BER Assessors – Dwellings Technical Bulletin #01

Issue No. 1/09 **March 2009**

Contents:

Sources of information

A large number of queries directed to SEI in relation to dwelling BER assessments can be answered from a number of documents which are readily available to the BER assessor:

All BER assessors must be fully familiar with the **DEAP Manual.** Assessors for existing dwellings must also be fully familiar with the DEAP Survey Guide. These are both available under
http://www.sei.ie/Your_Building/BER/BER_Assessors/Technical/DEAP/DEAP_2008/
In addition to this, a number of frequently asked questions are covered under the **BER FAQ:**
www.sei.ie/berfaq
Any information required on **Building Regulations Part L** (current or previous) can generally be found under http://www.environ.ie/en/TGD/
For U-value calculation information, while it is very useful for assessors to purchase the relevant standards, the document **BRE 443** is also an excellent source of information and is available under http://www.bre.co.uk/filelibrary/rpts/uvalue/BR_443_(2006_Edition).pdf. CIBSE Guide A (Part 3) is also a very useful source of information.

Building Elements – non default window data entry

Measurements of thermal transmittance (U-value) in the case of doors and windows should be made according to IS EN SO 12567-1. Alternatively, U-values of windows and doors may be calculated using IS EN ISO 10077-1 or IS EN SO 10077-2. A BER assessor may perform these calculations bearing in mind that standards must be adhered to and that all non default data used in calculations must be obtained from accredited sources. These sources can include the Irish Agrement Board (IAB), the British Board of Agrement (BBA) and the British Fenestration Rating Council (BFRC). Table 6a of the DEAP Manual gives values that can be used in the absence of test data or calculated values. All test certificates must be in English or accompanied by an English translation. A value should be selected from Table 6a which corresponds most closely to the description of the actual window. Interpolation should not be used in this table.

When the window U-value is declared by the manufacturer using certified data (rather than from Table 6a) the solar transmittance must also be obtained from certified data. Ensure that such solar transmittance values relate to the glazing, not the whole window. In cases (such as BFRC certificates) where the transmittance for the entire window is given (including frame), then solar transmittance to be entered in DEAP ~~= g_{glass} = g_{window} / Frame Factor. Please refer to Table 6b of the DEAP manual.~~
UPDATE JULY 2012 in DEAP Manual v3.2.1 Table 6b:
solar transmittance to be entered in DEAP as: $g_{\perp}$ = g_{window} / [Frame Factor*0.9]

Distribution loss and gains - gas flue fans

When a gas-fired central heating system is specified, the associated number of gas boiler flue fans must also be entered. Where no gas flue fan is present, substantiating evidence needs to be retained by the BER assessor to this effect. The HARP database is a very useful source for determining the number of gas flue fans. In the absence of supporting evidence the default of one gas flue fan must be entered. Any information (such as that pertaining to flue fans) from the supplier/manufacturer/service engineer should be on headed paper from that source for clarity.

Distribution loss and gains – oil boiler pump

When an oil boiler central heating system is specified, the associated number of oil boiler fuel pumps must also be entered. Most oil boilers contain an internal fuel pump and/or there may also be a fuel pump outside the boiler. All oil fuel pumps must be counted in DEAP for an individual heating system. The boiler specification may indicate the presence of an internal pump. In the absence of this information it must be assumed that the boiler contains a fuel pump.

Room in roof for existing dwellings

The BER FAQ has been updated to provide further detail on the room in roof option for existing dwellings in DEAP under

http://www.sei.ie/Your_Building/BER/BER_FAQ/FAQ_DEAP/Building_Elements/How_do_I_enter_a_"room_in_roof"_in_DEAP_.html.

Electrical immersions and supplementary hot water heating

(1) What happens when there is no water heating system present?

As stated in Appendix A of the DEAP manual: "In DEAP a main space heating and main water heating system (and associated fuel for each) must be specified at all times."
If there is no evident source of water heating in the dwelling assume direct electric heating as the main water heater (as specified in table S12 of the manual).
Supplementary water heating is set to "no" in this case and, if there is no storage, enter "no storage losses" under water heating.

(2) The main water heating system is an electric immersion in a cylinder. What do I do?

Where an immersion is the main water heater, then the hot water storage temperature factor from table 2 is set to 0.6. When determining the temperature factor multiplier, the immersion will have a built in thermostat, and the timer adjustment does not apply as this is not a boiler/heat pump. Therefore the temperature factor multiplier is set to 1.
The main water heating efficiency is 100% and the main water heating fuel is electricity.
Do not specify supplementary water heating during summer in this scenario.

(3) The immersion is backup to a main water heating system (other than a heat pump). What do I do?

Systems where the boiler can supply domestic hot water (DHW) independent of space heating should **not** have "supplementary immersion during summer" specified as outlined in section 4.6 of the DEAP manual. Systems where the space heating can be switched off without turning off water heating include the following (note that any switches or valves must be accessible by the home owner):

1. Full time and temperature control for DHW separate from space heating
2. Separate zoned time control (DHW separate from space heating) with no temperature control
3. A "summer/winter switch" that either controls a motorized valve or a separate pump for the hot water only to be separated from the space heating
4. Boiler with a time clock and a switch to turn off the heating of the space and not of the DHW
5. Boiler with just a time clock and a manual pipe valve to turn off the heating to the space
6. Room thermostats which can turn off all space heating without affecting water heating.

The following systems should have supplementary immersion during summer entered in DEAP as **"yes"**

1. Individual radiator shut off valves as the only means of switching off space heating.
2. Solid fuel stove with back boiler, or other solid fuel back boiler appliance located in the living space, providing hot water from the back boiler.
3. Boiler with just a single time clock and none of the switches or valves outlined above.

(4) What about water heating with heat pumps? Is supplementary water heating specified then?
No – supplementary water heating is not specified in this case. Further information on how to deal with this issue is given in the BER FAQ under
http://www.sei.ie/Your_Building/BER/BER_FAQ/FAQ_DEAP/Energy_Requirements/Where_a_Heat_Pump_is_used_to_provide_both_space_and_domestic_hot_water_DHW_,_why_is_the_"Adjusted_Efficiency"_of_the_DHW_system_less_than_that_of_the_space_heating_system_.html.

(5) Can solar water heating be specified as the main water heater?
No – further details are given in the BER FAQ under
http://www.sei.ie/Your_Building/BER/BER_FAQ/FAQ_DEAP/Water_Heating/What_figure_do_I_enter_for_system_efficiency_in_the_Energy_Requirements_tab_if_my_main_water_heating_system_is_a_solar_water_heater_.html

BER Assessors – Dwellings Technical Bulletin #02

Issue No. 2/09 April 2009[1]

Contents:

[1] Article on Cylinder Sizing updated Feb 2014.

DEAP Survey Guide Version 1.1

Some minor modifications have been made to the DEAP Survey Guide.
An updated version (Version 1.1) has been published and is now available under
http://www.sei.ie/Your_Building/BER/BER_Assessors/Technical/DEAP/DEAP_2008/ .

Survey Form (Existing Dwellings)

When conducting a site survey, assessors need to ensure that a site survey form is retained as supporting evidence of data entered in the DEAP assessment. The survey guide should be used in conjunction with the DEAP manual (and Appendix S therein) in completing the DEAP survey form. This survey form (or an equivalent containing the same information) must be used on site to gather survey data required to complete a BER assessment for an existing dwelling using the DEAP software and must be retained as supporting evidence.

The survey form is available under www.seai.ie/deap

NAS Notices

When a BER assessment XML file is submitted to the NAS, the NAS performs a number of validation checks on the uploaded XML file:

- an assessment with NAS "errors" cannot be published;
- an assessment with NAS "notices" must not be published until the notices are either resolved (by correcting the data entered in the assessment), or the Assessor has fully understood the notices and accepts that the notices are valid for the assessment in question;
- assessments can only be published when the Assessor is satisfied that they have followed the rules and guidance set out by SEI.

Ventilation – Chimneys and Open Flues

A chimney is specified in DEAP as a duct for combustion gases which has the equivalent open area of a circle with 200mm diameter. If the duct's open area less than a 200mm diameter circle then it is entered as an open flue. Open flues are also specified in the following cases:

- a chimney for solid fuel appliances with controlled flow of the air supply (but not room sealed)
- a chimney with open fireplace having an air supply ducted from outside to a point adjacent to the fireplace;
- a flexible flue liner sealed into a chimney;
- a chimney fitted with a chimney damper;
- a chimney fitted with an open-flue gas fire where the flue products outlet is sealed to the chimney;
- a permanently restricted fireplace fitted with ventilators (if ventilator open area does not exceed equivalent of a 200mm diameter circle).

Temporary restrictions blocking the chimney (i.e restrictions which can be easily removed) do not eliminate the chimney for the purposes of DEAP and it must still be included in the assessment. Permanent air supply vents associated with the chimney or open flue are not counted in addition to the chimney or open flue.

A room heater which is room sealed does not have any direct air exchange with the interior of the dwelling. However, while this would not have any ventilation loss in DEAP it may still need to be entered as a primary or secondary heating system subject to the guidance in Appendix A of the DEAP manual.

Ventilation – Controllable Background Ventilation

The DEAP manual details the types of ventilators which are counted under the "intermittent fans and passive vents" entry in DEAP (Ref. Section 2.2 of the DEAP manual). Vents which can close (such as controllable trickle vents in windows or controllable wall vents) are not counted under this entry in DEAP.

Heating System Efficiency

Where an entry in DEAP is specified in the DEAP data entry screens as being a percentage, Assessors must ensure that the relevant data is entered as a percentage rather than a fraction. For example an 80% efficient boiler should be entered as having an efficiency of 80 not as 0.80. SEI has encountered a number of assessments where heating system efficiency is entered as a fraction rather than a percentage. This error causes the rating to be substantially inaccurate and therefore SEI has had to revoke these ratings.

Water Heating - Water Cylinder Sizing and Insulation Thickness[1]

The water cylinder volume should be derived using DEAP Table 2a and the associated footnotes. In some cases, the cylinder or storage may be clearly much larger or much smaller than the values in Table 2a. In such instances, and in the absence of other information on labels or technical data based on relevant standards, the volume of a cylinder can be calculated by recording both the cylinder height and the diameter of the cylinder. The volume (which applies to hot water storage only) is then calculated as follows:

$V = (pi \times d^2/4) \times h / 1000$

Where:
d = diameter of the cylinder (cm)
h = height of the cylinder (cm)
pi = 3.142
V = volume of the cylinder (litres)

Where multiple hot water cylinders are present in a dwelling the average insulation thickness is determined using the weighted volume of each cylinder.

For example if a dwelling has two cylinders heated by a boiler as follows:

(a) 70 litres with 50mm insulation

(b) 80 litres with 20mm insulation

The cylinder volume specified under "Water storage volume" is 150L

The insulation thickness specified in DEAP is [(70x50) + (80x20)] / 150 = 5100/150 = 34mm

For factory fitted insulation, the insulation thickness should be measured at the pipe connections to the cylinder. If this is not feasible a needle or pin can be used to determine insulation thickness, ensuring, as always, that maximum care is taken and no damage is done to the cylinder.

