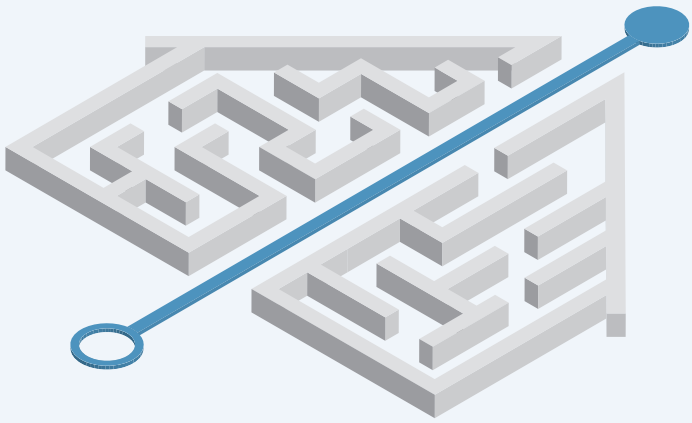

CLOSING THE GAP BETWEEN

DESIGN & AS-BUILT PERFORMANCE

END OF TERM REPORT

July 2014

APPENDIX C

ZERO CARBON HUB

The Zero Carbon Hub was established in 2008, as a non-profit organisation, to take day-to-day operational responsibility for achieving the government's target of delivering zero carbon homes in England from 2016. The Hub reports directly to the 2016 Taskforce.

To find out more, or if you would like to contribute to the work of the Zero Carbon Hub, please contact: info@zerocarbonhub.org.

Zero Carbon Hub
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This document contains Appendix C to the End of Term Report, which is available from www.zerocarbonhub.org

Published July 2014

APPENDIX C: DESIGN & ASSESSMENT TOOLS WORK GROUP PROPOSALS

This appendix was produced by the Design & Assessment Tools Work Group. It provides:

- Details of the conclusions and recommendations of the Work Group[1], including a comparison of these proposals with the current SAP (Standard Assessment Procedure) assessment process.
- An example of the standardised, comprehensive 'Product Specific Plain Language Compliance Report' proposed to help ensure that the Design Stage and As-Built SAPs are accurate and that the inputs are easier for developers, Building Control Bodies and others to check.[2]

It should be noted that only relatively minor amendments and edits have been made to the recommendations provided by the Work Group. Many of these have been included in the main report, with additional Work Group recommendations included here. Reference A, contained at the end of this document, details which parties would be involved with each document at each stage, under the proposed changes to the process.

1. As summarised on pages 35-42 of the End of Term Report. To download the report please visit: www.zerocarbonhub.org/full-lib

2. For more detail on this recommendation, please see page 36 of the End of Term report.

Main Conclusions

- Responsibilities can be too easily overlooked and not adhered to.
- The SAP assessment process structure can be easily bypassed, leading to incorrect or incomplete results.
- There can be conflicting business considerations which are exacerbated by the above by driving / influencing the assessor to make unqualified judgements.
- The assessor is at a commercial disadvantage which can significantly affect the quality of the assessment through failure of all or one of the above.

Brief Summary of Current Process

1. Design Stage SAP assessments can be undertaken and completed with a high variability in the robustness and content of the input data.
2. Upon completion of dwellings the compliance check sheet is not always used as intended.
3. As-Built SAP assessments can be completed upon instruction on the basis of 'no change from As Designed', which may not be the case in reality.
4. Energy Performance Certificates (EPCs) can be produced based on the above input data limits.
5. Building Control issue completion certificates when air test results and EPC Report Reference Number (RRN) are received. This may or may not follow the checking of SAP output sheets for strict minimum compliance.
6. CML (Council of Mortgage Lenders) certificates are produced by warranty bodies when Building Control Bodies (BCBs) / Approved Inspectors sign off the dwelling(s) as complete.

