SUSTAINABLE ENERGY AUTHORITY OF IRELAND

DEAP Methodology Update

Onsite defaults for upgraded existing dwellings

Contents

Change log 2
1 Introduction 3
2 Amended methodology 4
2.1 Identifying each element type 4
2.2 Supporting documentation route 4
2.3 Onsite Verification *measurable* route 4
2.4 New On-site verification *observable* route 4
2.5 Age-band/characteristic default route 4
3 U-Value Defaults 5
4 Verification indicators 6
4.1 Hollow sound of the insulation (EWI) 8
4.2 Acrylic/silicone render (EWI) 8
4.3 Larger than usual reveal depths (EWI & IWI) 9
4.4 Metal/plaster insulated windowsills (EWI) 10
4.5 Metal flashings at soffit/barge level (EWI) 10
4.6 Wall thickness confirmation – EWI with adjoining house 11
4.7 Filled Cavity wall insulation (CWI) 11
4.8 Window Date Stamps (Windows) 13
Appendix 1 – Flow chart 14
Appendix 2 – DEAP Manual Table S9 update 15

Change log

Version	Date	Changes from previous version
1.0	01/06/2023	First published version

1 Introduction

This document describes an amendment to the verification procedures for the performance of building elements in the DEAP methodology. The focus of this amendment is existing dwellings where energy efficiency retrofits have been implemented to walls, roofs or windows that may not have appropriate supporting documentation. The objective of the amendment is to make the U-values of upgraded elements more representative than the established age-band/characteristic defaults. **Dwellings with no upgrades should continue to use the other methodology provisions from Appendix S in the DEAP Manual.**

Before this amendment, the routes for verification of elemental U-values for existing dwellings were limited to:

- The supporting documentation route, with U-values supported by appropriate documentary evidence;
- For dry-lined walls, the verification of the installed thickness of insulation and use of Table S3b from the DEAP Manual;
- Where the thickness of additional insulation can be reliably measured onsite, a U-value calculation[1] can be based on the thickness and the thermal resistance[2] of the additional insulation;
- The age-band/characteristic default route, which by design is conservative.

In cases where documentation has been lost or misplaced, for example receipts of building materials, the dwelling's BER rating could be adversely impacted. This could have a bearing on the sale of the dwelling, renting, or when seeking a green mortgage, and can have a negative impact on the performance gap[3].

This amendment in the BER methodology aims to improve the accuracy of the BERs as a statistical tool for the energy performance of the housing stock. This is done by retaining the routes for verification in the established methodology and introducing an additional verification route called onsite *observable* route.

This amendment has been developed in consultation with stakeholders. It empowers assessors to use their judgement, onsite expertise, and experience to improve the quality and accuracy of BER Certificates and to increase through-put of BERs in the market.

[1] The thickness of insulation would need to be reliably measured over the whole wall area.

[2] Default thermal conductivities may be sourced from Tables 12a and 12b if appropriate evidence is not available.

[3] The performance gap is defined as the difference between the predicted energy use and the actual energy consumption.

2 Amended methodology

A new verification route has been introduced, based on what is observable during an onsite survey, as shown in the flowchart in Appendix 1 – Flow chart and described below.

2.1 Identifying each element type

The first section (blue) accommodates varying elements of walls, roofs, and windows, within a dwelling, for example, cavity walls and solid wall construction, or flat roof and rafter insulated roof. This follows the established methodology, where an assessor identifies each heat loss element type in the dwelling and applies the guidance in the flow chart to determine the appropriate U-value for each element type identified. As per the established methodology, evidence is required to support each U-value inputted in DEAP.

2.2 Supporting documentation route

The next section (yellow) is the supporting documentation route, where if the appropriate supporting documentation is present, this should be used, as it is the most accurate and representative of the real situation. This route continues to follow all the established procedures for supporting documentation outlined in Appendix S of the DEAP manual.

2.3 Onsite Verification *measurable* route

This verification route applies where insulation thickness can be measured onsite. As outlined in Section 4.2.3 of the survey guide, assessors can use the insulation type to identify the relevant thermal conductivity of that insulation, using Table 12b in the DEAP manual. The insulation thermal conductivity and insulation thickness are used to calculate the U-value. The insulation thickness should be verified onsite with photos. When using this verification route, you must ensure that there is sufficient evidence to demonstrate that the measured insulation thickness is representative of the whole dwelling, wall or area being assessed.