[1] Updated in Feb 2014 to correctly refer to table 2a in DEAP.

Energy Requirements - Boiler Identification

Gross seasonal boiler efficiency can be taken from any one of the following sources:

- HARP database (www.sei.ie/harp) - this is the preferred option;
- SEDBUK database (www.sedbuk.com);
- Certified test data (following guidance in Appendix D/J/E of the DEAP manual to convert to gross seasonal efficiency for use in DEAP);
- Defaults in Table 4a and Table 4b in the DEAP manual.

If an Assessor has encountered a boiler which does not have the exact same name as a boiler on HARP/SEDBUK or the full name is not visible on the boiler, then a HARP/SEDBUK entry can be used if one of the following is available and clearly equates the boiler in the dwelling to a HARP/SEDBUK entry:

- Boiler installation manuals or instruction manuals for the dwelling's boiler;
- Statement on printed letterhead (in softcopy or hardcopy) from one of:
    - boiler manufacturer;
    - boiler supplier;
    - boiler service engineer or maintenance firm.

Building Elements - Thermal Bridging Factor

The default value for the thermal bridging factor (y) in DEAP assessments is 0.15. Acceptable substantiation must be used when entering any figure other than 0.15. As per the DEAP manual Appendix K:

1) **y = 0.08 W/m²K:** for new dwellings whose details conform with "Limiting Thermal Bridging and Air Infiltration - Acceptable Construction Details" (www.environ.ie) as referenced in Building Regulations 2008 TGD L. This requires that the relevant drawings clearly show the relevant details and that these details are checked and signed off by the developer/builder, site engineer or architect.

2) **y = 0.11 W/m²K:** Only applies to new dwellings for which the Building Regulations 2005 TGD L apply[1]. This value may only be used when sign-off by the developer/builder or site engineer or architect indicates that all details in the dwelling have been constructed in accordance with both

i. Diagrams 3 and 4, and Sections 1.2.4 and 1.2.5 of Building Regulations 2005 TGD L
ii. The details set out in the Homebond publication "Right on Site, Issue No. 28" or the 5th or later editions of the Homebond Manual.

3) Alternatively values of *psi* can be determined from the results of numerical modelling, or they can be derived from measurement. If the junction detail is as recommended in *Acceptable Construction Details*, the *psi* -value associated with that junction can be taken from Table K1 in the DEAP manual or from Introduction Document for Acceptable Construction Details Appendix 1.

Building Elements - Wall and Roof U-Value Calculation

U-values for walls and roofs containing repeating thermal bridges, such as timber joists between insulation, etc, should be calculated using methods based on the upper and lower resistance of elements, given in IS EN ISO 6946.

[1] Note that Building Regulations 2005 TGD L only apply in the following scenario: where planning approval or permission has been applied for on or before 30 June 2008, and substantial work has been completed by 1 July 2009.
"Substantial work has been completed" means that the structure of the external walls has been erected.

IS EN ISO 6946 gives the calculation applying to components and elements consisting of thermally homogenous layers (which can include air layers) and is based in the appropriate design thermal conductivity or design thermal resistances of materials and products involved. The standard also gives an approximate method that can be used for inhomogeneous layers, except cases where an insulating layer is bridged by metal.

Thermal conductivity values for common building materials can be obtained from Building Regulations 2008 TGD L (Table A1), IS EN 12524 or the CIBSE Guide, Section A3. For specific insulation products, data should be obtained from accredited test data. Regarding default thermal conductivity for insulation products, Building Regulations 2008 TGD L, Table A2, IS EN 12524 and CIBSE Guide Section A3 may be used for design purposes (such as new dwelling provisional ratings) but not for final BER assessments for new dwellings. These sources may also be used for insulation thermal conductivity for existing dwellings where no further information is available.

U-values for ground floors and basements should be calculated using the procedure described in IS EN ISO 13370, or in the CIBSE Guide, Section A3. Further detail is available in BRE 443 which is available under www.bre.co.uk/filelibrary/rpts/uvalue/BR_443_(2006_Edition).pdf.

When using certified data to determine thermal properties of building elements, acceptable data is available on Agrement Certificates from the Irish Agrement Board (IAB) and British Board of Agrement (BBA) websites. Certified data from other sources can also be used, bearing the following text in mind (taken from Building Regulations 2008 TGD L): "For thermally homogeneous materials, declared and design values should be determined in accordance with I.S. EN ISO 10456: 1997. Design values for masonry materials should be determined in accordance with I.S. EN 1745: 2002. For insulation materials, values determined in accordance with the appropriate harmonised European standard should be used." If this information is not available for the specific product which you are dealing with then the data **cannot** be used in U value calculations.

Certified Data Sources

While there are a number of readily available sources for performance data entered into DEAP (such as HARP, Irish Agrement Board (IAB), British Board of Agrement (BBA)), Assessors may occasionally need to use other sources to substantiate DEAP data entries.

Data on "CE marked" literature is acceptable provided that the literature refers to the relevant test performance standard. Alternatively, if test data is obtained for the product in question then a number of criteria should be borne in mind:

- test certificates must be clearly related to the actual product in question;
- any installation instructions in the test certificate on which the stated performance depends must be adhered to;
- test certificates must be in English or be accompanied by a certified English translation;
- the relevant test performance standard must be stated on the test certificate;
- the test laboratory must be accredited. To determine if a laboratory is accredited, one of the following approaches should be used:
    - the governing accreditation body for the country in which the laboratory is situated can be found under http://european-accreditation.org/mla-and-bla-signatories . This governing body may have the test laboratory listed as accredited;
    - the accredited laboratory may be found under http://ec.europa.eu/enterprise/newapproach/nando/ ;

In cases where there is any doubt, the test certificate should be sent to the BER helpdesk for clarification.

Energy Requirements – Solar Space Heating – Individual Systems

Solar space heating for individual heating systems can be accounted for in DEAP using the method defined under http://www.sei.ie/Your_Building/BER/BER_Assessors/Technical/DEAP/
A method for solar space heating with group heating systems will be made available as soon as possible.

BER Assessors – Dwellings Technical Bulletin #03

Issue No. 3/09 **May 2009**[1]

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[1] Page 2 updated Feb 2014

DEAP Software 3.0.1

DEAP V3.0.1 is now available on the SEI website under
http://www.sei.ie/Your_Building/EPBD/DEAP/Download/ .
The download folder contains installation instructions and release notes detailing all changes made from the previous software release. These changes to the software are minor in nature and the same DEAP methodology rules (and same DEAP manual) apply. The main functional addition to DEAP V3.0.1 is that there is now a "heating controls lookup" available under the "Distribution System Losses and Gains" tab in the software to assist Assessors in use of Table 4 of the DEAP manual.

N.B. when installing DEAP V3.0.1, please uninstall DEAP V3.0.0 first using the program removal utility under "Control Panel". This is detailed on page 2 of the release notes in the download folder.
When installing DEAP V3.0.1 ensure you click on the "setup.exe" icon in the downloaded folder.

The National Administration System (NAS) will accept BER assessments from DEAP V3.0.0 and DEAP V3.0.1 until 22nd June 2009. After 22nd June the NAS will only accept BER assessments from DEAP V3.0.1

When do I specify the dwelling as being an "existing" dwelling in DEAP?

An existing dwelling is a dwelling which has previously been sold and/or occupied. Dwellings which have not previously been sold or occupied are to be specified as new dwellings in DEAP.

~~Note that a new dwelling (i.e. a dwelling that has never been sold or occupied) is exempt from the BER requirement if it had been the subject of a planning application submitted on or before 31 December 2006 and if it was substantially completed by 30 June 2008~~.

All new and existing buildings as identified in S.I. 243 for sale or rent require a BER. Additionally, new buildings require a BER before they are first occupied even if not being sold or rented. (Updated February 2014).

Gas flue fans – further information

As further information to the guidance on "gas flue fans" in the March technical bulletin under
http://www.seai.ie/Your_Building/BER/Technical_Bulletins/BER_Assessor_-_Dwelling_Technical_Bulletin_March_09.pdf (page 2):
The gas boiler flue fan is included in the DEAP calculation when it is situated at the air intake or exhaust gas outlet of the gas boiler.

Inadequate heating systems

Where some or all rooms in a dwelling are unheated, the BER Assessor must follow guidance in Section A3 of the DEAP manual (page 41). This provides a detailed method to help specify the main heating and secondary heating system in this scenario. The following example is based on the guidance in the DEAP manual:

A house with 5 habitable rooms has a fireplace heating the living room only. There is no other space heating system present. As the open fire heats less than 25% of the habitable rooms in the dwelling, then the main space heating system is assumed to be "direct electric heating" with the open fire as the secondary space heating system.

Where there is no water heating system present, please follow the guidance in the March technical bulletin
http://www.seai.ie/Your_Building/BER/Technical_Bulletins/BER_Assessor_-_Dwelling_Technical_Bulletin_March_09.pdf (page 3).

Elements adjacent to unheated or thermally separated spaces

Where parts of a dwelling are excluded from a BER assessment subject to the guidance in Section 1 of the DEAP manual then the building elements between the dwelling and the thermally separated space are treated as follows:

Windows between the dwelling and unheated/thermally separated conservatories:
Windows between the dwelling and unheated/separated conservatories which are being excluded from the assessment should be treated as if conservatory is not there. The solar transmittance and U-value of these windows should not be adjusted. Walls and doors between the dwelling and the excluded conservatory can still have an 'Ru' adjustment value applied. Guidance defining when a conservatory should be excluded from the assessment is given in Section 1 of the DEAP manual.

Building elements between the dwelling and other unheated/thermally separated spaces (such as garages, stores, porches, corridors):
For walls in existing dwellings, the "semi exposed" option in DEAP allows an 'Ru' adjustment value to be automatically applied by DEAP. For new dwellings, 'Ru' can be taken from Appendix A of Building Regulations 2008 TGD L - available under http://www.environ.ie/en/TGD/ .
In this case, windows between the dwelling and the unheated space should be entered under "walls" rather than "windows" as the light and solar transmittance is low through these windows. In an existing dwelling, when entering these windows under "walls" select "semi exposed" to apply the appropriate 'Ru' adjustment. Default U-values for these windows are taken from Table 6a in the DEAP manual.

Note that excluded conservatories, garages, porches can still provide a sheltered side or part thereof in relation to the ventilation heat loss section of DEAP (as outlined in section 2.5 of the DEAP manual).

Also note the following text from the DEAP manual section 3.3.3:
"for dwellings to which the Building Regulations 2008 TGD L applies, an attached conservatory is always considered as an integral part of the habitable area of the dwelling. In all other cases (i.e. existing dwellings or dwellings to which Building Regulations 2008 TGD L do not apply), an attached conservatory may be treated as an unheated space if it is thermally separated from the main dwelling."

Amendment to room in roof FAQ

The room in roof FAQ has been amended with the following text:
"For single storey apartments which are entirely within the roof, the room in roof approximation should not be used."

In other words, an "attic apartment" in the top storey of an apartment block would not be specified using the room in roof approximation in DEAP.