Summary of Recommendations

RECOMMENDATION	COMMENT
1. REFINE THE SAP PROCESS: IMPROVED COMPLIANCE REPORTING	
A more comprehensive and plain language compliance report, with a signed declaration of accuracy of the input information by the housebuilder, provided to the BCB at design stage as part of the controlled documents - henceforth known as the Product Specific Plain Language Compliance Report.	To ensure the standard and accuracy of the design stage SAP assessment better reflects the anticipated final energy / carbon performance of the proposed dwelling.
The SAP assessor to confirm back to the developer, prior to the as-built assessment, every element that has changed since the design assessment to enable the housebuilder to sign off the assessment.	It is important that the housebuilder is notified of all and any changes the assessor may have made, as well as confirmation that the assessor has used the specification information provided.
At the as-built stage the updated Product Specific Plain Language Compliance Report, with signed declaration by the housebuilder, to be provided to the SAP assessor, BCB and house purchaser.	Provided to the house purchaser to reinforce the importance of accuracy and consequence, the declaration would be signed to ensure the housebuilder appreciates the importance of the document. It would also be more comprehensive than the current compliance report and in plain language to enable the housebuilder to check the inputs they are confirming, facilitating better building control inspections.
BCBs only issue a completion certificate on receipt of both the signed Product Specific Plain Language Compliance Report and the EPC RRN generated from a full SAP, not RDSAP (Reduced Data SAP).	
SAP Assessor disciplinary procedures to reflect the very serious nature of the offence if an EPC is issued in the absence of a housebuilder signed Product Specific Plain Language Compliance Report.	This should represent a very clear breach for all parties and be recognised as something that cannot be 'waived' under pressure.
Scheme managers should, as part of their audit regime, sample check the validity of the housebuilder signed Product Specific Plain Language Compliance Report.	This would ensure that all parties are confident that declarations are true.
2. GOVERNANCE OF SAP ASSESSOR ACCREDITATION SCHEMES AND SAP ASSESSORS	
SAP assessor responsibilities need to be clearly defined within the Scheme Operating Requirements (SORs), together with summarising the responsibilities of all parties including the housebuilder and the BCB. Responsibilities should be included in the schemes: training, assessment, CPD (Continuing Professional Development) and audits.	This would ensure that SAP assessors clearly understand what they are and are not responsible for, and would avoid ambiguity.
DCLG audits of EPC Accreditation Schemes to have a strong technical standards dimension.	To verify consistently high technical standards across all schemes against the SORs and verify consistency across schemes for the application of conventions.
Scheme managers and DCLG to develop agreed CPD expectations and provide a framework to audit them against.	To ensure that CPD quality is at a high level and a consistent standard across all schemes.

RECOMMENDATION	COMMENT
3. IMPROVE U-VALUE AND PSI-VALUE CALCULATIONS	
Separate qualification for U-value calculations, with more comprehensive training and assessment requirement, as well as CPD. The U-value qualification should be provided as a module within the current DOCEA (Domestic On Construction Energy Assessor) qualification as currently, but made more rigorous. However, it should also be available to non assessors outside of the DOCEA qualification.	To drive up and then maintain the higher standards.
An appropriate accreditation scheme for Psi-value calculations to be established with a specific Psi-value modeller qualification (although this should not be brought into the DOCEA qualification as it is significantly more complex and not something that all DOCEAs need to undertake: this can be provided by the newly accredited third parties).	Training and assessment needs to incorporate the science behind such calculations, not just in using a tool.
The SOR should require that Psi-value and U-value calculations can only be accepted from persons holding the above qualifications and that these calculations are checked as part of the audit process. An implementation plan needs to be developed.	
4. REVIEW OF SAP METHODOLOGY AND ASSUMPTIONS	
Confidence (or in-situ) factors should be considered for evaluation to reflect the system or combined elements' in-situ performances (i.e. the performance of a specific make up of completed walls or specific entire heating system including its controls etc.) and implemented in such a way as to allow competing systems to innovate and demonstrate their specific as-built performance. An appropriate robust scheme should be developed for determining and updating these factors and developed in a manner that has the confidence of housebuilders, product manufacturers and wider industry.	To make the model a better predictor of as-built performance and provide designers / specifiers the information they need to make more informed decisions.
SAP default values to be reviewed to ensure product / system specific values are used with defaults set at an appropriate level to ensure the use of specific values. In particular: communal heating, thermal bridging, window g-values, etc.	To ensure that the use of defaults does not result in an improved design performance.
5. CHANGES TO SAP SOFTWARE	
Scheme managers collectively create and operate a download / upload area for managing document transfers between the client and SAP assessors including: storage of compliance documents, digital signing of declaration, archive and providing householder access to supporting documents.	To simplify document handling / signing, householder document retrieval and archiving.

