 1); b) The first floor height is measured from internal floor to ceiling (dimension Y in Figure 1).	Issued Sept 2010
2.03		Dwelling volume	The volume of the dwelling comprises the internal volume of the dwelling, measured between the finished internal surfaces of the elements bounding the dwelling. Spaces outside the dwelling, for example roof voids, are not included even though within the insulated fabric.	Issued Sept 2011
2.04		Gable wall area	Where the roof insulation is between the ceiling joists, the area of the gable wall above the finished ceiling level does not need to be included in the heat loss wall area. Where the insulation is along the slope of the roof (between the rafters) the gable wall needs to be included in the heat loss wall area (unless it is a mid terrace house). Note that the gable wall area also needs to be included where there is a flat ceiling with insulation in the slope between the rafters..	Issued Sept 2011
2.05		Internal elements (for thermal mass calculation)	Areas of internal and party walls, floors and ceilings are measured: - vertically using floor-to-ceiling height - horizontally as the length on plan ignoring any intersecting partitions. - disregarding openings	Issued Sept 2011
2.06		Bay windows	Include the area of the bay in the floor area. Include the perimeter of the bay in the total perimeter for calculation of thermal bridging wall/floor and wall/roof	Issued Sept 2011

#	Limitations	Topic	Conventions	Issue date
			OPENINGS	
3.01		U values of doors to unheated spaces	It is generally not necessary to adjust the U-values of doors in semi-exposed walls, in particular when the area of the element covered by the unheated space is less than 10% of the total exposed area of all external walls. In some cases (such as a flat with very small external elements) the door may be more than 10%, in which case the U-value of the door in the semi-exposed wall should be adjusted in the same way as that for a semi-exposed wall (SAP documentation section 3.3.2). Note: Attached garages are disregarded altogether.	Issued Sept 2010
3.02		Window areas	To be specified either individually or at least per elevation.	Issued Sept 2011
			VENTILATION	
4.01		Mixed centralised and decentralised mechanical ventilation	Where there is a mixed mechanical system, e.g. consisting of two centralised MEV systems or a centralised MEV system serving part of the dwelling and decentralised MEV serving the remainder, the data for the two systems are combined and the result entered into SAP software. A spreadsheet to assist the process is available from www.bre.co.uk/sap2009.	Issued Sept 2010
4.02		Mechanical ventilation but no data for the number of wet rooms	If there is mechanical ventilation but no data for the number of wet rooms served, use the default data (SAP Table 4g).	Issued Sept 2010
4.03		Solar ventilation	Solar powered vents should be entered into SAP software as passive vents.	Issued Sept 2010
4.04		Wet rooms	The data for mechanical ventilation systems is given according to the number of wet rooms. A wet room is a room used for domestic activities (such as cooking, clothes washing and bathing) which give rise to significant production of airborne moisture, e.g. a kitchen, utility room, bathroom, shower room and also sanitary accommodation. For SAP the number of wet rooms to be entered is the additional wet rooms in addition to the kitchen, which is assumed always to be present.	Issued Sept 2011

#	Limitations	Topic	Conventions	Issue date
U-VALUES AND HEAT LOSS				
5.01		Correct U-value calculations	U-values are calculated using the conventions given in BR 443. The SAP assessor should establish the specification of the construction for each element and should satisfy himself that the U-values used in the calculation are correct. Acceptable routes are: - calculation provided by a person accredited for U-value calculations - calculation undertaken by the assessor - calculation provided by another party and checked by the assessor	Issued Sept 2010 amended March 2011
5.02	England & Wales only	Swimming pools	In England & Wales U-values of swimming pool basins need to be checked for building control applications from 1 October 2010. However for entry into the SAP calculator the U-value of the floor is to be obtained as if the swimming pool were not there.	Issued Sept 2010 amended March 2011

#	Limitations	Topic	Conventions	Issue date
5.03	SAP 2009	Party wall U-values	In the context of U-values, 'party wall' includes any wall between the dwelling and another heated space which can be: - another dwelling - commercial premises - a heated corridor or stairwell in a block of flats - a heated common area The only U-values at present for party walls are 0, 0.2 and 0.5. This applies to both flats and houses regardless of construction type (masonry, timber frame etc) A solid party wall has U = 0. Where the party wall is closed at ceiling level by a robust construction element such as a concrete floor slab (not a mineral wool cavity barrier) the U-value is 0.2. U = 0.5 should be used for all other party walls unless documentary evidence is provided in which case: To qualify for U = 0.2 (effective edge sealing): - the sealing must prevent air going in or out of the cavity - the sealing required top and bottom and vertically. To qualify for U = 0: - the cavity must be sealed as above, and - the cavity must be fully filled	Issued Sept 2010 amended March 2011

#	Limitations	Topic	Conventions	Issue date
5.04		Window U-values and g-values	The U-value is that of the complete window, not that of the glazing alone. It is acceptable to use an average U-value, as long as the U-value used is based upon a standard Glass and Glazing Federation (GGF) 1230 x 1480 mm test window in accordance with BS EN ISO 10077-1. The GGF window is a two-pane window with one open and one fixed pane. However, it is preferable to assign a specific U-value to individual windows (which manufacturers can usually provide). If the design has large areas of glazing a better DER usually results by using individual window U-values (and individual frame factors for solar gain). In the case of a BFRC rated window, the U-value and g-value are taken from the front of the certificate. The g-value is that for the window as a whole, incorporating the frame factor. Because of this, the frame factor is set to 1 in the SAP calculation. G-values for BFRC windows are usually less than 0.5 and should be checked if greater. In the case of manufacturer-declared properties of windows the data needed as U-value, g-value for the glazing and frame factor. Documentary evidence of these data is required.	Issued Sept 2010 Amended Sept 2012
5.05	SAP 2005	Thermal bridging	For SAP 2005 and associated building regulations a y-value can be used if it is: (a) the default value of 0.15; or (b) a value of 0.08 if the builder confirms in writing that all junctions conform with Accredited Construction Details (ACD, see weblinks at the end of these conventions), or (c) a value of 0.04 if the builder confirms in writing that Enhanced Construction Details (ECD, see weblinks at the end of these conventions) have been used, or (d) derived from H_{TB} calculated following the rules in SAP 2005 Appendix K, or (e) calculated for another dwelling that is identical except for orientation.	Issued Sept 2010 Re-written March 2011