The FAQ is available under
http://www.sei.ie/Your_Building/BER/BER_FAQ/FAQ_DEAP/Building_Elements/How_do_I_enter_a_"room_in_roof"_in_DEAP_.html

Default window U-values in existing dwellings

As stated in Section S8 of the DEAP manual:
"If the surveyor is unable to determine whether double glazing is "Low E" or not, it can be assumed that double glazing installed before 2004 is not Low E and then refer to the associated value in Table S9. Any other U-value and solar transmittance from Table 6a/b may be chosen provided supporting evidence is available."

In other words, if a BER Assessor is unable to determine the glazing type, gas fill or gap between panes for double glazing windows in an existing house, then the following defaults can be used for the windows:
Installed before 2004:
Glass is uncoated, with 6mm air filled gap. Metal framed window default thermal break is 4mm. The same parameters (uncoated, 6mm air filled gap) can be assumed for pre 2004 triple glazed windows.
Installed during or after 2004:
Glass is hard coated with $\varepsilon n = 0.15$. 12mm air filled gap. Metal framed window default thermal break is 4mm. The same parameters can be assumed for triple glazed windows installed during or after 2004.

For example:

- If double glazed windows were installed in 2002 with a PVC frame, and no details are available with regard to glass coating, gas fill etc., then the U-value should be defaulted to 3.1
- If double glazed windows were installed in 2004 with a PVC frame, and no details are available with regard to glass coating, gas fill etc., then the U-value should be defaulted to 2.2.

Time and temperature zone controls

In order for a system to be specified with time and temperature zone control, it must be possible to program the heating times of at least two heating zones independently, as well as having independent temperature controls. These two heating zones must be **space** heating zones.

If there are more than two space heating zones in the dwelling, these should have a similar level of control, i.e. independent time and temperature control.

Programmers

A programmer may be specified in the following cases:

- Where the main space heating system also heats water (such as a boiler heating radiators and hot water cylinder coil) and there is time control of main space and water heating.
- Where the main space heating system does not heat water (such as a boiler heating radiators only) and there is time control of main space heating.

Intermittent fans and passive vents

As part of the survey carried out on site for existing dwellings, assessors need to ensure that intermittent fans and passive vents which are counted inside the dwelling are not permanently blocked up. Vents which are permanently blocked are not included in the DEAP assessment.

Low energy lighting

Where one or more fixed lights (including light bulbs, fluorescent tubes, light sockets) are controlled by a single switch, each must be counted when calculating the % of low energy lighting. Portable lighting is not included in this count.

As an example, a house has the following lighting:

- 15 single fixed light bulbs (all low energy CFL bulbs)
- A single central fitting (controlled by a single switch) containing 3 standard incandescent bulbs
- 2 fixed fluorescent tubes
- 5 portable bedside lamps

The total number of lights included in the lighting count in DEAP is 15 + 3 + 2 = 20.
Note that the portable bedside lamps are not included.

Of the total number of fixed lights, 17 are low energy. This includes 15 fixed CFLs and 2 fluorescent tubes.

The low energy lighting percentage entered into DEAP is 17/20 = 85%

Solar water heating – entry into DEAP

When entering solar thermal collectors for water heating into DEAP, the calculation in the software based on Appendix H in the DEAP manual must be used. Alternative data (such as a year's worth of on-site energy yield data) will not be accepted.
Go to the "water heating" tab in DEAP and answer "yes" to the question "is there a solar water heating system?" Then select "enter solar water heating". Enter the parameters for the solar water heating. Once completed, this tab calculates the yield of hot water for the year from the solar water heating system. This energy yield is subtracted from the water heating requirement for the dwelling and hence reduces the water heating requirement of the water heating system. Note that the parameters defining the solar panel performance such as Zero-loss Collector Efficiency, Linear Heat Loss Coefficient and Aperture Area can be taken from the HARP database, Certified data, or Table H1 in the DEAP manual.

Mechanical ventilation – use on non default fan powers and efficiencies

When entering whole house mechanical ventilation systems (such as heat recovery) into DEAP, the default specific fan power and efficiency in DEAP can be overridden using data from SAP Appendix Q website under http://www.sap-appendixq.org.uk/search.jsp
This is detailed in the following presentation:
http://www.sei.ie/uploadedfiles/InfoCentre/BER/Treatment_of_Mechanical_Ventilation_in_DEAP(2).PPT

Survey Form – heat loss table

All heat loss areas must be clearly shown on the DEAP Survey Form. This is done by recording each building element area in the heat loss table on the DEAP Survey Form. Alternatively this can be detailed through dimensioned sketches, clearly showing all heat loss elements, opening areas (e.g. windows and doors) and room heights.
As communicated in the April BER Assessors Technical Bulletin, the DEAP Survey Form (or an equivalent Survey Form containing the same information) must be used on site to gather survey data required to complete a BER assessment for an existing dwelling using the DEAP software and must be retained as supporting evidence.
The standard survey form is available under
http://www.sei.ie/Your_Building/BER/BER_Assessors/Technical/DEAP/DEAP_2008/ .

BER Assessors – Dwellings Technical Bulletin #04

Issue No. 4/09 **June 2009**

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Low energy lighting in unheated spaces

In quantifying the percentage of low energy lighting in a DEAP assessment, lighting in unheated spaces of a dwelling must be accounted for. Such areas would include unheated porches or garages. While such areas may not have been included in the assessment floor area, the lighting in these areas would be counted. Please refer to Appendix L of the DEAP manual for further detail.

Identification of primary and secondary heating system

As stated in Appendix A in the DEAP manual, the primary or main heating system is that which heats the largest proportion of dwelling.

With reference to Section A3.2 in the DEAP manual, consider a single storey existing dwelling, consisting of 6 habitable rooms (kitchen/dining room, living room, study room, 3 bedrooms) and 2 non-habitable rooms (hall and bathroom).

An oil heating system heats the following rooms:

- Kitchen/diner
- Study room
- Bedroom 1

An open fire heats the living room.

Fixed individual electric panel heaters heat the following rooms:

- Bedroom 2
- Bedroom 3
- Hall

The bathroom is unheated.

In this case, the oil heating system is entered as the main heating system. More than 50% of the dwelling is heated by fixed heaters and the oil heating system heats the greatest part of the dwelling relative to the other fixed heating systems.

The secondary heating system is specified as the open fire. While each of the fixed electric panel room heaters provides heat to a single habitable room, direct electric heating is marginally more expensive to run than the fire place. In addition, the fireplace is in the living room and is therefore more likely to be a more significant source of secondary heating than the electric heaters in the bedrooms.

Please refer to Appendix A (Primary and Secondary Heating Systems) for further guidance.

Survey equipment

In completing an on-site survey for an existing building, it should be ensured that any equipment used on site is functioning correctly. The Assessor should ensure that they have spare batteries for any digital equipment such as laser measuring devices, electronic compass or data storage devices. Ensure that all equipment is functioning correctly and is operated correctly. In establishing the orientation of dwelling, take a number of readings with a compass and ensure that there is no interference from any electrical devices or metal objects.

Definition of exposed perimeter when determining floor U-values

The exposed perimeter of a ground floor is the total length of the external wall dividing the dwelling ground floor from the external environment or from an unheated adjoining space. The part of the dwelling perimeter that adjoins (e.g. by a party wall) other heated properties (residential or commercial) is not included.

For example:

- If a dwelling adjoins an unheated garage on one side, the perimeter on that side is included when determining the ground floor U-value.
- However, the perimeter on a side adjoining the heated space of a neighbouring house would not be included in the total exposed perimeter when determining the ground floor U-value.
- But the perimeter on a side adjoining an unheated space (e.g. garage) of a neighbouring house would be included in the total exposed perimeter when determining the ground floor U-value.

When to include an attic in a DEAP assessment

As stated in Section 1 of the DEAP manual, attics should only be included in a DEAP assessment if they are habitable and accessed by a fixed staircase. This guidance applies regardless of whether the attic is heated or not.
A habitable attic would generally meet the following criteria:

- Part of the attic should be at least 2 m in height.
- The room should be "finished". A finished room would typically have finished internal surfaces (walls and ceiling are papered and/or plastered and flooring is in place rather than having exposed joists and rafters).
- Attic Room has lighting and possibly a window/rooflight.
- Structural timbers not preventing free movement.
- Water cistern not present in the attic room.

Fuel types for solid fuel appliances

When selecting the fuel type for a solid fuel appliance, a number of factors must be taken into consideration. These are detailed in the BER FAQ under:
http://www.sei.ie/Your_Building/BER/BER_FAQ/FAQ_DEAP/Energy_Requirements/How_do_I_determine_fuel_type_and_efficiency_of_a_solid_fuel_heating_appliance_.html .

Use of non default solar transmittance data

The March BER Technical Bulletin (available under
http://www.sei.ie/Your_Building/BER/BER_FAQ/FAQ_BER/Assessors/SEI_BER_Reports.html) referred to the use of non default data for solar transmittance of windows. As further clarification to this, when using non default solar transmittance data in DEAP, the certified data required must be produced in accordance with BS EN 410.

BER Assessments in the Home Energy Saving (HES) scheme

You will most likely be aware of the grants currently available under the Home Energy Saving scheme for homeowners to undertake a BER assessment Before and After grant aided works. On foot of a number of queries received at SEI and issues identified by us, we wish to bring your attention to a number of important considerations regarding this grant:

- The grant of €200 is to support homeowners who wish to undertake a BER BEFORE works (effectively to help identify the requisite works) and a second BER AFTER the works have been implemented (as a means of verifying the improvements achieved). It is vital therefore that the second BER not be conducted until all works to be grant aided are undertaken, and you should alert your clients to this fact at the time of the first BER.

- The BER grant is only available to homeowners who are undertaking other grant aided works – so they will not be paid for the BER in isolation, they must complete the works for which they applied and intend completing. Where homeowners request you to do otherwise please advise them that this will disqualify them from the grant scheme.

- The BERs are both to be treated as full BERs and both must be completed in full compliance with the BER Assessor Code of Conduct and both BERs must be fully published to the NAS. Note if the second BER is not published then the BER grant will not be paid.

Please note that these are very serious matters which merit your close attention and it is important to be aware that you are expected, under the professional conduct required under the BER Assessor Code of Conduct, to ensure that clients are fully and appropriately advised.

BER Assessors – Dwellings Technical Bulletin #05

Issue No. 5/09 **July 2009**

Contents:

Identifying the relevant Building Regulations Part L for a dwelling

DEAP is used to demonstrate a building's conformance with specific aspects of Part L of the Building Regulations. In completing a BER for a new dwelling, the assessor must identify the particular Building Regulations which apply to the dwelling. DEAP performs checks for new dwellings for which either Building Regulations 2005 TGD L or 2008 TGD L apply.

As per Section 18 of the Code of Practice, if the Building Regulations Part L applies to the building being rated and the BER Assessor finds that it does not conform to the requirements of Part L, then the BER Assessor is obliged to notify the client and to identify which elements of the design do not conform to these Regulations.
Please refer to Section 13 of the DEAP manual for further details.

Building Regulations 2008 TGD L applies to new dwellings, where the work commences or takes place, as the case may be, on or after 1 July 2008. Earlier versions of TGD L cease to have effect from 1 July 2008.
However, Building Regulations 2005 TGD L [1] apply in the case of new dwellings:

- where the work, material alteration or the change of use commences or takes place, as the case may be, on or before 30 June 2008, or
- where planning approval or permission has been applied for on or before 30 June 2008, and substantial work has been completed by 1 July 2009.