2.4 New On-site verification *observable* route

The additional verification route, onsite *observable* verification, applies where the homeowner has informed the assessor that their walls, roofs, or windows, have been upgraded but may not have supporting documentation. Also, the insulation cannot be measured onsite, then this route should be assessed next. The assessor should verify those upgrades through a mixture of onsite tell-tale signs and record type indicators. For example, a photo of a larger exterior reveal depth at the window and a contractor confirmation for external wall insulation. These verification indicators are discussed in Section 4, where guidance is provided.

If there is sufficient evidence of upgrades, through the verification indicators, the age of the dwelling or applicable area, for example an extension, is used to obtain the appropriate onsite observable defaults. There are two sets of defaults, pre-1978 and 1978 onwards. This aligns with the introduction of regulations in 1976 and a transition period. 1978 also aligns with age band F in the DEAP manual. The different default U-values are outlined in Section 0.

2.5 Age-band/characteristic default route

The age-band/characteristic default values listed in Appendix S will remain in place. If, for example, the BER Assessor has been informed that upgrade works were carried out but doesn't have supporting documentation, the insulation cannot be measured onsite, and cannot observe two or more of the verification indicators, then use the established age-band/characteristic defaults. This is the verification route of last resort.

3 U-Value Defaults

Table 1 shows the different U-values for each verification route.

Verification Route	EWI	CWI	IWI	Roof – Ceiling level	Roof -rafter/flat
Current Supporting documentation	No change – calculate based on documentation				
Onsite verification *measurable*[4]	No change – Measure onsite and use Table 12a/b thermal conductivity to calculate applicable U-values				
Onsite verification *Observable* (1978 Onwards)	0.33	0.37	0.55	No changes	Current approach (Table S5)
Onsite verification *Observable* (pre-1978)	0.55	0.6	0.8	No changes	0.49
Insufficient Supporting documentation and insufficient onsite verification	No change – follow DEAP manual for age-band /characteristic defaults				

Table 1 - U-values for each verification route

[4] '*Measurable*' means the ability to measure the thickness of the upgraded insulation.

4 Verification indicators

The new verification route requires a certain level of onsite confirmation in the absence of supporting documentation. Table 2 below lists examples of the verification indicators that can be used to reasonably confirm, onsite, that walls and roofs have been upgraded. For this purpose, **we require at least two indicators**, which can be any combination of records and onsite, for walls and roofs. In the case of the drill pattern indicator, for filled cavity wall, this indicator is sufficient by itself to confirm filled cavity wall insulation upgrade, if it is similar to patterns found on Irish agrément cert or equivalent. More guidance on drill pattern for filled cavity wall insulation is given in Section 4.7. In the case of window upgrades, proof of the window stamp or spacer bar date is sufficient; for windows that do not have a stamp, BER Assessors must continue to follow the instructions laid out in Section 7 of the BER guidance document.

For all visual onsite verification indicators, a photo must be provided as evidence for the different element types within a dwelling. For example, if a dwelling has a cavity wall and solid wall elements, a representative photo of their respective upgrade indicators must be taken and uploaded to the DEAP software. Some upgrades, for example flat or rafter level roof upgrades, in most cases will not have tell-tale signs of works; in this case, a record type indicator is required.

As outlined in the introduction of the survey guide, all dwelling surveys are expected to be non-invasive. Nothing in this document, the DEAP manual, or any other guidance provided by SEAI, shall be understood as requiring invasive surveys. Where, despite this, a BER assessor or their client carries out invasive surveys, this is carried out at the BER assessor's own and the householder's risk and is not required by SEAI.

If invasive survey methods are used to demonstrate an applicable non-default U-value, then, while these methods are not required in the DEAP methodology, they can be considered as a source of supporting evidence.

This supporting evidence for each relevant exposed surface must clearly indicate that the non-default U-value being specified is appropriate for the building element in question, examples of these indicators are shown in red in Table 2.

BER Assessors need to record the verification indicator(s) used to verify that there are sufficient signs of upgrades in the Survey Form or alternative survey notes. Survey Form version v5.02 and its successors, contain the area to record those indicators titled 'upgrade verification indicators', under the relevant element areas.