#	Limitations	Topic	Conventions	Issue date
5.06	SAP 2009	Thermal bridging, general	For SAP 2009 and building regulation standards based on SAP 2009 the transmission heat transfer coefficient associated with non-repeating thermal bridges H_{TB} must be calculated, or the calculation verified, by the SAP assessor; a y value can only be used if it is: (a) the default value of 0.15, or (b) derived from H_{TB} calculated following the rules in SAP 2009 Appendix K, or © calculated for another dwelling that is identical except for orientation. When calculating thermal bridges at <u>either design or as-built stage</u>: All bridging types listed in SAP Table K1 and in these conventions should be considered. Evidence is required for values other than the defaults in SAP Table K1. Junction types that are neither listed in SAP Table K1 nor in these conventions are disregarded. <u>At the design stage</u>: For a junction to be assigned a psi value for an Accredited Construction Detail (ACD) or an Enhanced Construction Detail (ECD) (see weblinks at the end of these conventions) for the purposes of SAP calculations, a list of the intended junction detail reference numbers should be confirmed by the client. The thermal bridging should be specified using (a), (b) or (c) above. <u>At the as-built stage:</u> For a junction to be assigned a psi value for an Accredited Construction Detail (ACD) or an Enhanced Construction Detail (ECD) (see weblinks at the end of these conventions) for the purposes of SAP calculations, confirmation is needed from the builder that the specific junction has been built in accordance with Accredited Construction Details and that the associated checklists have been completed. A list of the junction detail reference numbers should be confirmed by the client. The values for the design stage are used provided that (a) they were fully specified at the design stage and (b) it is confirmed that no design alterations were made.	Issued Sept 2010 Re-written March 2011

#	Limitations	Topic	Conventions	Issue date
5.07	SAP 2009	Thermal bridging, sources of psi values	The psi value for each junction is obtained from: 1. For any junction for which an ACD is being used use the applicable psi value in the 'accredited' column in Table K1, or 2. For any junction for which an ECD is being used use the psi value associated with the junction reference number, or 3. For any junction for which a calculated psi value is provided, this may be used subject to written confirmation that the calculation was performed by someone with suitable experience and expertise defined in AD L1A paragraph 5.12, or 4. If none of the above applies for any junction, use the psi value for the applicable junction type in the 'default' column in Table K1. The factors (0.02 or 25% whichever is the larger) stated in Approved Document L1A and SAP Appendix K are not applicable at present (until the Government announces that thermal bridging 'schemes' are launched). Also, these factors are not applied in Scotland. Values for accredited details can be used only for those junctions with an ACD/ECD reference number, e.g. for junction E2 an example is "MCI-WD-02" or Scottish ACD "1.08". If a psi value for any junction is not available use the applicable default value from SAP Table K1. The following junctions in Table K1 have no ACDs associated with them and so no ACD reference number: E8, E9, E16, E17, P1, P2, P3, P5. If no calculated value is available use the default psi value. The only exception to the foregoing paragraph is E16 (corner), for which it is acceptable to use the value of 0.09 W/m·K from the 'accredited' column in SAP Table K1 provided that the construction around the corner is the same as the rest of the wall and is not interrupted by any structural elements. When there is more than one type of a given junction type which have different psi values (e.g. corners in the main dwelling and stud wall corner in a roof room; multiple types of lintel), either: (a) use the highest psi value for the junction type with the total length, or (b) calculate a weighted average (psi value for each type weighted by the length of each type) and enter the result into the SAP calculator along with the total length.	Issued March 2011 Amended Sept 2012

#	Limitations	Topic	Conventions	Issue date
5.08	SAP 2009	Thermal bridging, additional junction types	For the treatment of - elements adjacent to an unheated space - dormers - bay windows - roofs with parapets - balconies - split level arrangements - corridors in blocks of flats see Appendix 1 to these conventions.	March 2011
5.09	SAP 2009	Thermal mass	The Thermal Mass Parameter (TMP) is required for calculations by SAP 2009. It can be: a. calculated from the areas and kappa values of each element, including party walls, party floors and party ceilings and both sides of internal partitions (which include internal walls and intermediate floors), where the kappa values are from SAP Table 1e or calculated following the guidelines in SAP Table 1e, or b. entered into software as a TMP value that has been calculated as in a. (for example using a spreadsheet), or c. treated as being low, medium or high using the global values of 100, 250 or 450 kJ/m²K given in SAP 2009 Table 1f. Guidelines for selection of values for c. are: - timber frame and AAC or lightweight masonry construction is usually low; - it is medium if there are dense blocks in external or partition walls; - it is high if at least two of external wall, internal partition wall, party wall have dense blocks - internal insulation makes it low irrespective of the construction; - in all of the above, only the innermost 100 mm of the construction influences the thermal mass If the choice is unclear, consult Table 1 at the end of these conventions. In case of a dispute, a detailed calculation via a. or b. should be undertaken.	Issued Sept 2010 Amended Sept 2012
5.10		Thermal bridging around openings	In the case of a lintel (and other window or door surrounds) the length of junction is the length of the opening in the wall.	Issued Sept 2011