"Substantial work has been completed" means that the structure of the external walls has been erected.

Data collection and retention for BER Assessments

Section 8 of the Code of Practice details the type of data which must be collected and retained for BER assessments. The code of practice is available under the following link:
http://www.sei.ie/Your_Building/BER/BER_Assessors/Code_of_Practice.pdf

Every BER Assessor is responsible for retention and maintenance of records and any calculations that may be required to support a BER assessment. Data must be retained securely both during the time when a BER Assessor is registered as a BER Assessor and until the related certificates expire or are otherwise superseded. This requirement remains even if the BER assessor ceases their registration.

For new buildings, a BER Assessor shall compile the data required from the plans and specifications submitted by or on behalf of the owner. In cases where certain details are not available from the client, a site visit may be carried out to supplement data from plans and specifications. Any on-site survey data must be recorded on a BER Survey Form (or an equivalent form containing the same information) and retained as evidence. In this way, a combination of the plans/specifications and survey data is acceptable for BER assessments of new dwellings.

A provisional BER can be carried out by a BER Assessor based on design drawings and specification of an unfinished building providing that, on completion of the building in question, a final BER is carried out on the completed building.

In the case of existing buildings, a BER Assessor is required to visit the premises to collect verifiable data required for the assessment. A BER Assessor may also review plans and specifications which are available in conducting the BER assessment.

[1] TGD L - Conservation of Fuel and Energy (1997 edition and 2002 edition) cease to have effect from 1 July 2006. However, these documents may continue to be used in the case of buildings:

- where the work, material alteration or the change of use commences or takes place, as the case may be, on or before 30 June 2006, or
- where planning approval or permission has been applied for on or before 30 June 2006, and substantial work has been completed by 30 June 2008.

Note that DEAP does not check for new dwelling conformance to versions of TGD L prior to that for 2005 Building Regulations. If you wish to perform these checks, please refer to archived versions of TGD L under
http://www.environ.ie/en/Publications/DevelopmentandHousing/BuildingStandards/

Under Section 5 of the Code of Practice, a BER Assessor shall not submit any BER assessment if there are reasonable grounds to doubt the credibility of the design or intent and capacity of the owner or developer to construct the building in accordance with drawings and specifications submitted.

Assessments classed as 'Repairable' on NAS

A BER submission will be placed in the Repair Queue on the National Administration System (NAS) when the BER and/or MPRN number submitted is incompatible with a record already held on the National BER Register. Repairs can be found by clicking on the 'Repairable' tab within your NAS account.

If the assessor can identify the error, they can discard the rating which is in repair, and resubmit the rating after correcting it in DEAP and re-exporting and uploading the .XML file.

If the assessor is unable to identify an error and the numbers are correct, they can await final determination of the status of the rating by the BER Administrator. SEI reviews the Repair Queue on a regular basis and resolves "Repairable" assessments as part of this review. This may involve contacting the assessor directly to help resolve the issue.

Verifying data entered into DEAP

On foot of data audits performed by SEI over the past number of months we would encourage assessors to ensure that they are satisfied with data entered into all DEAP assessments. The following list is a sample of some of the areas in which issues are arising:

- Low energy lighting – refer to Appendix L in the DEAP manual and the May Technical Bulletin.
- Thermal bridging factor – refer to Appendix K in the DEAP manual and the April Technical Bulletin.
- Heat loss areas – refer to Section 3 of the DEAP manual and the May Technical Bulletin
- Heating system controls – always ensure that data entered in DEAP is based on the relevant tables in the DEAP manual such as Table 2 and Table 4 even when using the control lookup functions in DEAP.

Extension age bands

When an extension is identified in the assessment of an existing dwelling, the heat loss building elements of that extension should have the extension age band applied rather than the age band of the original dwelling.
The DEAP Survey Guide gives guidelines on determining the age of an extension: www.seai.ie/deap

In cases where the extension age is unknown, it should be defaulted to the same age as the original dwelling.

Further detail on "habitable" attics

The June '09 edition of the Technical Bulletin defined habitable attics as generally meeting the following criteria:

- Part of the attic should be at least 2m in height.
- The room should be "finished". A finished room would typically have finished internal surfaces (walls and ceiling are papered and/or plastered and flooring is in place rather than having exposed joists and rafters).
- Attic Room has lighting and possibly a window/rooflight.
- Structural timbers not preventing free movement.
- Water cistern not present in the attic room.

In cases where an attic meets most of these criteria and is clearly and effectively employed as a habitable area by the occupants then it may be considered as habitable for the purposes of DEAP assessments. For

example, an attic which contains bedrooms, has finished surfaces, lighting, windows, no water cistern and no obstructive structural timbers, but is 1.95m high would be considered as habitable in a DEAP assessment.

Where the attic is habitable and is accessed by a fixed staircase, then it is included as another storey under "dimensions" in DEAP.

Where an attic's floor area is not being included under "dimensions" (due to it not being heated and habitable):

- If the attic is open to the storey below i.e. with no door or partition wall around the attic stairs landing, the attic floor space is not included in the assessment as floor area. In such cases, the attic height is heated as it is open to the storey below. Therefore the storey below is treated as having a vaulted ceiling and it is considered to extend as far as the attic roof. This will result in a much higher average storey height.
- Where the attic is clearly separate from the storey below e.g. by a partition ceiling and closable attic hatch, then the storey height of the storey below is not considered to extend into the attic.

When to include conservatories in dwelling floor area in DEAP

DEAP follows the requirements set out in Building Regulations 2008 TGD L Section 0.1.6 in relation to conservatories:
"An attached conservatory-style sunspace, or the like, forming part of a new dwelling construction should be treated as an integral part of the habitable area of the dwelling."

As this was not the case prior to that edition of TGD L, DEAP allows for thermally separated conservatories prior to this date as per Section 3.3.3 of the DEAP manual.

Examples:

- New dwelling constructed to Building Regulations 2008 TGD L including conservatory in original construction: the conservatory is included in new dwelling BER assessment floor area.

- New or existing dwelling constructed to any edition of the Building Regulations TGD L prior to 2008 including conservatory in original construction: the conservatory may or may not be included in the new dwelling BER assessment floor area subject to it being thermally separated as described in Section 3.3.3 of the DEAP manual.

- Existing dwelling which was built to Building Regulations 2008 TGD L with a conservatory at time of original construction: this conservatory is always included, on the basis that it was part of the original dwelling constructed to Building Regulations TGD L 2008.

- Existing dwelling which was built to Building Regulations 2008 TGD L without a conservatory. A conservatory was added after original construction: the conservatory may or may not be included in the new dwelling BER assessment floor area subject to it being thermally separated as described in Section 3.3.3 of the DEAP manual.

Staircase leading to a single dwelling

Where there is a staircase between a single dwelling (such as an apartment) and an external door:

- If there is an internal door between the staircase and the dwelling, the staircase is excluded from the assessment and is treated as a heated or unheated space (as relevant) adjoining the dwelling.
- If there is no door between the staircase and the dwelling (the staircase is open to the dwelling), then the staircase is included in the assessment. This is counted as an extra storey in DEAP.

Identification of gas room heaters and gas fires

There are a number of different gas fuelled roomheaters in DEAP. The following table gives guidance on identifying these heaters:

	Appliance	**Identifying features**
1	Gas fire, open flue, pre-1980 (open front) & Gas fire, open flue, 1980 or later (open fronted), sitting proud of, and sealed to, fireplace opening	The differentiating factor between these two gas fires is their age. If in doubt about the age, choose the more conservative option (pre-1980). "Open flue" means the fire draws its combustion air from the room (as opposed to balanced flue). See Section 2.1 of the DEAP manual to differentiate between an open flue and a chimney. "Open front" means there is no glass front or enclosure separating its flames from the room. It does not have solid fuel effect flames. It would typically have a line of uniform blue flames. Typically, the flue outlet would be part of the heater.
2	Gas fire or wall heater, balanced flue	Balanced flue (or "room sealed") is defined in Section 2.1 of the DEAP manual: "A room heater is considered to be room sealed if it does not have any air exchange with the room in which it is situated". Both the air intake and air outlet of this heater are ducted to the external environment. The balanced flue intake and outlet may be in the form of a concentric flue (two pipes centered around a single point).
3	Gas fire, open flue (open fronted), sitting proud of, and sealed to, fireplace opening, with back boiler unit	This is the same as (1) above but has a back boiler.
4	Flush fitting Live Fuel Effect gas fire (open fronted), sealed to fireplace opening, with back boiler unit	This has flickering solid fuel effect flames rather than uniform blue flames in (1). The flue outlet is likely to be part of the heater. This type of heater has a back boiler.
5	Gas fire, closed front, fan assisted	This unit would usually be glass fronted. It does not have a balanced flue as described in (2). A fan draws air into the unit from the room or is used to send heat out into the room from the unit.
6	Condensing gas fire	This unit is likely to have a back boiler. If it is not clear whether the unit has a condenser or not, check for manufacturers detail or instruction manuals.
7	Flush fitting Live Fuel Effect gas fire (open fronted), sealed to fireplace opening	This unit has flickering solid fuel effect flames rather than uniform blue flames in (1). The flue outlet is likely to be part of the heater and there is no back boiler.
8	Flush fitting Live Fuel Effect gas fire (open fronted), fan assisted, sealed to fireplace opening	This has flickering solid fuel effect flames rather than uniform blue flames in (1). The flue outlet is likely to be part of the heater and there is no back boiler. A fan draws air into the unit from the room or is used to send heat out into the room.
9	Decorative Fuel Effect gas fire, open to chimney	This unit has flickering solid fuel effect flames rather than uniform blue lines and is open to the chimney. It would typically sit in the lower part of an existing fireplace, with the original chimney opening over it. The amount of air being drawn up through the chimney will be uncontrolled.
10	Gas fire, flueless	This unit does not have an open flue, chimney or balanced flue exhaust outlet. In this case there are likely to be 2 permanent vents in the room in which this fire is situated.

BER Assessors – Dwellings Technical Bulletin #06

Issue No. 6/09 **August 2009**

Contents:

1 Use of registered email address

BER Assessors are advised to regularly check their registered email address for communications from SEI. If the registered email address is incorrect or out of date, please contact us on 1890 252738 or email registered@ber.sei.ie.

2 Guidance on DEAP data collection and data entry

2.1 Identifying a "maisonette"

For the purposes of DEAP assessments, an apartment which is part of a larger building but has its own external main entrance at ground level is defined as a maisonette. It may or may not have more than one storey.