Type	Verification Indicator	CWI	EWI	IWI	Windows	Ceiling level roof	Rafter Level roof	Flat roof
Records	Invoices, emails, receipts	x	x	x	x	x	x	x
Records	Works taking place (photographic evidence)	x	x	x	x	x	x	x
Records	Confirmation by contractors on company headed paper	x	x	x	x	x	x	x
Onsite	Visual evidence of insulation in the cavity - Top of wall plate/eaves blockwork gaps	x						
Onsite	Visual evidence of insulation - Meter box indication	x	x					
Onsite	Drill pattern on external walls[5]	x						
Onsite	Hollow knocking sound (confirmed on all facades)		x					
Onsite	Acrylic/silicone render		x					
Onsite	Wall thickness confirmation (reveals, door jamb, attic exposed areas)		x	x				
Onsite	metal/plaster windowsills		x					
Onsite	Metal flashings at soffit/barge level		x					
Onsite	Vents & service holes (may show exposed insulations works) e.g., lights fitting, waste pipe, water, gas oil, flues, electricity lines, internet, CCTVs, satellite dishes		x	x				
Onsite	Deeper electrical socket housing			x				
Onsite	Borescope /invasive	x	x	x				
Onsite	Window stamp or spacer bar date[6]				x			
Onsite	Attic survey and visual inspection (current approach)					x	x	
Onsite	Knee wall access visual inspection						x	

Table 2. Onsite Verification indicators

While Table 2 provides a good starting list of indicators, it is not intended to be exhaustive. BER assessors, auditors, and other stakeholders are asked, to contribute by submitting a proposal to include additional indicators. Prior to using indicators that are not in Table 2, BER assessors should contact the BER helpdesk; SEAI will then confirm whether the proposed verification indicator may be used as a valid tell-tale sign of upgrades for that element.

[5]This verification indicator alone is sufficient for filled cavity wall upgrade, in accordance with recommendations, see Section 4.7

[6] This verification indicator alone is sufficient evidence for window upgrade

Following this feedback, SEAI may periodically update Table 2 with new indicators. The SEAI BER Team will notify assessors of new updates via the monthly newsletter.

4.1 Hollow sound of the insulation (EWI)

An externally insulated wall has the insulation fixed to the outermost masonry layer, in contrast to other scenarios where the outermost layer is masonry with an appropriate finish, such as a cement-sand render, pebble-dash or similar. As a result, the simplest indication of the presence of external wall insulation is to knock on the exterior of the wall:

- a hollow sound indicates the presence of external insulation;
- a heavier, dull sound indicates no external insulation.

This check should be carried out at multiple points along the face of each wall to ensure a consistent result.

4.2 Acrylic/silicone render (EWI)

Acrylic/silicone render is essentially a mixture of paint and sand. The size of the grain varies from 0.5/1mm to 3.5/4mm, but the most common grain size is 1.5mm. On the wall, the render finish will have a textured, grained finish, which makes it distinguishable from a standard sand & cement render which will tend to be smoother.

Figure 1 – EWI render with 1.5mm grain

Figure 2 – EWI render with 3mm grain

4.3 Larger than usual reveal depths (EWI & IWI)

In a standard masonry wall – no external insulation added - the external reveal depth will typically be less than 150mm. When external insulation is retrofitted to the exterior walls of a dwelling, in many cases the windows are not moved. Therefore, the post-works external reveal depths will tend to be larger – typically greater than 200mm.

Figure 3 – Larger exterior reveal depth (240mm)

Therefore, a larger than usual external reveal-depth may indicate the presence of external insulation.
However, this does not always apply, in some retrofit projects, the windows will be moved outward to sit in line with the external insulation layer, in which case the external reveals will be of a standard depth.

For internal wall insulation, the larger than expected internal reveals around windows may also provide an opportunity to verify the presence of upgrades. Typically, in dwellings after 1978 internal reveal would be approximately 150mm without upgrades. However, this is not the case with all dwellings and especially older ones (Age band A-E), therefore it would need to be coupled with another indicator to verify the presence of IWI.

In the example in Figure 4, a thickness of over 400 mm can be expected when external insulation has been applied to a hollow block wall that was initially built with 50 mm of internal insulation (Age band H).

Figure 4 – Wall thickness as a verification indicator

4.4 Metal/plaster insulated windowsills (EWI)

EWI systems typically have metal or plaster insulated sills specified in the certification for the product. This contrasts with standard sills which are typically made of concrete.
The metal sill is a powder-coated aluminium sill with an insulation insert, and is installed under the window, or attached to the window. This minimises the heat loss due to thermal bridging at the junction of the window, sill, and wall. The size and shape of these sills can vary, from small 25mm front ends to thicker 80mm front ends.

Plaster windowsills are essentially sections of insulation, shaped to look like a concrete sill, with a mesh-reinforced plaster finish. These usually have a front-end thickness of 60mm.
Metal or plaster sills can be distinguished from standard concrete sills by the sound made when you knock on the sill. A metallic or hollow sound would indicate a metal or plaster sill; a heavier, dull sound would indicate a concrete sill.