#	Limitations	Topic	Conventions	Issue date
SPACE HEATING				
6.01		Micro-CHP	If the system is unavailable in the database, select condensing boiler with SAP default efficiency.	Issued Sept 2010
6.02	SAP 2009	Two main heating systems	Although in the large majority of cases there is only one main heating system, SAP 2009 provides for two main systems. A second main system is not to be confused with a secondary heater. The latter are rooms heater(s) heating individual room(s) either as a supplement to the main heating in the room (e.g. a wood burning stove in the main room) or for rooms not heated by the main system. A main system is generally one that would be described as central heating (a heat generator providing heat to several rooms via a heat distribution system), although the term does also include for example storage heaters and fixed direct-acting heaters in each room. When there are two main systems, system 1 always heats the living area.	Issued Sept 2010
6.03	SAP 2009	Two solid fuel boilers	Where there are two solid fuel boilers feeding the same distribution system, the fraction of heat should be taken as 0.5 from each.	Issued Sept 2010
6.04	SAP 2009	Boiler using liquid biofuel	The boiler must be found in the Product Characteristic Data File for the fuel concerned.	Issued Sept 2010
6.05		Community heating systems	SAP assessors need to obtain details of heat generators, distribution loss, etc from the system designers.	Issued Sept 2010

#	Limitations	Topic	Conventions	Issue date
6.06		CHP supplying both dwellings and commercial buildings	Where a CHP system is providing heat to dwellings and electricity to commercial premises, the electricity generation must be credited only once. a) If the electricity generated is included in the assessment of the commercial premises but the electricity is assumed to have the same CO_2 emission factor as electricity from the grid, the CHP heat and electrical efficiencies are entered into the SAP software. This will normally apply when the CHP is located in a different building from the commercial premises and electricity is supplied from the CHP to the commercial premises over the regional distribution network operator's (DNO) cables, and may also apply in other circumstances.. b) If the electricity generated is included in the assessment of the commercial premises and the electricity is assumed to have a CO_2 emission factor of zero, only the CHP heat efficiency is entered into the SAP software (electrical efficiency is zero or heat-to-power ratio of 10,000). c) For a situation intermediate between a) and b), i.e. if the electricity generated is included in the assessment of the commercial premises and the electricity is assumed to have a CO_2 emission factor between zero and that of grid electricity, an effective CHP electrical efficiency is used, equal to the CHP electrical efficiency multiplied by the fraction given by: assumed CHP electricity CO_2 emission factor divided by grid electricity CO_2 emission factor The CHP heat efficiency and effective CHP electrical efficiency should then be entered in SAP. Note: for all alternatives, the CHP heat utilisation is taken into account in the heat efficiency of the CHP..	Issued Sept 2010 Amended Sept 2013
DHW HEATING				
7.01	SAP 2009	Separate boiler for DHW	Sometimes there is a separate boiler providing DHW only. If there is information about it in the PCDF, it can be entered into SAP software as follows: - two main systems - main system 1 is that providing space heating - main system 2 is that DHW boiler - fraction of main heat from system 2 is zero - water heating from main system 2.	Issued Sept 2010

#	Limitations	Topic	Conventions	Issue date
7.02		More than one hot water system	Except in the case of heat pump systems, solid fuel room heaters with back boilers and where there is solar water heating, it is only possible to include one water heating system in the SAP 2005 or SAP 2009 calculation. In the event of there being more than one specified, the one selected should be that which is intended to heat most of the hot water, e.g. an immersion heater that is provided primarily as a backup should be disregarded.	Issued Sept 2010
7.03		Independent programming of DHW heating	Many heating system programmers have a single channel time control with a separate switch that can be set to 'H/W only', 'H/W and space heating', 'Space heating only' and similar combinations. Such a device does not provide independent programming of the hot water. In order to qualify as water separately timed it must be possible to program the space heating for two or more time periods a day and the hot water to be programmed for at least two different periods per day. This requires a time switch or programmer with more than one time control channel.	Issued Sept 2010
RENEWABLES				
8.01	SAP 2005	Multiple PV orientations	Where there are two PV arrays with different orientation: - collect data for the two sets of PVs, getting the kWp, tilt, orientation and overshading for each one; - apply equation M1 in SAP Appendix M to each; and - add the resulting kWh/year figures. A spreadsheet is available www.bre.co.uk/sap2009 to assist making the above calculation. Once all relevant data has been entered, the spreadsheet gives instructions as to what to enter into the SAP calculator for the installed peak power (kWp), collector orientation, collector tilt and overshading of the PV system.	Issued Sept 2010
8.02		Multiple wind turbines	A spreadsheet is available on www.bre.co.uk/sap2009,which accepts details of multiple turbine types and converts them into equivalent parameters for a single type that can be entered into software.	Sept 2012
SUMMER OVERHEATING				
9.01		Cross ventilation	It is important that the guidelines set out in SAP Appendix P are adhered to in assessing whether or not there is cross ventilation and the extent of window opening. Issues to consider include the presence or otherwise of fire doors and the degree to which security concerns prevent windows being left open at night, e.g. ground floor flats.	Sept 2012

Table 1: Thermal mass parameter for whole dwelling

If the thermal mass is calculated in detail, TMP can be assigned as follows:

Calculated value of TMP	Thermal mass	TMP for SAP calculations
Less than 175	Low	100
175 to 350	Medium	250
More than 350	High	450

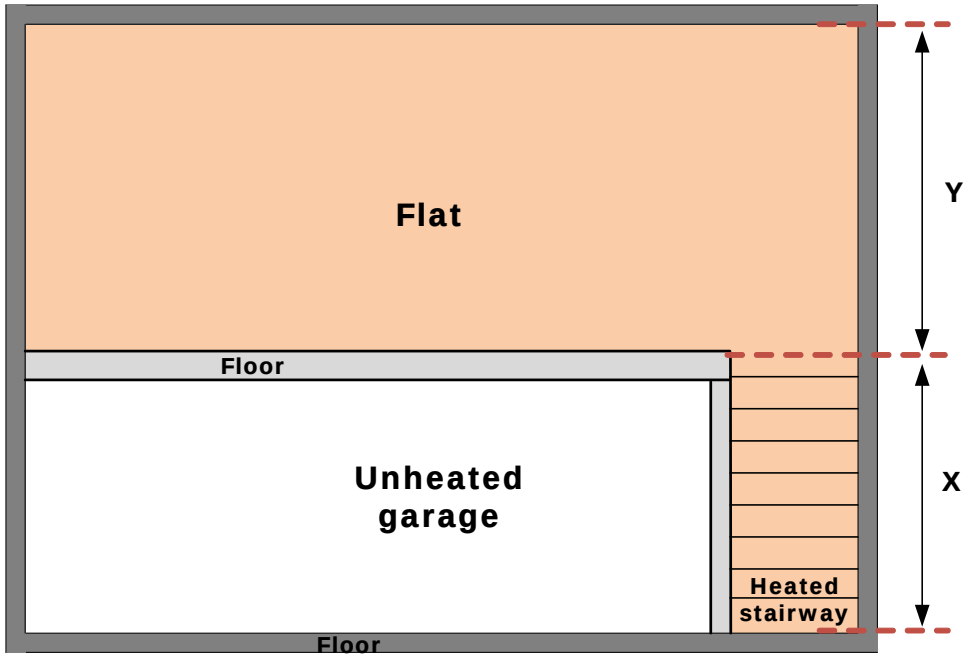
The following provides the thermal mass assessment for some illustrative constructions.