2.2 Adequate description of roofs, walls and floors in BER assessments

When calculating a U-value for a new or existing dwelling roof, wall or floor in DEAP, Assessors should use the Description entry for that element in DEAP to briefly describe how the U-value was obtained. In other words, the known components of the building element should be listed in the description. While this is not a mandatory DEAP entry, this brief description (particularly providing type and thickness of insulation) greatly assists in providing clarity as to how the U-value was determined. The following examples illustrate the type of description which should be included:

- Render, 100mm block, 40mm air cavity, 60mm platinum insulation, 100mm block, light plaster
- 50mm screed, 100mm polystyrene, concrete slab on external ground
- Roof space, 100 mineral wool, 150mm mineral wool + joists, plasterboard

2.3 U-value defaults for existing dwellings

As per Table S2 in the DEAP manual, the default U-values for existing dwellings for age bands F, G, H, I and J are based on Building Regulations which were made available from 1976 onwards. Defaults for age bands prior to this generally assume insulation is not present. However, actual U-values must be calculated when the Assessor has evidence of the particular construction or makeup of the exposed element (as detailed in the DEAP Survey Guide). This is particularly important where:

- The actual U-value is less than the relevant default U-value.
- The actual U-value exceeds relevant default U-value. An example of this would be an uninsulated stud partition wall between a more recently constructed apartment and an unheated corridor. Rather than containing insulation, the partition may consist of plaster (internal and external), sheathing ply and air gaps between studs.

As can be seen from the tables of Appendix S in the DEAP manual, the dwelling age band can have a significant bearing on the default U-value. Consequently it is important that the guidance in the DEAP Survey Guide is followed when determining the dwelling (or extension) age band.

Note that the word of the homeowner on its own is not enough to provide proof of dwelling age. Where the knowledge of the homeowner is being used to determine dwelling age, then further evidence based on at least one of the following must be obtained:

- dwelling style;
- age plate or plaque indicating dwelling/development year of construction;
- electricity meter age;
- glazing age stamps.

2.4 Selecting the correct overshading category for windows in DEAP

Assessors are required to select the appropriate overshading category from Table 6d of the DEAP manual for each window in the dwelling. For existing dwellings, the overshading category must be entered in the appropriate location in the Survey Form.

Excerpt from Table 6d:

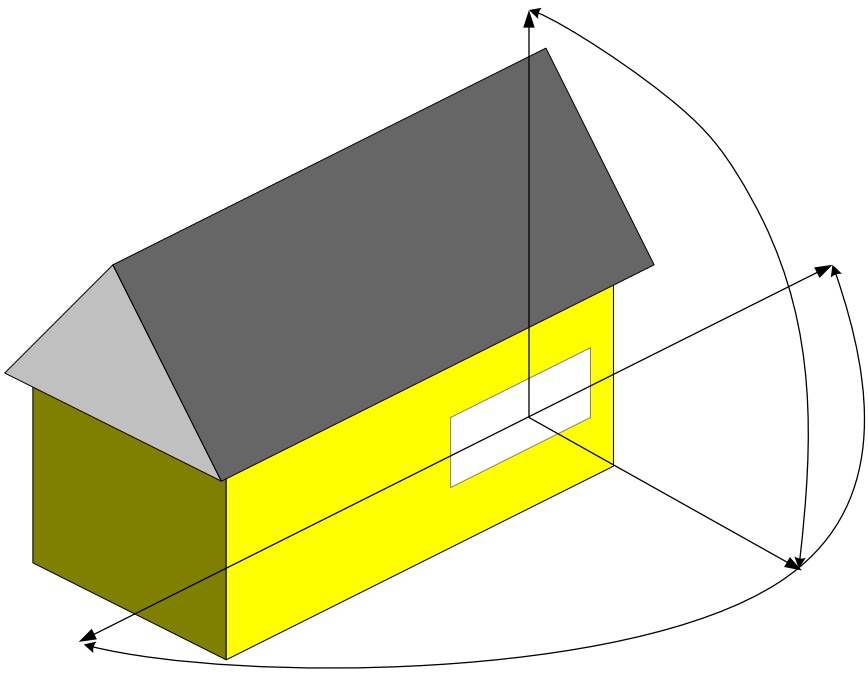
Table 6d: Solar and light access factors

Overshading	% of sky blocked by obstacles
Heavy	> 80%
More than average	> 60% - 80%
Average or unknown	20% - 60%
Very little	<20%

In borderline cases where the Assessor is unsure of the appropriate overshading category, then the more conservative option should be chosen. For example, if the overshading category lies between "Average" and "More than average", and the Assessor is unsure which one is applicable, then "More than average" should be selected.

Overshading of a window is an **estimate** of the sky which is blocked when viewed outwards from the centre point of the window in question. The skyline to be considered is that which is in front of and above the window's centre point, as illustrated in the following diagram. Objects obscuring the skyline below or behind the window centre point should be ignored. Objects obscuring the skyline may be close to the window, such as balconies and window reveals, or far away from the window, such as landmasses and other buildings.

Alternatively, think of the entire surroundings of the window as being a sphere. The areas behind and below the window are not relevant for overshading estimation, so only the quarter sphere above and in front of the window should be considered, again as illustrated in the diagram below.



3 Demonstrating compliance with Building Regulations TGD L

3.1 Meeting TGD L U-value requirements for walls, roofs and floors

When determining if a new dwelling meets Building Regulations 2008 TGD L fabric heat loss limitation requirements a number of points must be taken into consideration in relation to walls, roofs and floors.

(a) Referring to Table 1 of Building Regulations 2008 TGD L, Column 3, no individual heat loss roof element or section of a heat loss roof element should have a U-value greater than 0.3W/m^{2}K. Similarly, wall and floor U-values should not exceed 0.6W/m^{2}K. DEAP checks that the requirements of Table 1, Column 3 are met.

(b) The area weighted average U-value of floors, walls and roofs must not exceed the appropriate value in Table 1, Column 2. For example, the average, area weighted U-value of all heat loss walls in the dwelling should not exceed 0.27W/m^{2}K. DEAP checks that the requirements of Table 1, Column 2 are met.

(c) Where the condition in (b) is not met then the following method may be used. As per Section 1.3.2.3 of Building Regulations 2008 TGD L, if any one of heat loss walls, roofs or floors do not meet the requirements of Table 1, Column 2, then the combined area weighted average U-value of all heat loss walls, roofs and floors should be calculated. Compliance can be achieved if this combined value does not exceed the combined area weighted average U-value of the heat loss walls, roofs and floors which would be the case if the U-value requirements in Table 1, Column 2 were met. This calculation is not currently performed in DEAP, but will be considered for addition to the DEAP software in a future revision. The following is a sample calculation for demonstration purposes:

Element type	Area (m2)	U-value required W/m2K (Table 1, Column 2)	Actual U-value W/m2K	Meets Table 1 Column 2 requirement?
Roof - insulated on ceiling	50	0.16	0.14	Yes
Walls	80	0.27	0.27	Yes
Floors	50	0.25	0.26	No
Total	**180**			
All walls, roofs, floors meet Table 1, Column 3 requirement, but floors do not meet Column 2 requirement				
Calculate actual combined area weighted U-value:	[50x0.14 + 80x0.27 + 50x0.26] / 180 = 0.2311			
Calculate combined area weighted U-value based on Table 1 Column 2 values:	[50x0.16 + 80x0.27 + 50x0.25] / 180 = 0.2389			
Actual combined value < Table 1 column 2 combined value. Therefore Table 1, Column 2 requirement is met				

Until such time as this calculation is made available in the DEAP software, BER Assessors wishing to perform this calculation as an alternative to meeting condition (b) above should keep all records of this calculation on file to demonstrate conformance with Building Regulations 2008 TGD L.

Note that all openings (windows and doors) cannot be included as part of this calculation. Openings must meet the requirement outlined 1.3.2.4 of Building Regulations 2008 TGD L as implemented in DEAP.

3.2 Apartment walls – achieving TGD L compliance

As stated in Section 1.3.1.2 of Building Regulations TGD L 2008:
"Unheated areas which are wholly or largely within the building structure, do not have permanent ventilation openings and are not otherwise subject to excessive air-infiltration or ventilation, e.g. common areas such as stairwells, corridors in buildings containing flats, may be considered as within the insulated fabric. In that case, if the external fabric of these areas is insulated to the same level as that achieved by equivalent adjacent external elements, no particular requirement for insulation between a heated dwelling and unheated areas would arise. It should be noted that heat losses to such unheated areas are taken into account by the *DEAP methodology* in the calculation of the dwelling EPC and CPC (See Section 1.1)."

TGD-L Compliance:
Based on the guidance from Section 1.3.1.2 from TGD L , the elements between the dwelling and unheated space may be ignored for the purposes of meeting TGD L fabric requirements provided the external fabric of the corridor is insulated as described above.

In Section 1.3.1.2, "Equivalent adjacent elements" is taken to mean the external elements of the dwelling in question. E.g. if the external , front wall of the apartment achieves a U-value of 0.27 W/m^2K, then the "external fabric" of the unheated area (e.g. it's external wall) would also be expected to have a U-value of 0.27 W/m^2K for the unheated area to be considered "within the insulated fabric".

This check is not currently performed in DEAP but will be considered for inclusion in a future revision of the software. If an Assessor is using this method as an alternative to meeting the dwelling fabric requirements for a particular semi-exposed element, then they should keep a record of the method used with their BER assessment records (and within the comments entry field in the DEAP assessment). The records should indicate how Building Regulations fabric U-value requirements were met in accordance with Section 1.3.1.2 of Building Regulations 2008 TGD L for any relevant semi-exposed elements.

Note that Assessors will still need to ensure that all other heat loss elements of the dwelling meet the fabric requirements of TGD L using DEAP. Any non-conformance with TGD L must be communicated to the client.

BER Calculation:
All elements between the between the dwelling and unheated space should be included in the DEAP assessment as heat loss elements for the purposes of calculating the BER, EPC and CPC. The appropriate R_u factors from Table A4 of TGD-L 2008 may be used for new dwellings, or from Section S6.1 in the DEAP manual for existing dwellings.

For clarity, this element should be entered as a separate line under building elements in DEAP.

BER Assessors – Dwellings Technical Bulletin #07

Issue No. 7/09 **Septemeber 2009**

(Last Updated on April 2016)

Updates	
Date	**Description**
April 2016	Section 4 Pressure testing in DEAP and for TGD L compliance has been updated to give guidance on how to enter air pressure test results in DEAP and in accordance to the TGD L of the 2011 Building Regulations.

Contents:

1 Choosing the correct property address

It is critical that BER Assessors make every effort to ensure that they have the correct postal address for the dwelling that is being rated. It is up to the Assessor to make sure that they publish the rating under an accurate postal address.

The address should allow for unique identification of the property in so far as possible, and in such a way that prospective purchasers or renters (or their agents) can content themselves that the rating before them in fact relates to the property in question. This is a duty of care which Assessors owe to their clients. Any ambiguity in addresses should be eliminated or Assessors run the risk that a rating will be revoked and will thereafter need to be republished with a satisfactory address.

Assessors should confirm the postal address with the building owner and in addition there are a number of tools available to assist Assessors in verifying the postal address, as outlined below.

1. **Meter Point Reference Number (MPRN)**
   The Meter Point Reference Number (MPRN) is a unique reference allocated to the house by the ESB. It can be found on the household electricity bill. Through the NAS, Assessors are provided with access to the ESB's database of MPRNs to look up the MPRN address and to assist in ensuring that the rating is being published for the correct dwelling.