Detailed Recommendations

1. Refine the SAP Process: Improved Compliance Reporting

CURRENT INTENDED PROCESS	PROPOSED REFINEMENT
AT DESIGN STAGE	
SAP assessor gathers information from the housebuilder or housebuilder's agent (hereafter called 'client') on the planned design of the dwelling(s), in accordance with DCLG SORs and SAP conventions. This includes plans and elevations, plus details of construction, building services, renewables, etc. Such information may be diagrammatic, drawings or written specifications including reference to manufacturer technical information and / or certificates of performance. At the design stage there is currently no requirement that the SAP Assessor be a qualified DOCEA.	None
SAP assessor enters the required information into approved SAP software. Establishes whether or not the dwelling(s) as-designed meets the requirements of Part L1A. If not, discussions are had with the client regarding modifications required to get the dwelling to comply, until a compliant design is achieved.	None
SAP Assessor provides the following standard outputs from SAP Software to the client, as per DCLG SAP Convention 1.03: 1. Compliance Report – content is prescribed by BRE. This lists Pass / Fail against each of the five Part L criteria. It shows U-values vs. design limits, heating system values vs. Design Compliance Guide values. It also highlights key features of the design that are unusual or better than normal standards. 2. SAP Data Input Sheet – exact level of detail not prescribed by BRE; reflects the user interface of the individual software. Shows all data entered to software and some calculated values, but no product specific information other than for items drawn from the Products Characteristics Database. 3. Predicted Energy Assessment – required to be listed in SAP Conventions, but often not provided. 4. Any other supporting information requested by the housebuilder for Building Control.	A Product Specific Plain Language Compliance Report with a full energy specification at product level, with a prescribed format to be used in all SAP software. This would include details of underlying construction of fabric elements and thermal bridges, and associated U-value / Psi-value calculations. Similarly, product details of building services, renewables, etc.
Client passes the information on to Building Control as part of the controlled documents.	Client signs the Product Specific Plain Language Compliance Report, confirming that the input information is correct, and then passes the documents to Building Control as part of the controlled documents.