Thermal mass of elements				Illustrative construction	Indicative Thermal Mass
Ground floor	External walls	Party wall	Internal partitions		
Low	Low	Low	Low	Suspended timber floor, carpeted Timber frame external wall Timber frame party wall Partitions: plasterboard on timber frame	Low
Medium	Low	Low	Low	Suspended concrete floor, carpeted Timber frame external wall Timber frame party wall Partitions: plasterboard on timber frame	Low
Medium	Medium	Low	Low	Suspended concrete floor, carpeted Masonry cavity wall – AAC block, filled cavity Timber frame party wall Partitions: plasterboard on timber frame	Low

Thermal mass of elements				Illustrative construction	Indicative Thermal Mass
Ground floor	External walls	Party wall	Internal partitions		
Medium	Medium	Medium	Low	Suspended concrete floor, carpeted Masonry cavity wall – AAC block, filled cavity AAC party wall Partitions: plasterboard on timber frame.	Medium
Medium	Medium	Medium	Medium	Suspended concrete floor, carpeted Masonry cavity wall – AAC block, filled cavity AAC party wall Partitions: medium block, plasterboard on dabs	Medium
High	Medium	Medium	Medium	Slab on ground, carpeted Masonry cavity wall – AAC block, filled cavity AAC party wall Partitions: dense block, plasterboard on dabs	Medium
High	High	Medium	Medium	Slab on ground, carpeted Masonry cavity wall – dense block, filled cavity AAC party wall Partitions: medium block, plasterboard on dabs	Medium
High	High	High	Medium	Slab on ground, carpeted Masonry cavity wall – dense block, filled cavity Dense block party wall Partitions: medium block, plasterboard on dabs	High

Thermal mass of elements				Illustrative construction	Indicative Thermal Mass
Ground floor	**External walls**	**Party wall**	**Internal partitions**		
High	High	High	High	Slab on ground, carpeted Masonry cavity wall – dense block, filled cavity Dense block party wall Partitions: dense block, dense plaster	High

Figure 1



Weblinks for thermal bridge details

ACD:
England & Wales: www.planningportal.gov.uk/buildingregulations/approveddocuments/partl/bcassociateddocuments9/acd
Scotland: www.scotland.gov.uk/Topics/Built-Environment/Building/Building-standards/techbooks/techhandbooks
The Scotland ones can be used in England & Wales if the actual construction corresponds.

ECD:
www.energysavingtrust.org.uk/business/Business/Housing-professionals/Interactive-tools/Enhanced-Construction-Details/Enhanced-Construction-Details-Matrix

Revision history

September 2010	First issue Conventions: 1.01 to 1.07, 2.01 to 2.02, 3.01, 4.01 to 4.03, 5.01 to 5.07, 6.01 to 6.06, 7.01 to 7.03, 8.01
March 2011	Second issue Re-numbered: 5.07 to 5.09 Amended: 1.02, 1.03, 1.04, 1.07, 5.01, 5.02, 5.03, 5.05, 5.06 1.06 deleted pending clarification Added: 5.07, 5.08, Appendix 1
September 2011	Third issue Amended 5.08 Added 1.08 to 1.11, 2.03 to 2.06, 3.02, 4.04, 5.10
September 2012	Fourth issue Amended 1.05, 1.08, 5.04, 5.07, 5.09 Added 8.02, 9.01

July 2013	Fifth issue Amended 6.06 Added Appendix 2

Appendix 1 : Thermal bridges

This Appendix specifies how to treat junction types not specifically listed in SAP Table K1. The tables indicate which junction descriptor to select in SAP calculations. In most cases the default psi value will be applicable.

SAP Table K1 : Values of Ψ for different types of junctions

			Accredited	Default
	Ref	**Junction detail**	**Ψ (W/m·K)**	**Ψ (W/m·K)**
Junctions with an external wall	E1	Steel lintel with perforated steel base plate	0.50	1.00
	E2	Other lintels (including other steel lintels)	0.30	
	E3	Sill	0.04	0.08
	E4	Jamb	0.05	0.10
	E5	Ground floor	0.16	0.32
	E6	Intermediate floor within a dwelling	0.07	0.14
	E7	Intermediate floor between dwellings (in blocks of flats) [a]	0.07	0.14
	E8	Balcony within a dwelling [b]	0.00	0.00 *
	E9	Balcony between dwellings [a] [b]	0.02	0.04 *
	E10	Eaves (insulation at ceiling level)	0.06	0.12
	E11	Eaves (insulation at rafter level)	0.04	0.08
	E12	Gable (insulation at ceiling level)	0.24	0.48
	E13	Gable (insulation at rafter level)	0.04	0.08
	E14	Flat roof	0.04	0.08
	E15	Flat roof with parapet	0.28	0.56
	E16	Corner (normal)	0.09	0.18
	E17	Corner (inverted – internal area greater than external area)	-0.09	0.00
	E18	Party wall between dwellings [a]	0.06	0.12
Junctions with a party wall [a]	P1	Ground floor	0.08	0.16
	P2	Intermediate floor within a dwelling	0.00	0.04
	P3	Intermediate floor between dwellings (in blocks of flats)	0.00	0.04
	P4	Roof (insulation at ceiling level)	0.12	0.24
	P5	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