   The MPRN is generally reliable however there can be situations where there may be an issue with the address stored in the MPRN database. For example, in the case of new developments the address given to the ESB may have been the address used during the construction phase and may be out of date. If there are significant differences between the MPRN address and the postal address inserted in DEAP, the Assessor must publish the rating under the most accurate address.

2. **Other Utility Bills**
   Other utility bills, such as gas bills, can be another useful reference point.

3. **An Post**
   An Post: http://address.anpost.ie/precisionaddressanpost/precisionaddresspost.aspx
   An Post provide an address verification service. The maximum number of searches allowed is 10 per day or 80 per month. If you require more searches per month then you need to contact info@dataireland.ie. The address is verified by checking the details you provide against Ireland's official address database, the Irish GeoDirectory.

4. **GeoDirectory**
   GeoDirectory: http://www.geodirectory.ie/GeodirectoryMap.aspx
   The GeoDirectory is a database (a joint An Post and Ordnance Survey initiative) that contains the address and map coordinates of over 1.7 Million addresses, every building in the Republic of Ireland. The database is updated by An Post postal workers, with official updates released on a quarterly basis. GeoDirectory offer services such as GeoAddress Locator which could be used to confirm dwelling addresses.

5. **Bizmaps**
   Bizmaps: http://www.bizmaps.ie/
   Bizmaps offer a service called Address Link which is an address matching software tool that matches addresses to the GeoDirectory.

6. **Eircom Phonebook**
   Eircom: http://www.eircomphonebook.ie/displayhome.ds
   The Eircom phonebook is provided online and can be helpful in confirming an address if you have the name of the owner and the county they reside in.

2 Guidance relating to DEAP "Dimensions" and "Building Elements"

2.1 U-value adjustments for semi-exposed elements

New dwellings
When performing a BER assessment on a new dwelling, then BER Assessors should refer to Section 3.3 of the DEAP manual, which outlines the adjustments which may be made to U-values of semi-exposed elements between the dwelling and an unheated space. The U-value adjustment is based on the effective thermal resistance, "Ru", of the unheated space. Tables A3, A4 and A5 of Building Regulations 2008 TGD L indicate values of Ru which should be used in new dwellings adjoining unheated spaces.

With reference to Table A4 of Building Regulations 2008 TGD L, the Ru values specified for access corridors apply to unheated spaces in which each dwelling is approached via a common horizontal internal access or circulation space which may include a common entrance hall. The corridor does not form an open space between more than one storey.

The Ru values for stairwells apply to common enclosed areas which are open between more than one storey such as a stairwell or lift shaft.

Existing dwellings
When using default U-values for semi-exposed walls between an existing dwelling and an unheated space, the "Wall is semi-exposed" option in DEAP can be selected. DEAP then automatically applies the Ru values in section S6.1 of the DEAP manual to the default U-value.

Doors adjacent to unheated spaces
As stated in Section 3.3 of the DEAP manual: "The effect of unheated spaces, however, need not be included if the area of the element covered by the unheated space is small (i.e. less than 10% of the total exposed heat loss areas of the dwelling). Consequently a door in an element abutting an unheated space would not need to have its U-value changed (unless it is part of a very small flat where the U-value of the door might make a significant contribution to the result)."

2.2 When to include garages in the dwelling BER assessment

To determine if a garage should be included in the BER assessment, refer to Section 1 of the DEAP manual:
"**Garages:**

- should be included if heating is provided within the garage from the main central heating system;
- should not be included where the garage is thermally separated from the dwelling and is not heated by the central heating system "

As further information on this issue:

- If the garage adjoining the dwelling is heated by the main space heating system, then it should always be included in the DEAP assessment.

- If the garage is not heated by the main space heating system one of the following two scenarios apply:
    - If the garage is likely to reach the same or similar temperatures to the dwelling (because there is little or no insulation between the dwelling and garage and the garage external wall is insulated and achieving similar U values to the other external walls of the dwelling), then the garage should be included as it is not thermally separated.
    - If the wall between the dwelling and the garage is well insulated or the external garage wall is poorly insulated, then the garage is unlikely to reach similar temperatures to the dwelling and is therefore thermally separated. This garage would not be included as part of the dwelling DEAP assessment.

2.3 Including glass block walls in DEAP

A wall consisting of "glass blocks" can sometimes be used in a dwelling in place of a normal wall or window. CIBSE Guide A lists the thermal conductivity of glass as 1.05W/mK which may be used in place of certified thermal conductivity for the glass in a glass block wall. Once the glass thickness is measured, the U-value can then be determined.

The glass block wall may be entered as a window or a wall in DEAP. If there is a certified solar transmittance value and U-value available for the glass blocks, then it may be entered under "building elements -> windows" in DEAP. In the case where there is no certified U-value and solar transmittance data, the glass block wall should be entered as a wall - thick glass will absorb more light than thin glass, so the values in Table 6b of the DEAP manual should not be used.

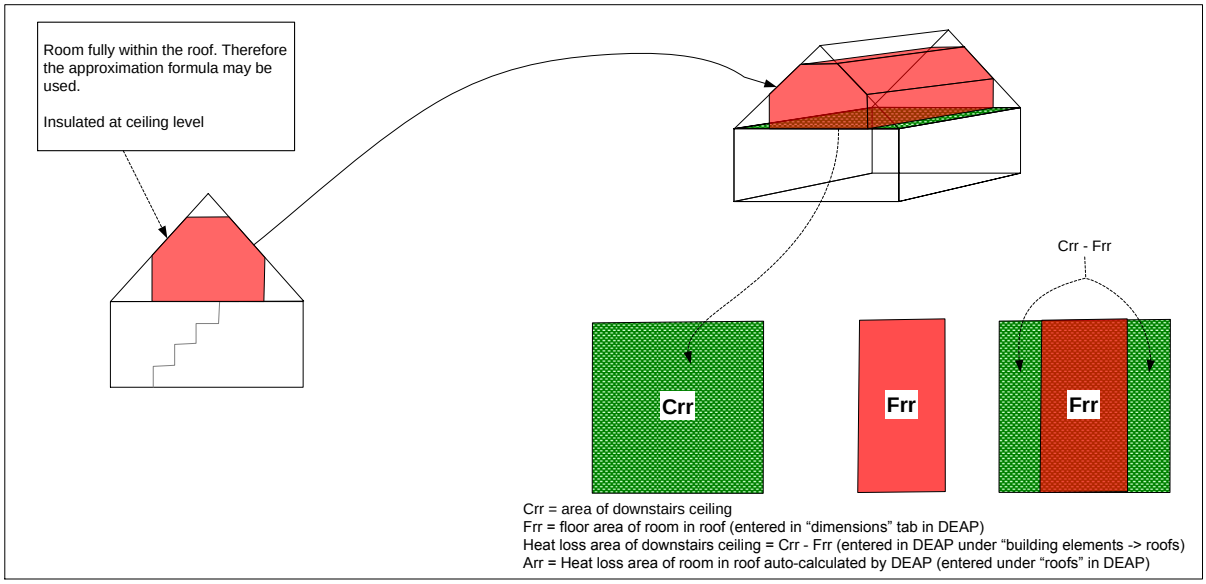
In the absence of other information, the thermal bridging effect of the adhesive between the glass blocks may be ignored as the adhesive can be assumed to have a similar thermal conductivity to that of the glass blocks.

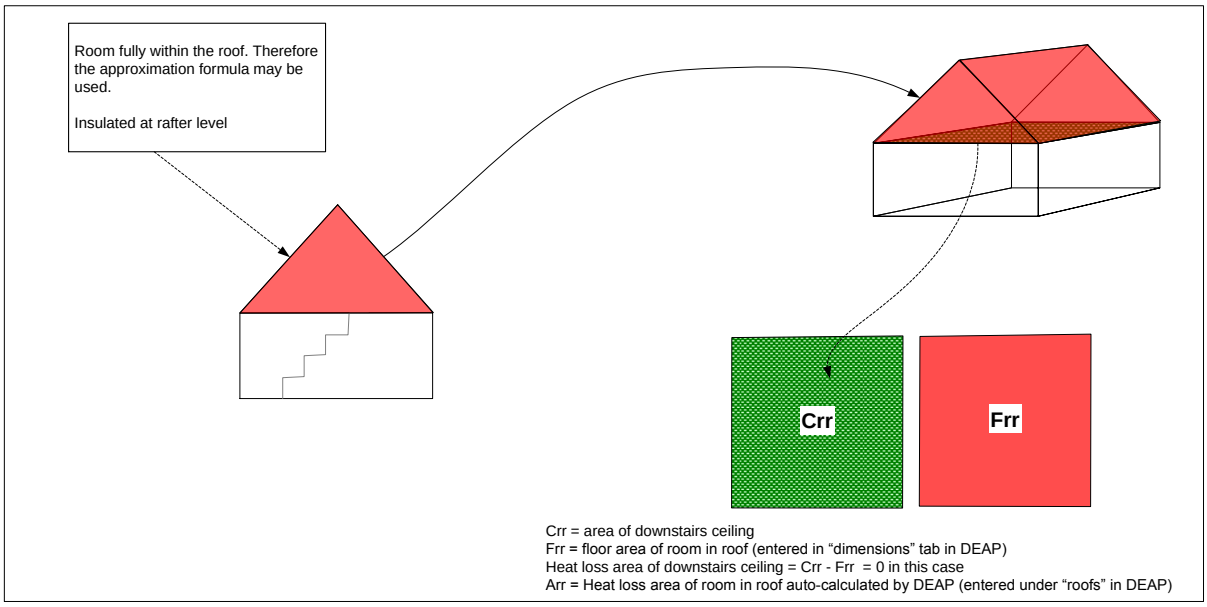
2.4 DEAP Survey Form – heat loss areas

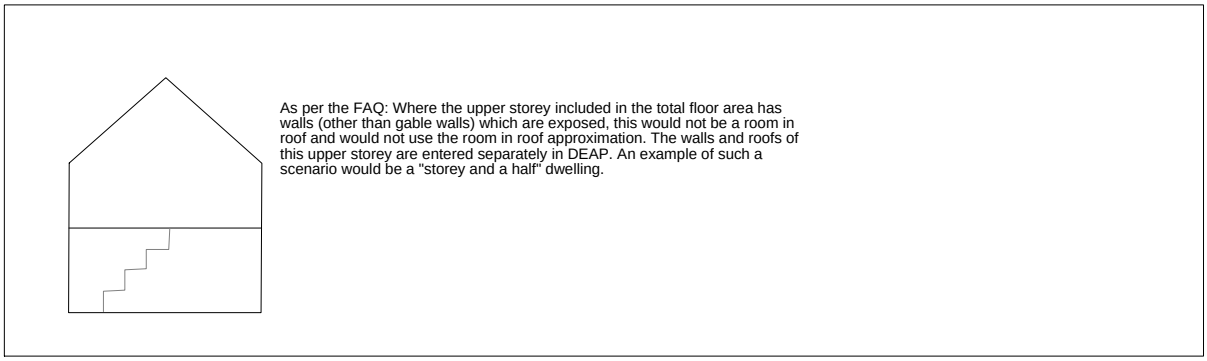
With reference to both the DEAP Survey Form and the May Technical Bulletin, Assessors must ensure that the correct heat loss areas are entered in DEAP and recorded in the heat loss table section of the DEAP Survey Form prior to publishing the BER Certificate. When calculating wall heat loss areas, ensure that opening areas such as doors and windows are not included in the wall heat loss area.