CURRENT INTENDED PROCESS	PROPOSED REFINEMENT
DURING THE BUILD	
BCB carries out sufficient checks on site referring to the compliance report, SAP data input sheet and supplementary information necessary to discharge their responsibility.	BCB carries out sufficient checks on site referring to the Product Specific Plain Language Compliance Report necessary to discharge their responsibility.
Client notes any design changes and checks with SAP assessor to see if there are consequences for compliance.	Housebuilder ensures that any changes are captured, noted & advised to the SAP assessor, who will confirm the adequacy of those changes.
SAP Assessor amends data file and checks that it is still compliant. If not, the assessor informs the client with suggestions for how to comply.	None
Housebuilder commissions air tightness tests and appropriate commissioning checks.	None
AFTER BUILD	
Client informs SAP Assessor when all details are finalised. SAP assessor asks if there have been any last minute changes, and asks for written confirmation.	Client returns the marked up Product Specific Plain Language Compliance Report, air tightness test result, Psi-value check sheet, commissioning check sheets, etc. to the SAP Assessor.
Once confirmation is received, the SAP Assessor updates any relevant data items in software. In many cases, written confirmation is difficult for the assessor to get from the housebuilder, and verbal communications are relied upon. Commonly, the assessor will confirm the details in an email to the housebuilder.	Assessor provides the client with finalised Product Specific Plain Language Compliance Report, including all backing information. Housebuilder signs the declaration and sends a copy to the Assessor.
SAP assessor lodges the xml file of SAP data to produce an EPC via the Landmark register. This xml file does not contain any compliance data, or any product specific data not required for the SAP calculation.	Assessor lodges the EPC xml of SAP data, which is accompanied by a compliance xml containing all of the product specific information and compliance results, uploaded to the Landmark register and EPC produced.
SAP assessor creates a pack of information for the housebuilder to give to the BCB: ○ Compliance report, ○ Final SAP data input sheets (in theory marked up to show differences), ○ RRN, and ○ The EPC for the housebuilder to give to the householder. SAP assessor stores documentary evidence in case needed for audit checks e.g. air leakage test result, details of U-value and Psi-value calcs, etc.	SAP assessor creates pack of information for Building Control / householder and provides this to the client: ○ Final SAP input sheets, ○ RRN, and ○ EPC. *Note 1: The signed Product Specific Plain Language Compliance Report (including U-value / Psi-value calculations, air permeability test certificate etc) is already with housebuilder.* *Note 2: To ensure consistency of approach between assessors and counter commercial considerations, SAP Conventions should state that the assessor must not produce the EPC without receipt of the signed declaration document.*
Housebuilder provides: compliance report, final SAP data input sheet and the RRN to Building Control.	Client provides signed Product Specific Plain Language Compliance Report (with all supporting information), SAP input sheet, RRN and EPC to Building Control.
Building Control issues the Completion Certificate.	In addition to the current process, make it clear to BCBs that they must not issue the completion certificate without signed copies of the Product Specific Plain Language Compliance Report.
	Client includes the signed Product Specific Plain Language Compliance Report and supporting info in the householder pack and provides the RRN to allow subsequent retrieval from Landmark as required.

2. Governance of SAP Assessor Accreditation Schemes and SAP Assessors

DEFINING RESPONSIBILITIES		
WHO	CURRENT DESCRIPTION OF RESPONSIBILITY	RECOMMENDATION
Housebuilder	Responsibility for compliance: people who are responsible for building work (for example the agent, designer, housebuilder or installer) must ensure that the work complies with all applicable requirements of the Building Regulations. The housebuilder must give a design-based calculation to the BCB, along with a list of specifications used in calculating the DER and DFEE (Dwelling Fabric Energy Efficiency) rate. When work is complete, the housebuilder must notify the BCB of the TER and DER, the DFEE rate and TFEE (Target Fabric Energy Efficiency) rate, and whether the building was constructed in accordance with the list of specifications submitted to the BCB before work started; if not, they should provide a list of any changes since the design stage specification. Give an energy performance certificate to the owner of the building and a notice to the BCB that a certificate has been given, including the reference number under which the certificate has been registered.	The description of housebuilder responsibility to be included in SOR and referenced in CPD along the lines of the following: *"The housebuilder is responsible for compliance with Building Regulations. Agencies acting on their behalf have their role to play but ultimate responsibility lies with the housebuilder."*
SAP assessor	Responsibilities not defined within the SORs resulting in individuals having a range of interpretations and general confusion with the responsibilities of the housebuilder.	A clear description of SAP assessor responsibilities to be included in the SOR and referenced in CPDs along the lines of the following: *"Accurate interpretation of the design using the client's / designer's or housebuilder's inputs for the design / as built calculations in adherence with the SORs and DCLG conventions."*
Building Control	Often seen as the authority whose approval is taken as confirmation that building regulations have been met.	The description of Building Control responsibility to be included in the SOR and referenced in CPDs along the lines of the following: *"Reasonable endeavour to ensure building regulations have been complied with."*