4.5 Metal flashings at soffit/barge level (EWI)

In retrofit scenarios, it is common to find that existing barges and soffits on a dwelling may not have the required depth to accommodate the thickness of insulation, installed. This could compromise the waterproofing of the insulation. To counter this, flashings can be attached to the underside of the barges and soffits to extend out over the insulation and allow any water to drop to the ground. These flashings are usually made of powder-coated aluminium.

Figure 5 - Metal flashing at soffit level

Figure 6 - Metal flashing at barge level

4.6 Wall thickness confirmation – EWI with adjoining house

Another opportunity to verify EWI is the boundary between two houses where the other house hasn't installed EWI, shown in Figure 7. As the insulation can be measured onsite in this instance, use the onsite *measurable* verification route to confirm the EWI upgrade.

Figure 7 - EWI upgrade evidence at boundary wall

4.7 Filled Cavity wall insulation (CWI)

One of the main indicators for the presence of CWI is the drill pattern on the exterior of external walls. Drill mark should be spread out across larger wall sections and especially around windows where the flow of the beads may be restricted by the window hence requiring more holes for a better installation. These marks are typically filled with mortar. If using the presence of these marks as evidence of cavity wall fill insulation, they must be visible on each facade for which the filled cavity wall U-value is to be applied.

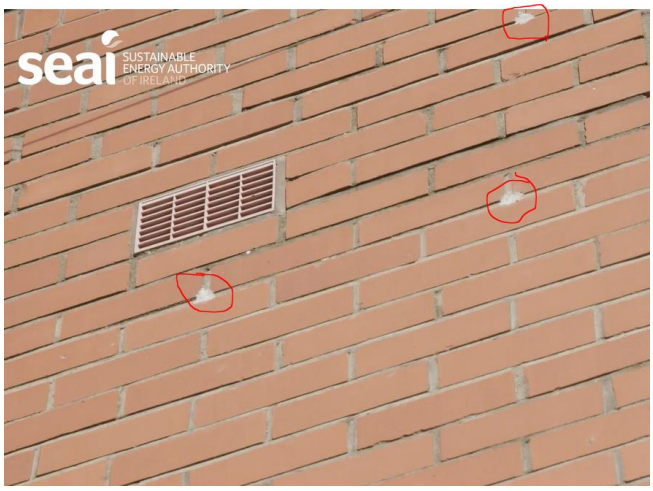


Figure 8 - Drill pattern example for CWI upgrades

Figure 9 - Drill pattern example for CWI upgrades

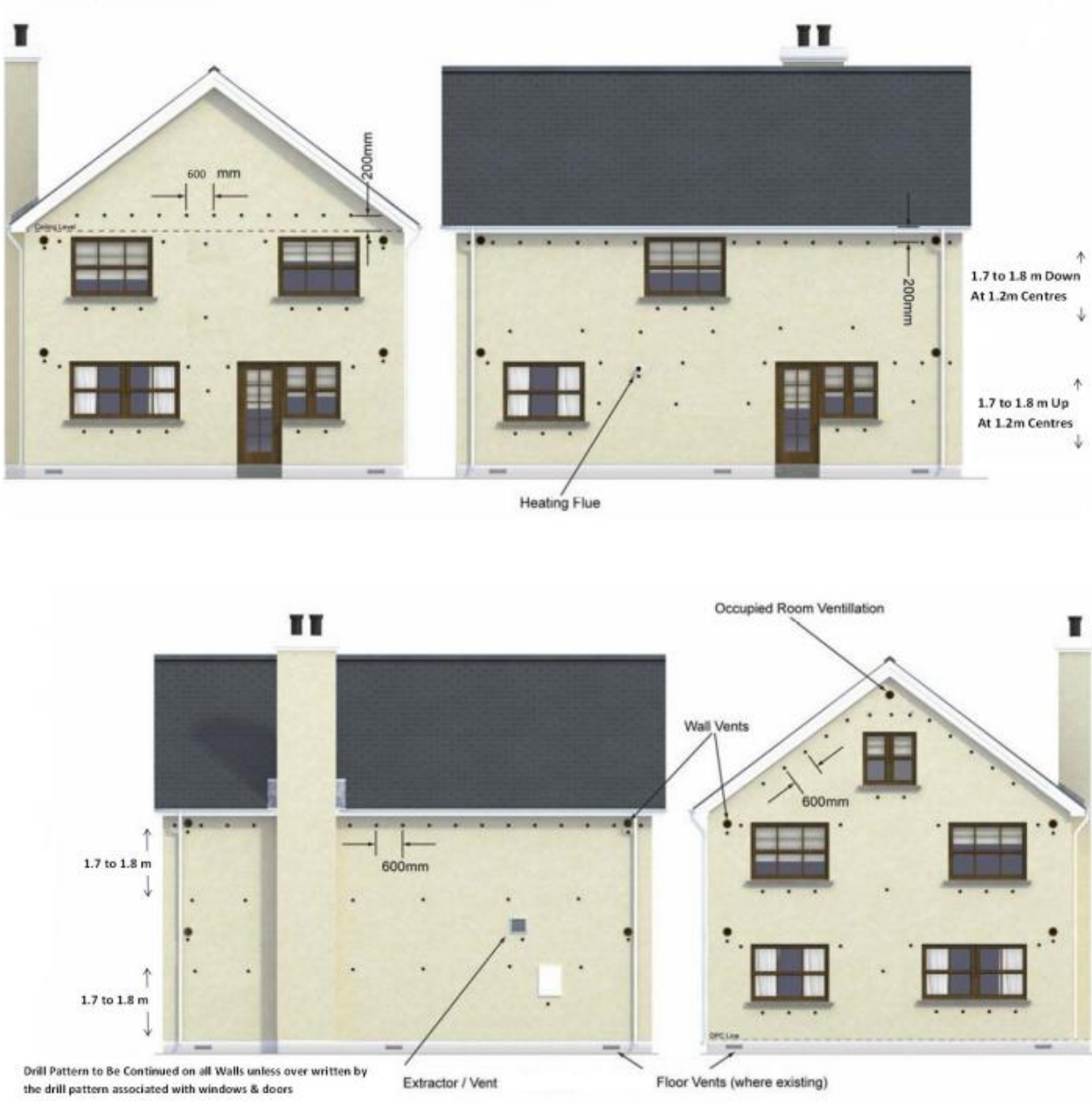


Figure 10 - Drill patten example from NSAI agrément cert

Figure 10 shows a typical drill pattern for bead filled cavity wall insulation according to a NSAI agrément cert[7] or equivalent. For this verification indicator, the drill pattern should be similar to this pattern for all facades. If the pattern has significantly less drill holes/marks, especially around windows, a second indicator should be gathered to verify filled CWI for the dwelling.

[7] https://www.nsai.ie/images/uploads/certification-agrement/08_0302_Envirobead_Rev_June_2021.pdf