A1.1 Elements adjacent to unheated or other heated spaces

Elements adjacent to unheated or other heated spaces	
Junction	**Reference in SAP Table K1**
Exposed upper floors and floors above garages	E5
Floor above heated space	E7
Floor above unheated space	E5
Walls adjacent to heated corridors / stairwells, or other heated space: treat as party walls.	ground floor: P1 intermediate floor: disregard roof: P4 or P5
Walls adjacent to garages (or other unheated space) walls: treat as external walls.	E16
Walls adjacent to enclosed unheated corridors / stairwells: treat as external walls.	ground floor: E5 intermediate floor: E6 or E7 roof: one of E10 to E15

A1.2 Dormers

See also Figures A1.1 and A1.2.

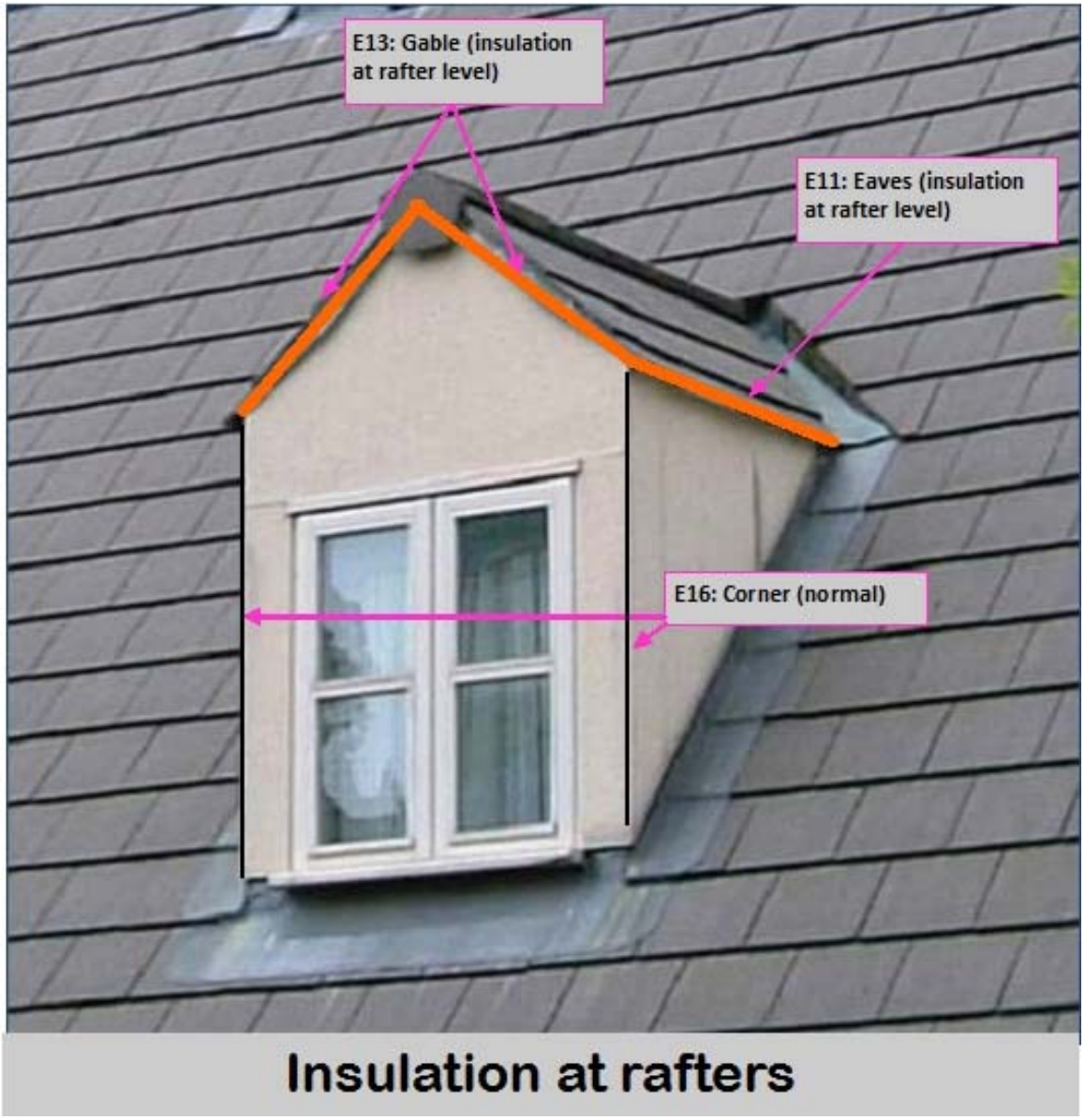
Dormers	
Junction	**Reference in SAP Table K1**
Wall of dormer / Roof of dormer, insulation at ceiling	E10 and E12
Wall of dormer / Roof of dormer, insulation at rafters	E11 and E13
Corner wall of dormer	E16
Inverted corner	E17

Junctions where the dormer meets the main structure are disregarded.