CURRENT INTENDED PROCESS	PROPOSED REFINEMENT
All SAP Assessors are to adopt a consistent approach to SAP / Part L assessments. This consistent approach is to a degree specified in the DCLG SORs for EPC Accreditation schemes. Where there are gaps in the SORs or things are unclear, the DCLG SAP conventions specify the approach that should be taken, via a document that gets updated every 6 to 12 months. Despite this, it is not clear that all assessors are in practice adopting a consistent approach. This is thought to be due to commercial pressures on assessors and accreditation schemes to adopt a 'light touch' approach. A recent appendix to the SAP Conventions has started to list the documentary evidence required by an assessor to back up the EPC and compliance report. This is a good step forward in ensuring consistency. However, there is currently a fear of making the requirement for documentary evidence too onerous for housebuilders and assessors. The SAP Conventions group meets infrequently, has limited representation and an unclear brief around Building Regulations.	Clarify the role of SAP Assessors and update the SORs to reflect this. SORs and DCLG Conventions to stipulate more clearly what assessors are to do to ensure all relevant documentary evidence is available. This should include a clear statement that, in the absence of a signed Product Specific Plain Language Compliance Report, an EPC must not be produced and that to do so would be a major breach of assessor professional standards, which could result in the assessor's accreditation being withdrawn. Recognise the key role of the SAP Conventions Group in bringing consistency to the process. Clarify the Terms of Reference of the group, expand the membership to include DCLG Building Control and others committed and empowered to ensure that dwelling energy performance is appropriately reflected in an efficient manner by all. Ensure that meetings are tightly focussed, structured and frequent enough to produce the required result. Require that all EPC schemes circulate the conventions to all assessors and provide sufficient support to assessors in implementing them consistently.
DCLG established a 'Cross Scheme Moderation Group' at which all EPC Accreditation schemes are represented. The aim was to ensure that all schemes apply the SORs in a uniform way, and identify any areas of difference or unclarity. This group meets at most quarterly, and has no DCLG representative present. The one group covers all strands of EPC: Domestic & Non Domestic New-build; Domestic & Non-Domestic Existing Buildings. Due to the broad agenda and infrequent meetings, progress is slow and schemes themselves have little incentive to increase standards.	A more effective EPC Accreditation scheme Cross Scheme Moderation process, with a DCLG nominated chair briefed to drive up quality. The chair to ensure linkage to the assessor audit process and to the scheme audit process.
EPC Accreditation schemes are formally audited by an external agency on behalf of DCLG. In 2012 / 2013 there was a period when no scheme was audited for more than a year. Although now reinstated, these audits are not of a technical nature, being concerned mostly with process. The auditors are not themselves DOCEAs and do not for example check that specific conventions are being correctly applied by schemes.	Introduce a more effective DCLG EPC accreditation scheme audits that ensure SOR and Conventions requirements are being adhered to; the current approach is insufficiently penetrating. The process to be made more risk-based i.e. those schemes with the worst standards to get audited most frequently. The audit must have a substantial technical element which reviews the schemes' audits of their assessors for accuracy, interpretation of conventions and effectiveness of CPD requirements.

3. Improve U-value and Psi-value Calculations

CURRENT INTENDED PROCESS	PROPOSED REFINEMENT
U-VALUES:	
DCLG SAP Convention 5.01: *"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"*	U-values undertaken by individuals specifically accredited to undertake these calculations.
Suitable Accreditation is currently deemed to be (a) the DOCEA qualification and (b) BBA U-value Accreditation of organisations. Some manufacturers are BBA Accredited for U-value calculations.[1]	Include these data sheets / certificates / statements in the Product Specific Plain Language Compliance Report.
DCLG Conventions Appendix 2 on Documentary Evidence item A2.1 requires: *"U-value calculation data sheet including construction layers (materials, thickness and thermal properties) and corrections"* Also A2.2 for Windows: *"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"* The last option for window evidence illustrates how non-specific some of the documentary evidence requirements are.	Review the SAP Conventions so that the documentary evidence requirements are consistent throughout the document.
PSI-VALUES	
DCLG SAP Convention 5.07 states: *"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 ADL1A"* ADL1A 2013 3.10 states: *"Evidence of suitable expertise and experience for calculating linear thermal transmittance would be to demonstrate that the person has been trained in the software used to carry out the calculation, has applied that model to the example calculations set out in BR 497 and has achieved results that are within the stated tolerances."* Currently, there is no framework for checking / auditing Psi-values, as there is with U-value calculations.	An appropriate accreditation scheme for Psi-value calculations to be established.

