

AECB Building Standard

The AECB Building Standard is aimed at those wishing to create high-performance buildings using widely available technology. We estimate that this low-risk option will reduce overall CO₂ emissions by 70% compared to the UK average for buildings of each type – a highly significant result given the relative ease and low cost with which this standard can be met. Individual self-builders and large-scale residential and non-residential developers could make a valuable contribution to low-carbon building by meeting the AECB Building Standard.

Performance Requirements

The AECB Building Standard can be said to be achieved where a building that is designed and modelled using the Passivhaus Planning Package (PHPP) in accordance with current Passivhaus methodology meets the following requirements:

Parameter	Target	Notes
Delivered Heat and cooling	≤ 40kWh/(m ² .a)	According to the methodology described in the PHPP* handbook.
Primary Energy (P.E.)	Varies kWh/(m ² .a)****	As per PHPP for each country
Primary Energy Renewable (P.E.R)	≤ 75 kWh/(m ² .a)	ditto
Air tightness (n50)	≤ 1.5 h ⁻¹ (≤ 3 h ⁻¹)	With MVHR (with MEV) **
Thermal Bridges ***	Psi _{external} <0.01 W/mK	Calculated if > 0.01 W/mK
Summer overheating	<10%	<5% recommended

TABLE 1: Summary of AECB Standard Performance Requirements

* Passive House Planning Package.

** it may not be possible to meet the heat demand target without MVHR for some buildings.

*** Standard Passivhaus methodology is used. If no calculation is submitted, then the decision as to whether a detail is thermal bridge free may be queried at the discretion of the AECB.

**** PE demand varies by country according to each nations PE ratio. The Passivhaus Institute reviews and updates the PE ratio at intervals.

Note: If your project was started using an older version of PHPP you can certify the building within those parameters. If you choose you may also re-build the model in a later release of PHPP and certify under those criteria.

Why should I build to the AECB Building Standard?

Clients

One of the primary benefits of AECB Building Standard is choice. Working with your design team you will be able to determine the fabric standards and ventilation systems that suit your needs. This gives you the opportunity to consider how ventilation systems will be used and maintained throughout the project lifecycle.

At the same time, by focusing on a fabric-first methodology, you can make the most of passive and low energy design and technology. This serves to reduce energy demand and minimise lifecycle cost.



Architects and Engineers

AECB Building Standard is an ideal vehicle for conscientious professionals committed to creating sustainable low energy, low carbon buildings. If you lack the knowledge and experience you can employ a certified Passivhaus designer/consultant although this is not mandatory.

Contractors

If you want to demonstrate your prowess at construction and the quality of craftsmanship of your tradespeople, AECB Building Standard will suit you down to the ground. If you have not built a certified Passivhaus then AECB Building Standard provides an opportunity to stretch yourself without such an onerous airtightness target. Once you have the experience of successfully designing and building to the AECB Standard, and for projects where the Passivhaus Standard is required - you will be well prepared for that challenge

How are AECB Building Standard projects certified?

Client

For your piece of mind AECB recommends that a suitably experienced person certifies the project. This might be a suitably qualified and experienced Passivhaus designer/consultant or certifier, or a building professional who has previously successfully certified an AECB Building Standard project.

Ideally the AECB certifier is already a member of your design team, which means many costs associated with meetings and site visits can be absorbed without incurring significant additional cost. You should ensure the certifier carries suitable Professional Indemnity Insurance.

You are strongly encouraged to employ contractors that have completed buildings to the AECB Building Standard or Passivhaus Standard. Furthermore, you should ensure that the site manager and their team includes at least one experienced Passivhaus Certified Tradesperson. Where they lack the experience skills and training, they should be strongly encouraged to attend Passivhaus Certified Tradesperson training.

Many suitable designers and contractors are members of the AECB. You can search the database for suitable organisations in your area <https://www.aecb.net/directory-members>

Architects, Engineers and Consultants

If you are about to embark upon an AECB Building Standard project and you are already a certified Passivhaus designer/consultant then you pretty much know all you need to know. Now all you need to do is execute what you already know to the best of your ability.

If you are not a suitably qualified Passivhaus designer/consultant and do not have the necessary experience, then it is recommended that you develop suitable knowledge and skills by becoming trained. You will not only learn how to use the Passivhaus Planning Package (the fundamental design tool used in AECB Building Standard projects), you will also discover how to mitigate thermal bridging, minimise air leakage and incorporate appropriate building services. To learn about how you can become a Passivhaus designer/consultant go to www.PassivhausTraining.co.uk

Certification

As Passivhaus designer/consultant you may certify buildings to the AECB Building Standard or you may work with a third-party certifier. The self-certification route has been developed to allow the certifier to take responsibility for the certification process and for underwriting the AECB Building



Standard claim.