Figure A1.1


E12: Gable (insulation at ceiling level)
E10: Eaves (insulation at ceiling level)
E16: Corner (normal)
Insulation at ceiling

Figure A1.2


E13: Gable (insulation at rafter level)
E11: Eaves (insulation at rafter level)
E16: Corner (normal)
Insulation at rafters

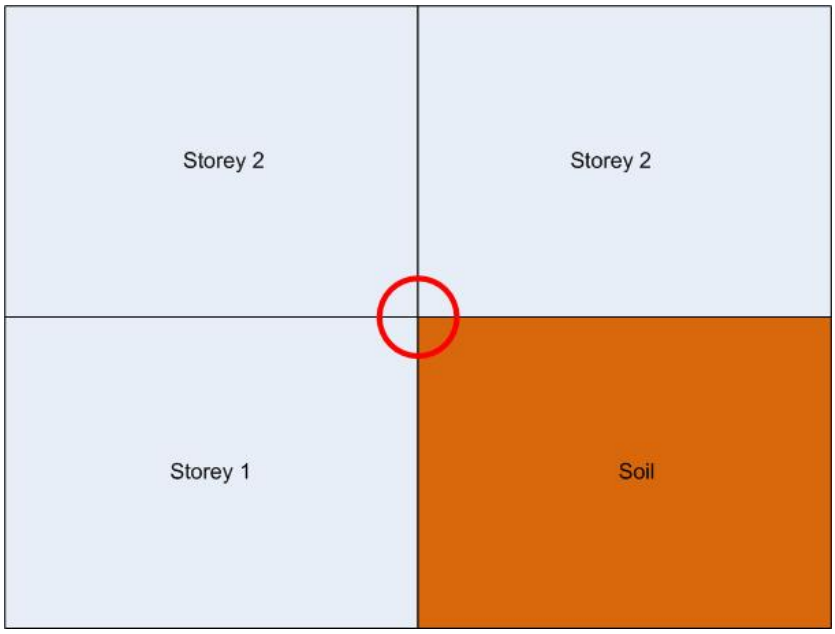
A1.3 Balconies

In the case of a balcony where the balcony support does penetrate the wall insulation, use the default value for junction E2.

*Note: this supersedes the footnote * in Table K1.*

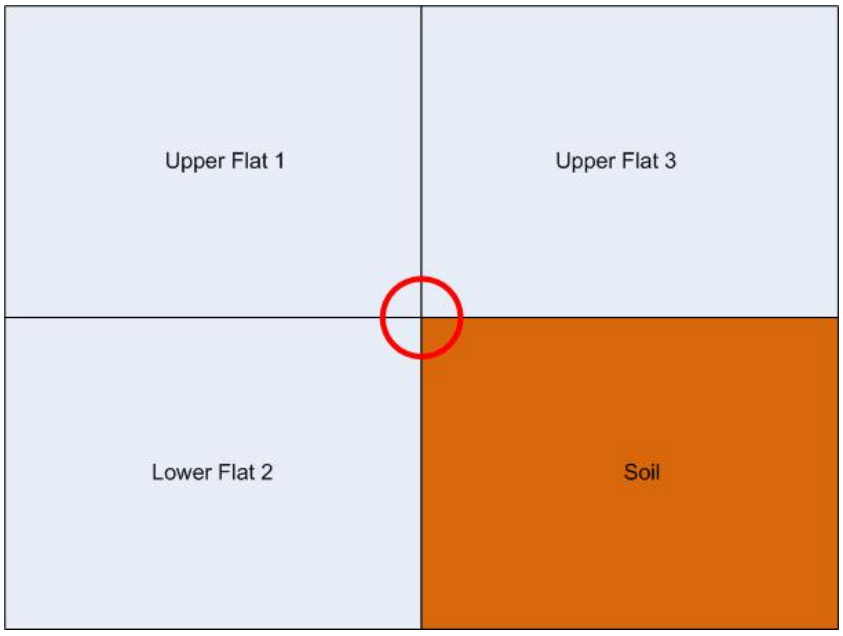
A1.4 Split level arrangements – single dwelling

Use P2 for the junction indicated



A1.5 Split level arrangements – flats

Use P3 for the junction indicated for each flat



A1.6 Bay windows

Junctions between walls:

- If the insulation is continuous the junctions are disregarded.
- If not continuous insulation, use the default values from SAP Table K1 for junctions between two walls (E16 and E17).

Junctions of wall with ground floor, intermediate floor and roof: according to the following table.

Bay windows – walls to ground floor, intermediate floor and roof	
Junction of wall of bay window with:	**Reference in SAP Table K1**
Ground floor	E5
Intermediate floor	E6
Flat roof	E14
Pitched roof, insulation at ceiling level	E10
Pitched roof, insulation at rafter level	E11

A1.7 Junctions between two roofs

Disregarded.