1. See http://www.bbacerts.co.uk/product-approval/competency-scheme.aspx

4. Review of SAP Methodology and Assumptions

CURRENTLY	PROPOSED REFINEMENT
In most cases, using SAP default values leads to a higher (worse) DER than using product specific information. SAP 2012 corrected a situation in SAP 2009 whereby some default heat pump efficiencies produced a better result than using specific default heat pumps. In SAP 2012, some default thermal bridging Psi-values are thought to be lower (better) than would be achieved on site with some building practices. Also, with windows, DCLG SAP Convention item A2.2 allows "a statement from the builder that the windows meet the minimum requirements of building regulations" in which case a minimum Building Regulations U-value can be used.	Review SAP methodology to ensure that all default values are worse than product specific values, and thereby encourage the use of product / system specific information. In particular: communal heating, thermal bridging, window g-values, etc. Review the DCLG SAP Conventions to ensure that default values are to be used when no documentary evidence of the use of specific products is available.

5. Changes to SAP Software

CURRENTLY	PROPOSED REFINEMENT
Appendix C of ADL1A section 4 describes various ways in which SAP software can "make a clear connection between the product specifications and the data inputs required by the compliance software (e.g. what is the wall construction that delivers the claimed U-value?)". A similar, although less detailed, section was present in ADL1A 2010. However, there is no formal BRE requirement for this to be implemented in software.	SAP software providers be required, as part of the normal software approvals process, to implement this in software, in a way that produces a standardised Product Specific Plain Language Compliance Report as described in previous recommendations.
Some SAP software has integrated U-value calculators; others use stand-alone U-value calculation software. There is no approval process for U-value software.	U-value Calculators to require formal approval. Require that the data underlying a U-value calculation be made available to incorporate within the proposed Product Specific Plain Language Compliance Report.
Not all SAP software has an integrated thermal mass calculation; a High / Medium / Low estimate is sufficient or an external spreadsheet can be used. There is no BRE requirement for the calculations to be done within SAP software.	Require that the data underlying a thermal mass calculation be made available to incorporate within the proposed Product Specific Plain Language Compliance Report.
Some SAP software has better validation checks within the user interface. This can help to avoid entry of inconsistent data items into software.	Require a certain minimum level of data validation within the user interfaces of SAP software.
In-use factors are applied within the model for boilers. Systems (such as walls) are assumed to perform exactly as calculated by the appropriate conventions using individual product performance data.	Confidence (or in-situ factors) should be considered for evaluation to reflect the system or combined elements' real performance (i.e. the performance of a specific make up of completed walls or specific entire heating system including its controls, etc.), implemented in such a way to allow competing systems to innovate and demonstrate their specific as-built performance. An appropriate scheme should be developed for determining and updating these factors and developed in a manner that this has the confidence of housebuilders, product manufacturers and wider industry. This is to make the model a better predictor of as-built performance and provide designers / specifiers the information they need to make more informed choices.

Product Specific Plain Language Compliance Report – Illustrative Example

As detailed above, the Work Group recommend that a Product Specific Plain Language Compliance Report be introduced. This would be a declaration signed by the house-builder, listing details of the underlying construction of fabric elements, thermal bridges, services, renewables and U-value and Psi-value calculations. Once signed, it would then be provided to the SAP assessor, Building Control Bodies (BCBs) and the house purchaser. BCBs would only be able to issue a completion certificate on receipt of both the signed Product Specific Plain Language Compliance Report, along with the EPC RRN generated from a full SAP.