The certifier may be a suitably qualified and experienced Passivhaus designer/consultant or certifier, or a building professional who has previously successfully certified an AECB Building Standard project. If you intend to certify the project you should ensure you have the appropriate skills by attending Passivhaus Designer/Consultant course: www.PassivhausTraining.co.uk

Contractors

The AECB Building Standard is not without its challenges. Providing your design team has experience and a good track record then you are in a good position. If not, you may consider employing an appropriately a suitably qualified and experienced Passivhaus designer/consultant to review the design, construction details and PHPP calculations and certify your project. You should ensure that the design has been demonstrated to comply with the AECB Standard prior to commencing on site.

One of the biggest risks on large projects is the lack of continuity of knowledge and skills while on site. After a series of trade specific toolbox talks it is simply a case of being careful and diligent. This means one of the best things you can do is to ensure quality, consistency and continuity of onsite labour.

If you are a site manager or a tradesperson and have not built to the AECB Building Standard before then you can reduce risk and avoid blind spots by becoming a Passivhaus Certified Tradesperson. You can receive Tradesperson training by attending a course at www.PassivhausTraining.co.uk

If you are planning to work on retrofit projects where the Standard has been specified it is crucial to have undertaken the [retrofit specific training](#) provided by the AECB.

Certification costs and modelling guidelines

For up to date fees refer to <https://www.aecb.net/aecb-building-certification>

Trading Standards and legal considerations

- The claim that a building is designed to the AECB Building Standard can be independently verified.
- Where a certificate is provided by the AECB, the responsibility for certification rests with the professional signing this certificate and not with the AECB.
- The AECB reserves the right to recall any certificate in the event of proven malpractice or false claims.

Trading Standards and legal considerations:

- By making a project's claim explicit and a matter of public record the self-certification process has been designed to provide a degree of consumer protection under trading standards – without the AECB having to get involved in quality control and legal matters.

Duty of care:

- Responsibility for certification and claims regarding building performance rest with the person signing the certificate. There is also a duty of care placed on the client to ensure that the certifying



consultant is competent and suitably insured.

The role of the AECB in the certification process

Records: The AECB will retain electronic copies of such details as required to verify that a building meets the AECB Building Standard, but it does not necessarily check for compliance.

Queries: The AECB reserves the right to query submissions at its own discretion. Self-certifiers shall respond to all queries to the AECB's satisfaction. In the event of a failure to respond to queries within 20 working days then the AECB reserves the right to disallow the claim of AECB Building Standard compliance.

Declaration certificate: Though the AECB provides a declaration certificate it does not audit or take responsibility for the certification process. In this respect the responsibility for certification lies firmly with the certifying consultant making the declaration. To this end the declaration certificate, and all other relevant information must be completed by the certifying consultant.

In the event of a non-conformance claim the onus lies with the certifying consultant, not with the AECB.

How do I apply the AECB Building Standard to a retrofit project?

If you are applying the building standard to a retrofit project you may need training in delivering moisture-robust energy efficiency measures. Read about our advanced retrofit training course which is studied online at your own convenience [here](#).

Please note the AECB is developing a Retrofit Standard based on a range of building energy performance: the Retrofit Standard also incorporates the AECB Building Standard as well as the Passivhaus suite of standards.

Many individual AECB members have undertaken the CarbonLite Retrofit training and are now graduates. Those who are integrating this training into their professional work are listed [here](#)

Notes on compliance:

Compliance with the AECB Building Standard cannot be assumed unless:

- 1) The design is developed in accordance with the requirements set out in this document
- 2) The building has been modelled in the Passivhaus Planning Package (PHPP)
- 3) A letter from the site manager confirms the construction complies with the contract documents - any variations should be declared.
- 4) Construction quality has been verified by the certifier
- 5) The supporting data has been publicly declared on the Low Energy Buildings Database

What design tools are required?

If you want to start designing your AECB Building Standard project today you can [purchase the latest version of Passivhaus Planning Package \(PHPP\) here](#).

Note: If you wish to add additional functionality to PHPP, such as for daylighting design, whole-life carbon, PAS2035 options evaluation - a suite of complimentary tools are available [here](#).