2.5 Further information on the "room in roof" facility in DEAP

The following three diagrams provide further illustration of the room in roof approximation facility for existing dwellings in DEAP. These diagrams are supplementary information to the BER FAQ under http://www.sei.ie/Your_Building/BER/BER_FAQ/FAQ_DEAP/Building_Elements/How_do_I_enter_a_"room_in_roof"_in_DEAP_.html .







3 Guidance relating to DEAP "Energy Requirements"

3.1 Solar space heating in group heating systems

Solar space heating for group heating systems can be accounted for in DEAP using the method defined under http://www.sei.ie/Your_Building/BER/BER_Assessors/Technical/DEAP/ .

When this guidance is used, the spreadsheet used in the methodology should be kept on file as part of the records for the BER assessment.

The methodology estimates the amount of solar thermal energy which will be delivered to the dwelling based on the total floor area of all dwellings served by the solar heating system. To this end the total dwelling floor area, or at least the total number of dwellings for which the solar space heating system is designed for should be specified by the system designer or client.

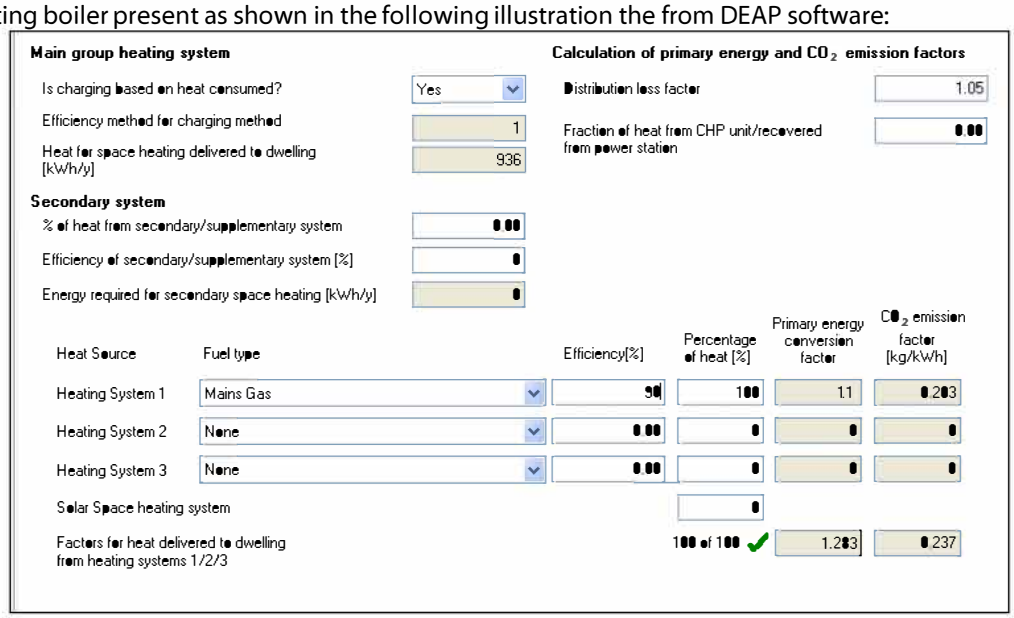
When determining the hot water storage losses in a group heating system the BER Assessor should refer to Section 4.5 of the DEAP manual.

3.2 Specifying group heating systems in DEAP

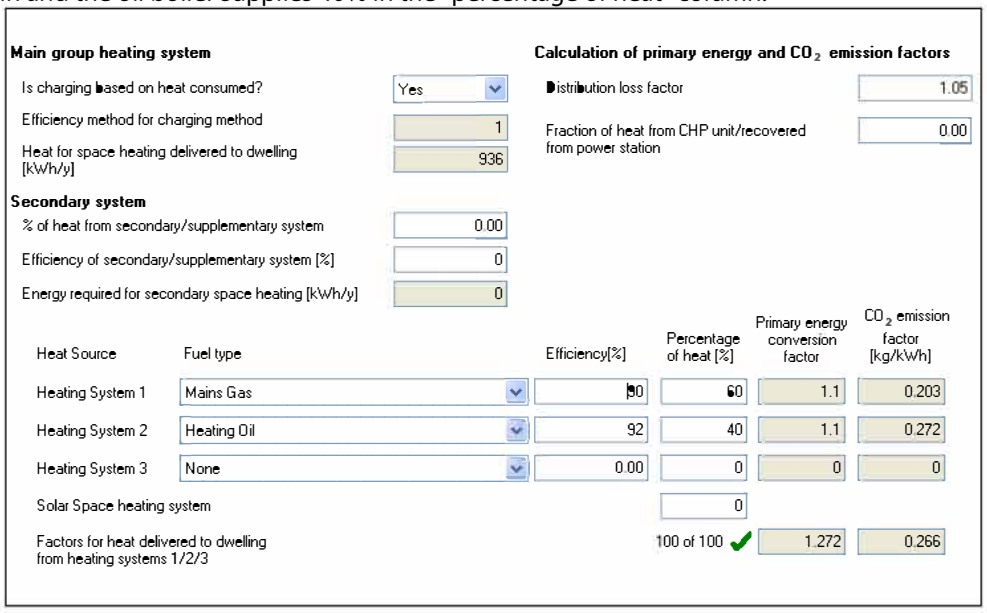
Under "Energy Requirements" -> "Group" -> "Space Heating" in DEAP, the "percentage of heat" entry for heating systems 1/2/3 is the percentage of heat which the dwelling receives from the group heating scheme boilers and is not reduced when CHP or secondary individual heating are present. This percentage of heat column only represents group heating appliances which provide heat only (and not electricity). Therefore it does not include the portion of heat from CHP plant (which also generates electricity) or secondary heating (which is not part of the group heating scheme – it is within the dwelling).

Scenarios and corresponding DEAP entries:

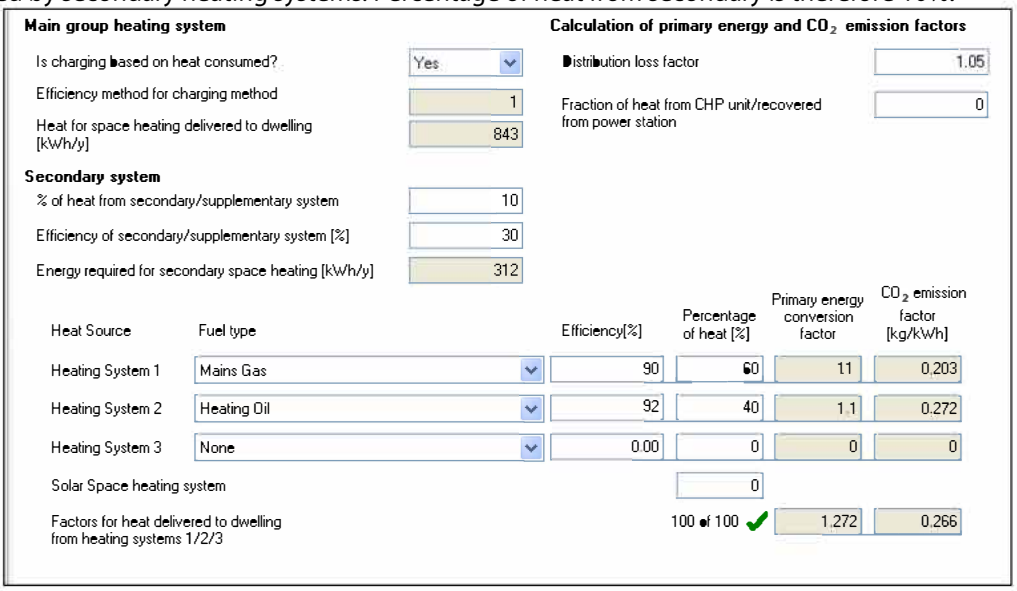
1. A single boiler (90% efficient; mains gas fuel) in the group heating system. No other source of heat (from CHP or secondary heating) is present. The distribution loss factor for the group heating system is taken from the DEAP manual Table 9. The "Percentage of heat" is 100% for this boiler as it is the only group heating boiler present as shown in the following illustration the from DEAP software:



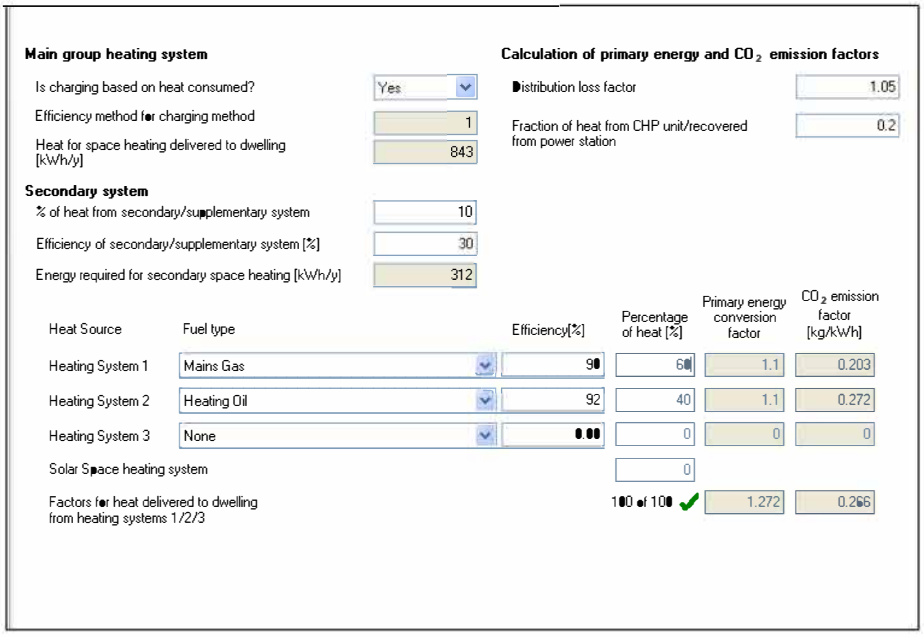
2. Same as (1) above but with the addition of another boiler (92% efficient; oil) which supplies 40% of the heat from group heating boilers. Therefore the mains gas boiler supplies 60% in the "percentage of heat" column and the oil boiler supplies 40% in the "percentage of heat" column.