A1.8 Parapet on flat roof

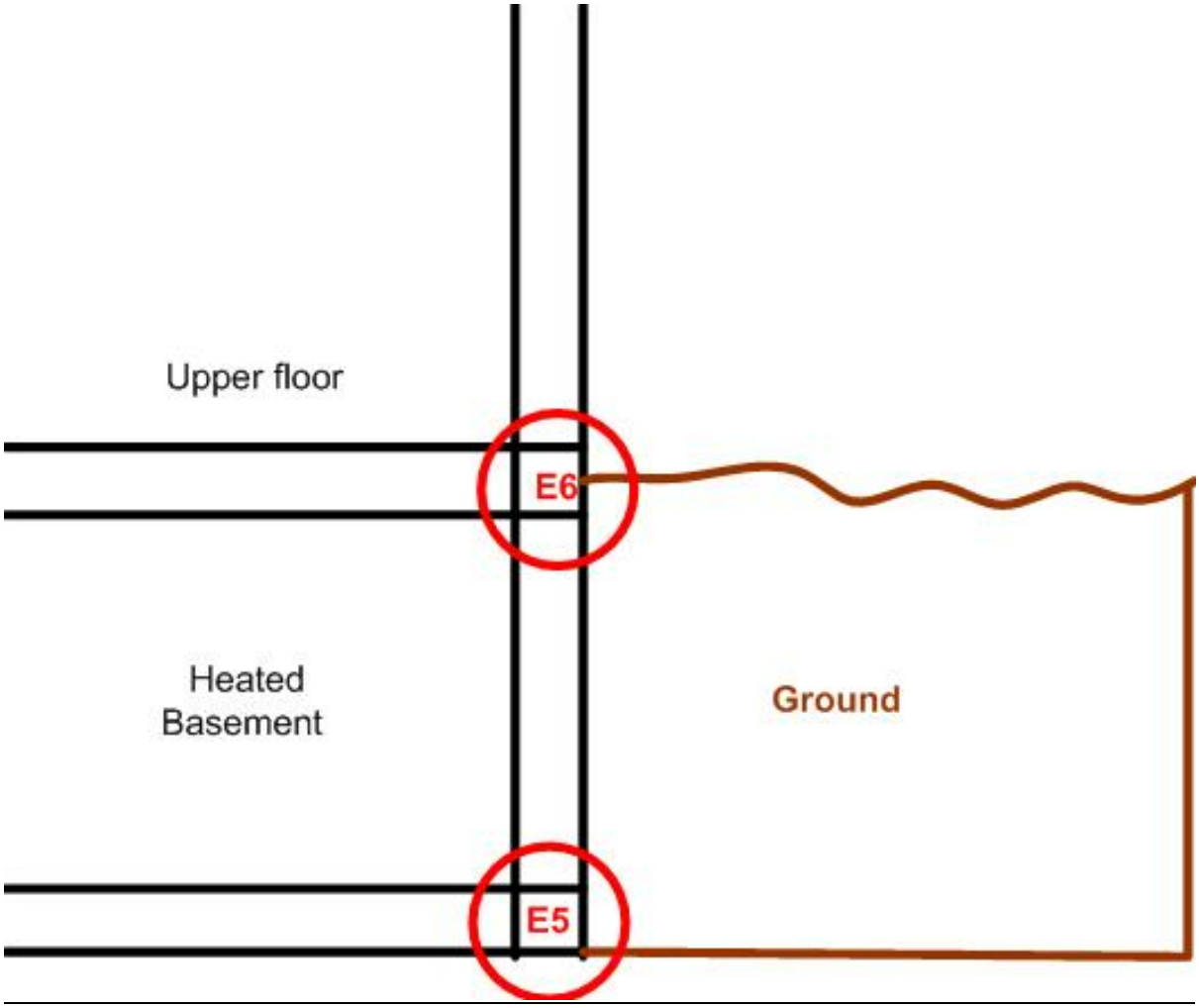
There are separate psi values in SAP Table K1 for flat roofs with and without a parapet..

From the thermal bridging point of view the principal difference between a parapet and not is whether the wall passes over the edge of the roof, or the roof passes over the top of the wall. These two possibilities form different types of junction.

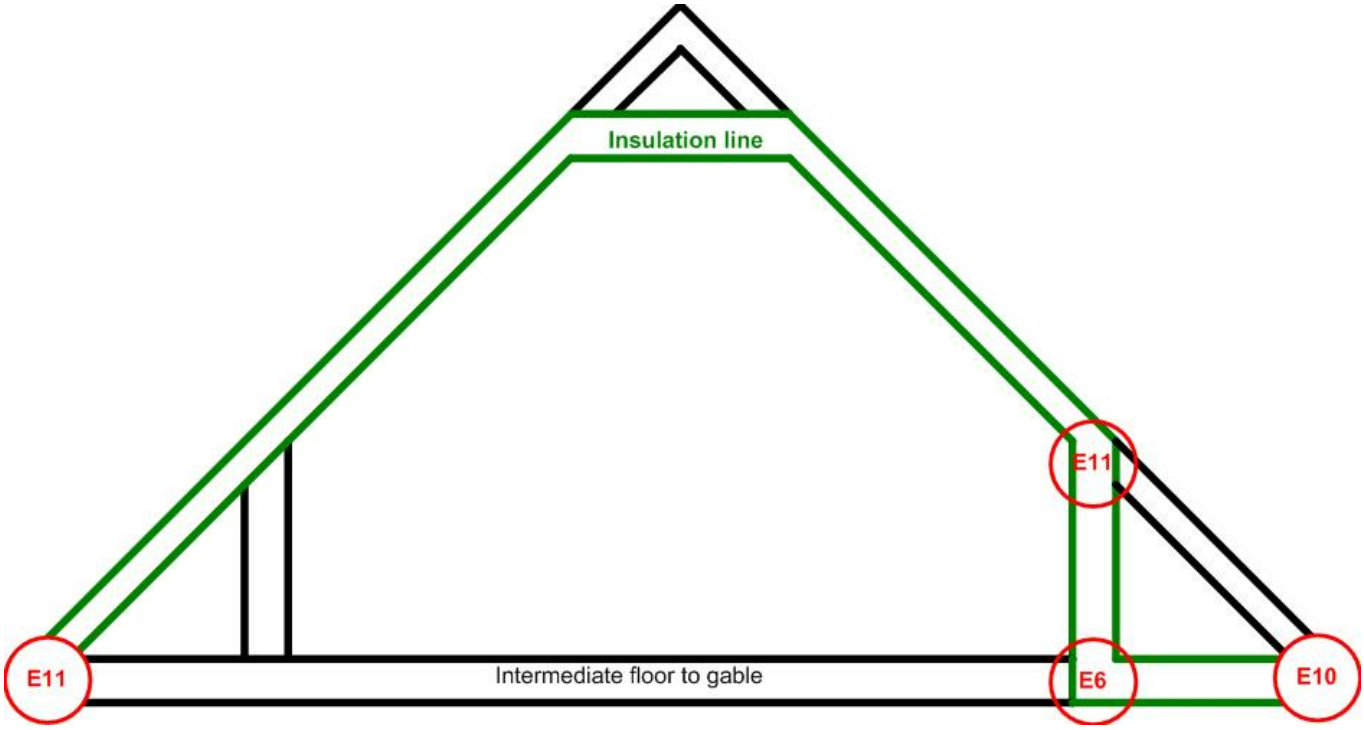
If the wall passes over the edge of the roof, treat as a roof with parapet.

If the roof passes over the top of the wall, treat it as a roof without a parapet.