PHPP Settings:

PHPP Verification sheets settings:

- 1) Use the 'PHI Low Energy Buildings' as the Building Energy Standard
- 2) Set the Class setting to 'Classic'
- 3) You may choose the PE or PER setting as considered appropriate to your project.
- 4) Use New Building

Building energy standard
3-PHI Low Energy Building

Class
1-Classic

Verification of primary energy
1-PE (non-renewable)

EnerPHit verification
1-PE (non-renewable)
2-PER (renewable)

New building / Retrofit
1-New building

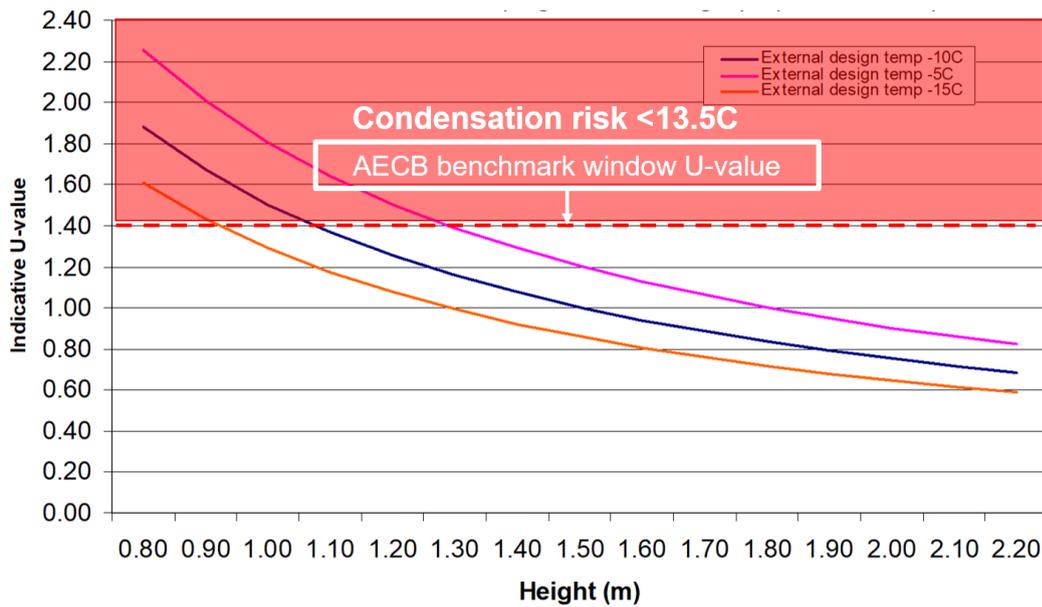
NOTE:

As is standard practice for a Certified Passivhaus Designer, all boundary conditions influencing energy performance are as per the PHPP manual. This includes ventilation/MVHR. Therefore, MVHR units that are not Passivhaus Certified are subject to a 12-percentage point performance penalty. Example: Uncertified MVHR (assessed using SAP methodology) say, 90% efficient - 12% = 78% would be used in PHPP.

Winter comfort requirements

To reduce the risk of occupant dissatisfaction the designer will need to consider thermal comfort, for example limiting glazing areas and careful positioning of heat emitters as well as heat distribution within rooms and the building as a whole. Downdraft risks and radiant asymmetry should be minimised as with all good thermal design practise.

The following graph may be used to reduce window downdraft discomfort and inform decision making when selecting the U-value for a window of a given height:



U_{max} down draft velocity of <0.135 m/s, < 0.4m from vertical surface, <0.03m from floor, Downdraft PD = <15%

Summer comfort requirements

AECB Building Standard certification requires summer overheating risks to be calculated using PHPP. Target values shall accord with current Passivhaus requirements.

Thermal bridges

The AECB Building Standard uses the Passivhaus approach of using external dimensions to simplify modelling. It also requires that thermal bridges be minimised and there are the necessary guards against mould and condensation. Psi-values shall comply with Table 1.

Declaration takes place by:

You must create a user account at the [low energy buildings website](#) and create a project entry for your building project. Once you have created your project listing you can begin to provide the evidence required for self-certification of your project:

- Uploading the PHPP Verification sheet to the [Low Energy Buildings Database](#).
- Uploading a set of key construction details (drawn details and their photographic equivalent) to provide evidence of construction quality
- Uploading a all other relevant data scheduled in checklist provided below



Electric Resistance Heating

When assessing a design using PHPP's PER function the technical panel is aware that direct electric heating can appear attractive. However, as the resultant peak electrified heating loads are likely to negatively impact the power grid, the AECB discourages direct electric heating and will not currently certify such designs for 1 – 3 storeys detached, semi-detached and terraced homes.

The AECB accepts that in certain circumstances a case could be made for an exemption on a project by project basis e.g. for flats, maisonettes, multi-residential high rise and certain non-domestic buildings where heat distribution losses would result in increased energy demand and overheating risk. Prior to an exemption being given the AECB Certifier must provide evidence, in the form of PHPP calculations and a report, showing assumptions, the options explored and the rationale for the conclusions.

For details of how an AECB certifier can apply see Appendix 1: application for an exemption. To cover the cost of reviewing the proposal and providing feedback a fee of £250 per review will be charged – for payment details see Appendix 1.