It is envisaged that this Product Specific Plain Language Compliance Report would be automatically generated from the SAP software in a standard format, based on SAP assessor inputs. On the following pages is an illustrative example of the information that this Product Specific Plain Language Compliance Report might contain. Note that it includes design stage and as built information: items would be removed as appropriate for the stage of development. Guidance on how the form would work are included in the green boxes that accompany it.

DECLARATION

Site Ref

Plot Ref

Address

Building Type

(Semi-detached / terraced / etc)

Floor Area

m^2

Number of floors

Dwelling status

(Intended Construction / As-built)

Note

This declaration would need to be made by the housebuilder before this document could be changed from draft to final.

Either:

As representative of _____ (enter company name), I confirm that the inputs listed below and contained within the appendices accurately reflect the intended construction of the dwelling.

Or:

As representative of _____ (enter company name), I confirm that the inputs listed below and contained within the appendices accurately reflect the dwelling as it was built. I understand that this document will be provided to the home purchaser and that I may be contacted by an auditing body to verify its authenticity.

Name

Signature

Position

Date

Time

Contact address

Contact telephone number

BACKGROUND INFORMATION

Compliance parameters

Applicable building regulations date

SAP software version

TER

Target Emission Rate; maximum allowable carbon emissions per m² per year

TFEE

Target Fabric Energy Efficiency; maximum allowable energy use per m² per year

DER

Dwelling Emission Rate; actual emissions for this property

DFEE

Dwelling Fabric Energy Efficiency; actual energy use for this property

Pass/Fail L1a Criteria 1 CO_2 emissions:	PASS ☐	FAIL ☐
Pass/Fail L1a Criteria 1 Fabric Efficiency:	PASS ☐	FAIL ☐
Pass/Fail L1a Criteria 2 U-values:	PASS ☐	FAIL ☐
Pass/Fail L1a Criteria 3 Overheating:	PASS ☐	FAIL ☐

SAP Assessor

Contact address

Contact telephone number

BUILDING DETAILS

Note *At the design stage, the SAP assessor will have populated the software with basic construction details and U-values, based on drawings and discussions with the design team; U-value evidence would also be saved in an appendix, ideally within the software.*

KEY FEATURES

External Wall 1

Roof 1

Floor 1

Etc..

Note *These would each be a generic construction description, chosen from a limited menu: e.g. 'brick and block wall with a U-value of 0.18'*

FABRIC

Note *Information would be automatically generated by U-value calculation software, with an option for manual input if the U-value is calculated by a third party.*

EXTERNAL WALL 1

Area

m^2

SAP assessor calculation of area

U-value

W/m^2K

See U-value calculation in the appendices

Build Up

e.g. Timber cladding, 100mm Celcon Thermalite, 50mm Cavity, 100mm Kingspan K8, 100mm Celcon Thermalite, 13mm Plaster

EXTERNAL WALL 2 (as above)

INTERNAL WALL 1 (as above)

ROOF 1 (as above)

FLOOR 1 (as above)

WINDOWS 1

Number of windows

Total area

m^2

Window make and model

Description

e.g. timber frame, double glazed, 16mm air gap, low-e coating, g-value 0.45

Frame and glass combined U-value

W/m^{2}K

Overshading

Orientation

Note *All data inputs are already required by SAP software and the manufacturer's literature would be included in an appendix.*

WINDOWS 2 (as above)

DOORS / ROOFLIGHTS (as per window format)

Note *Air pressure test certificate would be included in an appendix.*

AIR PERMEABILITY

Target (at design stage) / Test result (at completion)

m^3/h.m^2 at 50 Pa Dwelling(s)

THERMAL BRIDGING JUNCTION DETAILS

Note *The full listing, as well as the Psi-value and y-value calculations, would be included in an appendix.*

All building fabric junctions are to Approved Construction Details YES ☐ NO ☐

THERMAL MASS

Either: Indicative value

Generic values, based on style of construction: no calculations required.