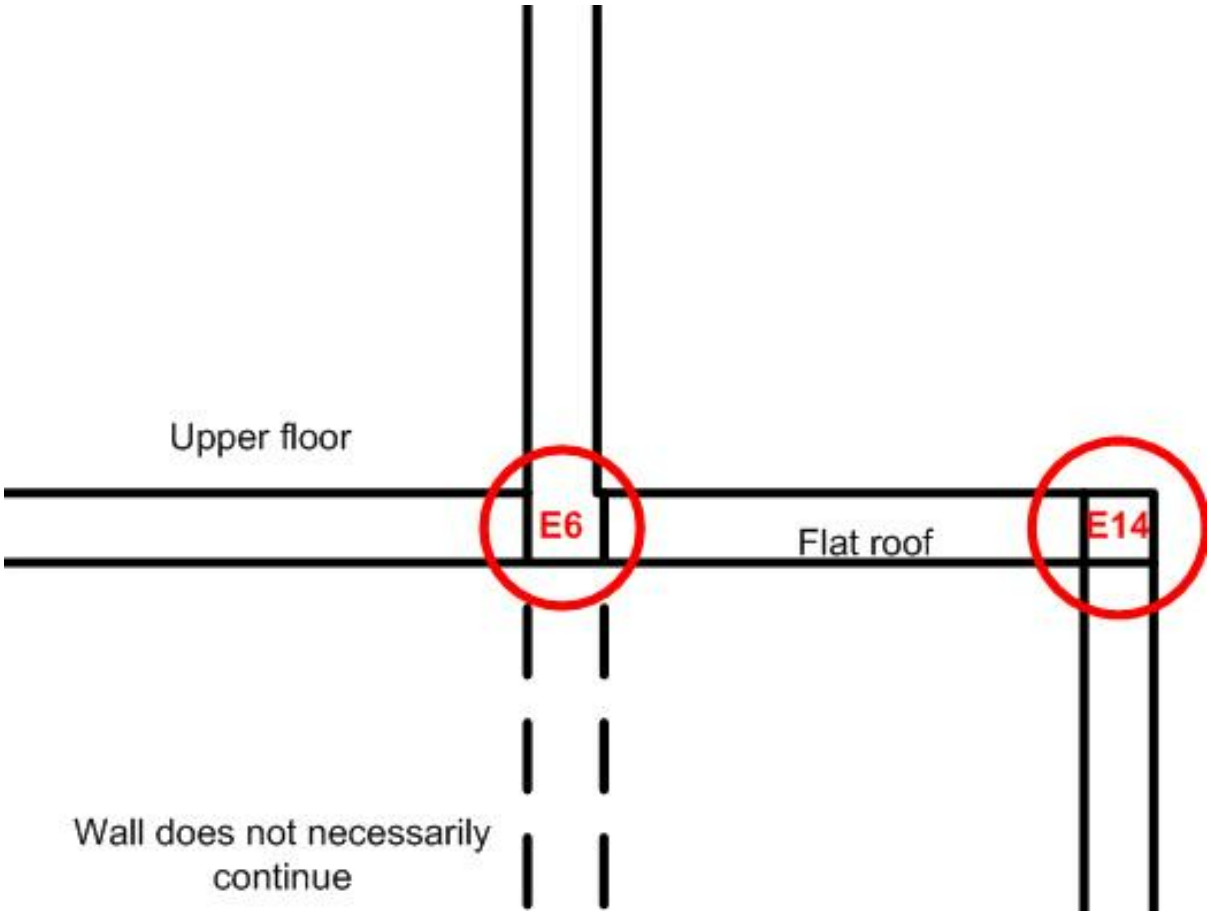
A1.9 Heated basement



A1.10 Roof room



A1.11 Partial flat roof



Appendix 2 – Documentary evidence

Where particular data values are brought to a SAP calculation, evidence is needed to confirm them. This appendix sets out appropriate forms of documentary evidence.

#	Item	Conventions	Evidence
A2.1	U-values for external elements	5.01	U-value calculation data sheet including construction layers (materials, thickness and thermal properties) and corrections
A2.2	Window U-values and g-values	5.04	Certificate based on BFRC methodology, or Statement from developer or equivalent person confirming the window properties as built, or that the windows meet minimum requirements of building regulations
A2.3	Party wall U-values	5.03	<u>Sealing</u> Specification on plans of location of edge sealing, including edge sealing detail, e.g. drawing or named system, or Written confirmation from builder that sealing has been done. <u>Filling and Sealing</u> Confirmation that MIMA Guidance[1] has been adhered to, or Written confirmation from builder that filling and sealing has been done.
A2.4	Air permeability as built	1.02	Test certificate conducted by member of BINDT or ATTMA
A2.5	Thermal mass parameter	5.09	(to be added later)

[1] www.mima.info/pdf/MIMA-Party-Walll-Bypass-Guide.pdf

#	Item	Conventions	Evidence
A2.6	Thermal bridging	5.06, 5.07, 5.08	Evidence that the psi values used for a specific junction have been produced by someone with suitable expertise and experience and that any associated checklists have been completed. Options include: - junction reference numbers for any ACDs or ECDs used - psi-values and checklists by professional bodies, e.g. BBA - manufacturers' psi values and checklists where they have indicated that the calculations have been done by persons with suitable expertise and experience. - written confirmation that individual psi values have been calculated by someone with suitable expertise and experience
A2.7	Items from the Product Characteristics database – heating and hot water systems, mechanical ventilation, FGHRS, WWHRS		Written confirmation from the developer that the specific products have been used in the dwelling concerned (sufficient to retrieve from the database). In the case of heat pumps, mechanical ventilation and WWHRS, confirmation is required that the appropriate installation checklists have been completed.
A2.8	Manufacturer's declared values of room heaters		Manufacturer's declared value as specified in E2 in Appendix E of SAP 2009.
A2.9	Cooling systems		Manufacturer's declared value as specified in Table 10c of SAP 2009.
A2.10	Solar water heating, PVs	8.01	Data sheet or equivalent giving manufacturer name and - for solar water heating: area, efficiency and heat loss coefficient; - for PVs: the kWp
A2.11	Community heating	6.05	(to be added later)
A2.12	Summer overheating	9.01	(to be added later)
A2.13	Appendix Q		Consult Appendix Q documentation for the item concerned