Supporting evidence requirements

	Drawing & photographic record	Drawings. (PDF format)	Photographs (jpeg format)
1	All elevations of completed building	One elevation per page. Scale bar to be included.	one photo. for each elevation
2	Floor to wall junction – continuity of insulation visible	✓	✓
3	Floor to wall junction – airtightness measures visible		✓
4	Intermediate floor to wall junction – airtightness measures visible	✓	✓
5	Roof to wall junction – continuity of insulation visible	✓	✓
6	Roof to wall junction – airtightness measures visible		✓
7	Typical window in wall detail – jamb with wall insulation measures visible	✓	✓
8	Typical window in wall detail – jamb with airtightness measures visible		✓
9	Typical treatment of services penetration in fabric – with airtightness measures in place	✓	✓
10	Typical MEV or MVHR installation showing ducts & duct insulation		✓
11	Hotwater storage and pipework – showing tank and pipe insulation		✓
12	Windows/doors – showing opening light with seals and glazing spacer bars		✓
Other			
13	Air pressure test certificate (pressurisation and depressurisation results)	✓	
14	PHPP verification sheet as pdf	✓	
15	Copy of building users manual	✓ optional	

Appendix 1 - Exemptions

Exemption Application - for AECB certifiers only

To apply for an exemption, the AECB certifier must submit a simple report, including the information specified below, based on PHPP modelling. Please combine the information into a report based closely on this document's format and submitted as a single pdf but with the supplementary data contained in a single spreadsheet file. We cannot consider any applications unless all information is provided in the requested format. The application fee of £250 must be paid before each application can be reviewed, please contact sally@aecb.net to make payment. If your application is declined, then each re-application will incur a new fee.

Report Content Requirements

The exemption methodology is currently undergoing a rapid process of testing and refinement. The requirements below represent those aspects of the application process that are easy to standardise. Further queries may be raised by the AECB once your initial report has been reviewed.

An Options Analysis Approach

We need to see two core options compared, presented in a combined pdf document, file name 'Options Analysis':

Standard option

We will need to see the PHPP Verification Sheet for a 'Standard' design model, with *no* use of electrical resistance heating.

Electrical Resistance option

We will need to see the PHPP Verification Sheet for your Proposed Electrical Resistance model where you have modelled the use of electric resistance heating.

Evidence to be submitted

1. PHPP Verification Sheet Settings

You shall submit the PHPP verification sheets for two options (1 & 2, see below) explored using two scenarios (a & b, see below). Scenarios are explored for both the 'Standard' variant (without electrical resistance e.g. heat pump etc.) and the 'Electrical Resistance' variant i.e. show us the verification sheet for the four resulting PHPP models.

Options	Scenario	
	Scenario A	Scenario B
	PHPP Settings: Values: 2-Standard Occupancy: 1-Standard (only for residential buildings)	PHPP Settings: Values: 3-PHPP calculation Occupancy: 2-User determined
Options 1a & 1b 'Standard'	PHPP model Option #1A*	PHPP model Option #1B*
Options 2a & 2b 'Electrical Resistance'	PHPP model Option #2A*	PHPP model Option #2B*
PHPP Verification Sheet for each model to be provided as evidence. plus a table of supplementary data to accompany each (see below)		

2. Supplementary data for each option analysed

In addition to the four PHPP verification sheets the following data should be scheduled/tabulated and submitted in a single spreadsheet for each of the 4 models:

Internal heat gains	PHPP Model Option #1A	PHPP Model Option #1B	PHPP Model Option #2A	PHPP Model Option #2B
Specific IHG W/m ²				
Heat available from internal sources kWh/(m ² a)				

DHW distribution	PHPP Model Option #1A	PHPP Model Option #1B	PHPP Model Option #2A	PHPP Model Option #2B
Annual heat released per m of pipe kWh/m/a				
Annual heat loss from circulation lines kWh/a				
Specific heat loss from circulation lines kWh/(m ² a)				

Electricity demand	PHPP Model Option #1A	PHPP Model Option #1B	PHPP Model Option #2A	PHPP Model Option #2B
Specific demand kWh/(m ² a)				

Gains	PHPP Model Option #1A	PHPP Model Option #1B	PHPP Model Option #2A	PHPP Model Option #2B
Solar gains kWh/(m ² a)				
Net internal gains kWh/(m ² a)				
Net internal gains W/m ²				

Occupancy	PHPP Model Option #1A	PHPP Model Option #1B	PHPP Model Option #2A	PHPP Model Option #2B
Persons people/m ²				

Drawings	PHPP Model Option #1A	PHPP Model Option #1B	PHPP Model Option #2A	PHPP Model Option #2B
Plans, Sections and Elevations.				

For further information please refer to <https://www.aecb.net/aecb-building-certification/>