Or: Calculated value

Area and mass of each construction style, calculated by assessor.

Description

Details of each construction (walls and floor) could be drawn from U-value table above.

Details would also be included in an appendix.

MECHANICAL AND ELECTRICAL SYSTEMS

Note *Manufacturer's data on each product would be included in an appendix.*

HEATING

Description

e.g. Gas-fired system boiler Vaillant EcoMax Pro28 E, with Flue Gas Heat Recovery

Efficiency

%

Emitter 1

e.g. underfloor heating

Controls

e.g. Enhanced load compensator, time and temperature zone control

Note *Information would be drawn from the SEDBUK database for appliances contained within it*

SECONDARY HEATING (as above)

WATER HEATING

Description

e.g. 210l Megaflow cylinder 1.89kWh/day heat loss

Waste water heat recovery systems

where relevant

Primary pipe work insulation

e.g. fully insulated

VENTILATION

Number of chimneys

Number of sheltered sides

Number of passive vents

Either: Natural ventilation with intermittent extract fans to wet rooms:

Number of intermittent extract fans

Or: Mechanical ventilation:

Type

e.g. Whole house mechanical ventilation with heat recovery

Product

e.g. Nuaire MRXBOX 95 Wall

Test efficiency

%

Specific Fan Power

Number of wet rooms

e.g. Kitchen + 1

Ductwork

e.g. un-insulated, rigid (Selected from product characteristics database)

RENEWABLE TECHNOLOGIES

Description

e.g. 1.5kWp photovoltaic panel

Inclination

e.g. 30 degree tilt

Orientation

e.g. south-facing

Overshading

e.g. little or no over shading

OVERHEATING:

Cross-ventilation on most floors? YES ☐ NO ☐

Blinds/curtains

e.g. net curtain covering full window

Window opening assumption

e.g. fully open half the time

OTHER CONSIDERATIONS

Details of any special features

Reference A: Provision of Documents

The table below lists each document that is required under the SAP process, under the proposed amendments. For each one, the parties involved in producing or receiving that document are identified, including the assessor, developer, BCB and home owner.

STAGE	ITEM	COMMENTS	ASSES-SOR	DEVEL-OPER	BCB	HOME OWNER	SCHEMES
DESIGN							
	site plan*		Y	Y	Y		
	plans*		Y	Y	Y		
	sections*		Y	Y	Y		
	elevations*		Y	Y	Y		
	construction spec*		Y	Y	Y		
	M&E spec*		Y	Y	Y		
	Product Specific Plain Language Compliance Report: Design Stage	produced by software	Y	Y	Y		
	SAP worksheet - Design	produced by software	Y		Y		
	Detail						
	Walls*	U value calc	Y	Y			
	Floor*	U value calc	Y	Y			
	Roof*	U value calc	Y	Y			
	Windows*	Manufacturers published data	Y	Y			
	Rooflights*	Manufacturers published data	Y	Y			
	Doors*	Manufacturers published data	Y	Y			
	Junction details*	List of junctions with ref no. (see complimentary xl sheet of suggested format)	Y	Y			
	Water heating*	Manufacturers published data	Y	Y			
AS BUILT							
	Product Specific Plain Language Compliance Report: As Built	produced by software	Y	Y	Y	Y	Held by
	SAP worksheet: As Built	produced by software	Y		Y		Held by
	"Pack of above supporting documents indicated by *						
(updated if different from design stage)"		Web	Web	Web	Web	Held by	
	Air permeability	ATTMA certificate	Y	Y		Web	Web
	Renewable Technology	MCS certificate	Y	Y	Y	Y	Web
	Completion Certificate			Y	Issued by	Y	Web
	EPC	produced by software	Issued by	Y		Y	
	CML Certificate			Y			
Notes						Included in the handover pack from the housebuilder	For audits & record retention / access by householder

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