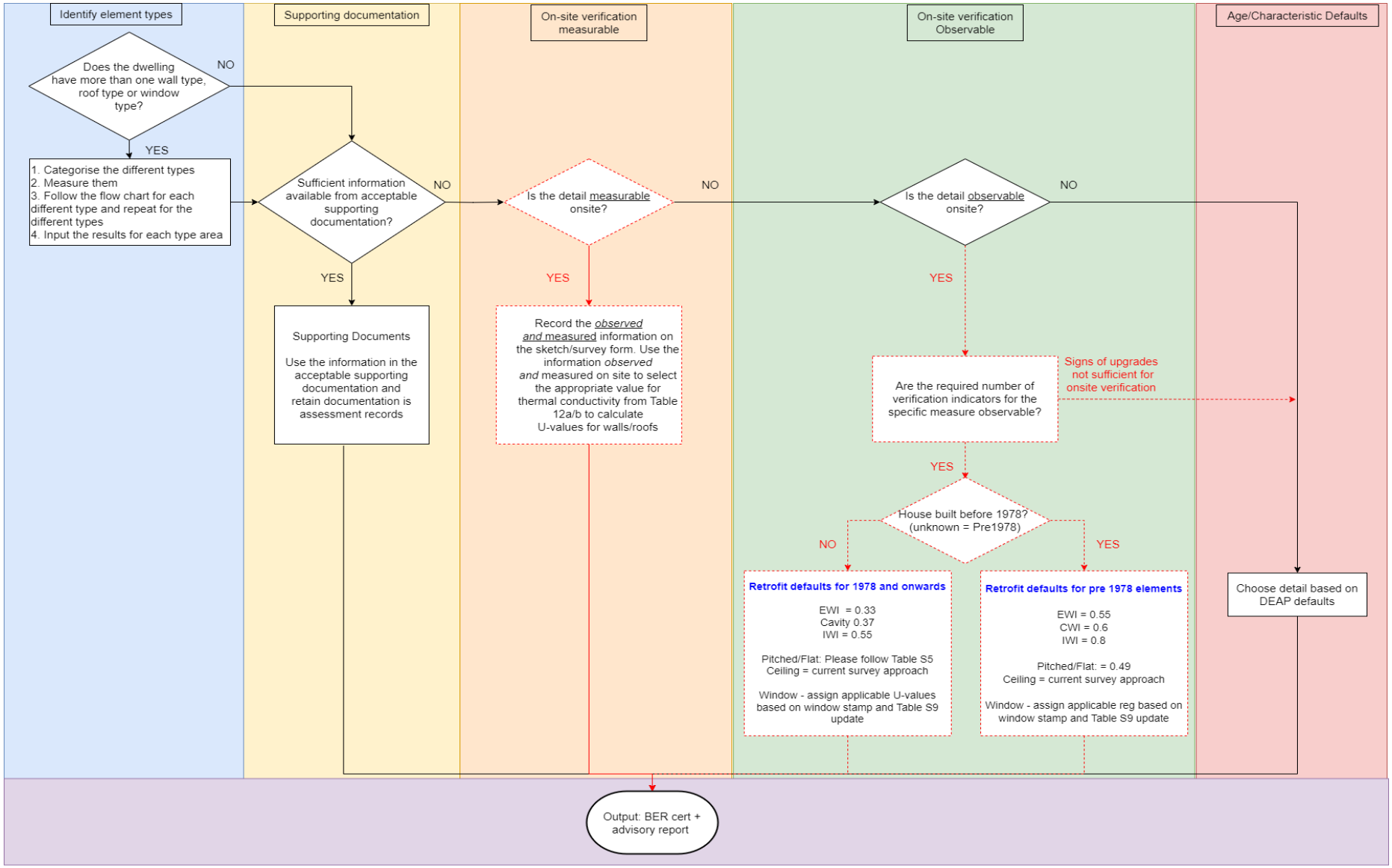
4.8 Window Date Stamps (Windows)

Table S9 have been modified in this update, Appendix 2 – DEAP Manual Table S9 update. When evidence of the window stamp is obtained and cross referencing its characteristics with Appendix 2 - DEAP Manual Table S9 update, this will ascertain the corresponding U-Value and Solar transmittance values for that window.

An example of a window spacer bar is shown in the photo.

Table 6a and Table 6b have not been modified and can still be used with the current approach.

Appendix 1 – Flow chart



Appendix 2 – DEAP Manual Table S9 update

The text in red, highlights the additions for this update.

Glazing	Assume low E coating	Frame	Metal Frame break assumed	U-value	Solar transmittance	Basis for derivation
Single	n/a	wood/PVC	n/a	4.8	0.85	
Single	n/a	metal	4mm	5.7	0.85	
Single with second glazing	n/a	wood/PVC	n/a	2.4	0.76	
Single with second glazing	n/a	metal	4mm	2.4	0.76	
Double - pre 2004	no	wood/PVC	n/a	3.1	0.76	Air filled 6mm gap
Double - pre 2004	no	metal	4mm	3.7	0.76	Air filled 6mm gap
Double - 2004 - 2009	yes	wood/PVC	n/a	2.2	0.72	Air filled, low E, hard coat, εn = .15, 12mm gap
Double - 2004 - 2009	yes	metal	4mm	2.7	0.72	Air filled, low E, hard coat, εn = .15, 12mm gap
Double - 2010 onwards	yes	wood/PVC	n/a	2	0.72	Argon filled, low E, hard coat, εn = .15, 12mm gap
Double - 2010 onwards	yes	metal	4mm	2.5	0.72	Argon filled, low E, hard coat, εn = .15, 12mm gap
Triple Pre-2010	yes	wood/PVC	n/a	1.7	0.64	Air filled, low E, hard coat, εn = .15, 12mm gap
Triple Pre-2010	yes	metal	4mm	2.1	0.64	Air filled, low E, hard coat, εn = .15, 12mm gap
Triple 2010 Onwards	yes	wood/PVC	n/a	1.5	0.64	Argon filled, low E, hard coat, εn = .15, 12mm gap
Triple 2010 Onwards	yes	metal	4mm	1.9	0.64	Argon filled, low E, hard coat, εn = .15, 12mm gap

w: www.seai.ie
e: info@seai.ie
t: 01 8082100

Rialtas na hÉireann
Government of Ireland