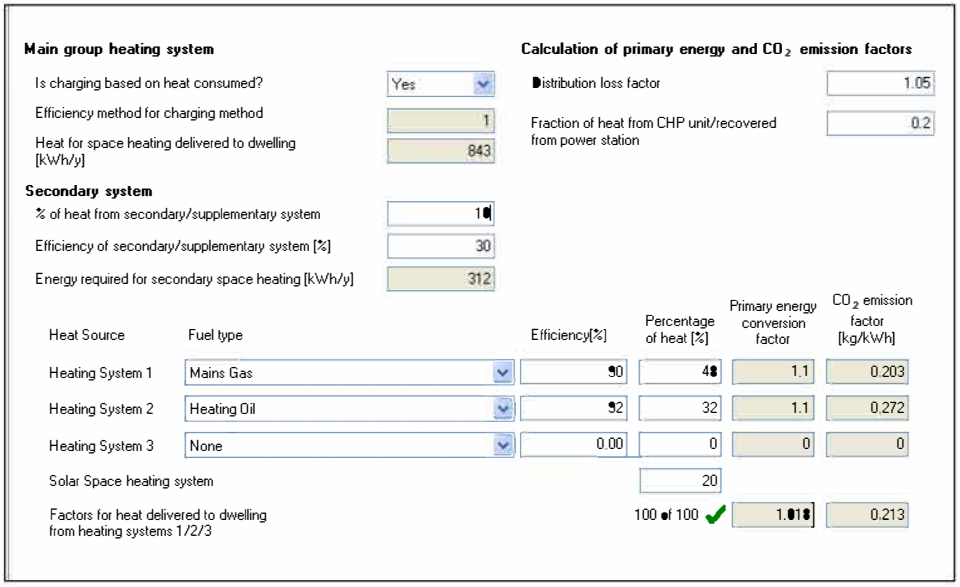
3. Same as (2) above but the dwelling itself also contains an open fire which is a fixed room heater. The "percentage of heat" column must **ALWAYS** total 100% and therefore the addition of the open fire (secondary heating system) does not reduce the percentages of heat from "Heating System 1" or "Heating System 2". When the Percentage of Heat column does not total 100%, DEAP flags this with a red "X" on the DEAP screen. Refer to Table 7 of the DEAP Manual for guidance on the fraction of heat supplied by secondary heating systems. Percentage of heat from secondary is therefore 10%:



4. Same as (3) above but with a CHP system supplying a fraction of 0.2 of the heat. The percentages from the secondary system and Heating systems 1 and 2 are not reduced when the CHP system is added as detailed at the start of this section of the Technical Bulletin.



5. Finally, take a system the same as (4) above, but add a solar space heating system. It is determined using the methodology in Section 3.1 of this technical bulletin that the "Percentage of Heat" from the group solar space heating system is 20% of the heat output from "heat-only" plant. Therefore, this is entered as per the following diagram, and each of the percentages from Heating system 1 and 2 are reduced by 20% of what they were prior to addition of solar heating. The Percentage of Heat column still must total 100%.



4 Pressure testing in DEAP and for TGD L compliance

(Last Updated on April 2016)

New Final and Existing BER Assessments

Section 1.5.4 of Building Regulations 2011 TGD L outlines the requirements for air permeability pressure testing of new dwellings. Section 1.5.4.3 indicates that permeability testing does not need to be carried out on every single new dwelling but must be tested in accordance with the sample regime defined in Table 4 of TGD L.

TGD L Section 1.3.4.4 indicates that a dwelling tested according to the sampling regime in Table 4 of TGD L should achieve a permeability test result of $7 m^3/(h \cdot m^2)$ or better. As per 1.5.4.1 of TGD L, the permeability test result in "$m^3/(h \cdot m^2)$" is divided by 20 to obtain the air changes per hour (ac/h) value to be entered in DEAP if an air permeability test has been carried out.

If the permeability test is not carried out on the actual dwelling, or dwelling(s) of the same type, subject to the sampling regime above, then "No" must be answered to "Has an air permeability test been carried out" when assessing the dwelling in DEAP. DEAP then assumes a default air leakage for the dwelling.

There is further information available under TGD L sections 1.5.4 and 1.3.4 and also under http://www.sei.ie/Your_Building/BER/BER_Assessors/Technical/DEAP/Air_Pressure_Testing/ .

In particular:

- Where an assessor has copies of pressure tests for building type, but not specific for the dwelling, which are greater than the backstop in TGD L and complying with minimum rate of testing in TGD L, the maximum air pressure test is used for the building type, in the case of the 2011 building regulations the backstop is 7 $m^3/(h \cdot m^2)$.
- Where an assessor has copies of pressure tests for building type, but not specific for the dwelling, which are less than the backstop in TGD L and complying with minimum rate of testing in TGD L they can use backstop, in the case of the 2011 building regulations the backstop is 7 $m^3/(h \cdot m^2)$.
- Where an assessor wishes to use an air permeability of less than the backstop (7 $m^3/(h \cdot m^2)$ in the case of the 2011 building regulations), a test must be performed on each specific dwelling.

Examples:

Scenario	TGD L conformance	DEAP: "Has an air permeability test been carried out?"	DEAP: "Adjusted result of air permeability test [ac/h]"
2 houses in a development with no permeability test carried out on any dwelling by the developer	No	No	n/a as these dwellings do not have a test result available.
2 houses in a development . They are not of the same type. Only one house has a permeability test result available and achieves $6m^3/(h.m^2)$	Yes on one house. No on the other	Yes on one house. No on the other	Tested house has test result of $6m^3/(h.m^2)$. Divide by 20 to get 0.3 ac/h on that house. n/a on the other house as no result available
2 houses in a development . They are of the same type. Only one house has a permeability test performed and achieves $6m^3/(h.m^2)$	Yes to both	Yes to both	Tested house has test result of 6 m3/(h.m2). Divide by 20 to get 0.3 ac/h on that house. Other house has test results for same type and sample regime applies, results are below backstop so backstop of $7m^3/(h \cdot m^2)$ can be used. Divide by 20 to get 0.35 ac/h on that house.
9 houses in a development . They are of the same type. 2 houses have a permeability test performed and achieve: 1) 6 $m^3/(h \cdot m^2)$ 2)10 $m^3/(h \cdot m^2)$	Yes to One No to Others – Remedial work should be carried out in compliance with regulations	Yes to all 9 houses	0.3 ac/h on the house which actually achieved $6m^3/(h \cdot m^2)$. 0.5 ac/h on the remaining 8 houses

In general, for BER assessments, SEAI encourages BER Assessors to use non-default certified test data wherever possible. This non-default data must be properly certified and substantiated. Where actual air permeability test results are identified in a BER assessment audit, SEAI may look for supporting evidence that the permeability test results are available, and that the test was carried out by an individual or organisation competent to do so.

Individuals may, for example, demonstrate competence to carry out permeability tests on dwellings by being registered under the NSAI's Air Tightness Testers Scheme.

Additionally, individuals and organisations may demonstrate competence by being accredited to carry out tests to **I.S.EN 13829:2000** by the Irish National Accreditation Board (INAB) or any other bodies capable of providing accreditation to ISO/IEC 17025:2005: "*General Requirements for the Competence of Testing and Calibration Laboratories*"

For developments with 3 dwellings or less, the conditions outlined in TGD L 1.5.4.8 may be used to demonstrate air-tightness compliance to the Building Regulations requirements. In this case, if a dwelling of the same type was built by the same builder in the preceding 12 months and if that original dwelling achieved a permeability test result <= 7$m^3/(h \cdot m^2)$ then the current dwelling would be deemed to be compliant to the Part L air permeability requirements. In this case an air permeability test would not be required on the actual dwelling. In the BER assessment of the actual dwelling the permeability test result is set to 7 $m^3/(h \cdot m^2)$ or 0.35ac/h in DEAP.

New provisional BER assessments

For provisional ratings the dwelling will not be completed at the time the BER assessment is being carried out, so there will be no permeability test result available for the dwelling.

- If Air Pressure Testing is **not** proposed on all dwellings within the development
  - Default of 0.35 ac/h (adjusted permeability test result to be used in DEAP) for dwellings where pressure test is not proposed.
- If Air Pressure Testing **is** proposed on all dwellings within the development
  - Non-default can be made via a permeability test for a similar building with all of the following:
    - Same builder/developer
    - Same structure type (timber frame/masonry/ICF)
    - Same dwelling type
    - Same floor area

    Assessor should verify the pressure test results relate to building area and building elements are appropriate for the new building type.
  - Default of 0.25 ac/h (adjusted permeability test result to be used in DEAP) for dwellings without Balanced Mechanical Ventilation (CIBSE TM23 Best Practice)
  - Default of 0.15 ac/h (adjusted permeability test result to be used in DEAP) for dwellings with Balanced Mechanical Ventilation (CIBSE TM23 Best Practice)

Note: These figures **must then be replaced** with an actual permeability test result for the dwelling (or development sample regime) when publishing the final BER for the dwelling.

BER Assessors – Dwellings Technical Bulletin #08

Issue No. 8/09 **October 2009**

Contents:

1 Guidance relating to heating systems in DEAP

1.1 Identification of smokeless fuel zones

Selection of fuel type for solid fuel appliances is detailed in the DEAP Manual Section 10.3.3. This method applies to both secondary and primary solid fuel heating systems and is summarised in the following table:

Table 1: Selecting the appropriate solid fuel type for solid fuel appliances

Scenario	Wood (logs, pellets, chips)	Manufactured smokeless fuel	One of house coal; sod peat; peat briquettes or anthracite	Solid multi-fuel
Appliance can only burn wood fuels	✓	X	X	X
Appliance can only burn a particular coal or peat based product	X	✓ (select fuel type as appropriate)	✓ (select fuel type as appropriate)	X
Appliance can burn multiple solid fuels but a particular non-wood fuel is the most commonly available fuel in the area	X	✓ (Select manufactured smokeless fuel when dwelling is in "smoke control area" and the appliance can burn multiple fuels)	✓ (Select one of these fuels when dwelling is in non "smoke control area" and that fuel is clearly the most commonly available fuel in the area)	X
All other scenarios	X	X	X	✓

Notes:
Smokeless coal areas are detailed on the Department of Environment, Heritage and Local Government website under http://www.environ.ie/en/Environment/Atmosphere/AirQuality/BituminousCoalBan/. These areas may also be referred to as areas in which the sale of bituminous coal is banned.

Individual Local Authorities may have further details:
http://www.environ.ie/en/LocalGovernment/LocalGovernmentAdministration/LocalAuthorities/

1.2 Efficiency of a boiler retrofitted with a new burner unit

In cases where the burner unit in a boiler has been replaced with a different type of burner to that originally in the boiler, then a non-default efficiency value from HARP, SEDBUK or certified test data is not to be used. In this case an appropriate default efficiency value should be selected from Table 4a or Table 4b in the DEAP Manual.

When choosing the appropriate default in this case, the boiler age should be based on that of the original boiler. The fuel type is that which is used by the newly installed burner attached to the original boiler.

As an example take the following case:

- Standard, non-condensing gas boiler installed in 1995;
- Burner replaced with a new oil burner.

In this case, the boiler entered in the DEAP assessment would have "Heating Oil" selected as the fuel type with the efficiency for "Standard oil boiler 1985 to 1997" taken from Table 4b in the DEAP Manual.

1.3 Case study: data entry for a heat pump in DEAP

UPDATE Q1 2016: This article is now superseded by the heat pump guidance update for DEAP under www.seai.ie/berfaq .

1.4 Ratings which are better than expected

In general it is unlikely that a typical dwelling designed to comply with Building Regulations 2008 TGD L or earlier would achieve an A2 or A1 rating. If this result is achieved in a BER assessment it is possible that one or more errors have been made in the assessment. Errors must be corrected prior to publication of the assessment on NAS. The most common cause of a BER assessment showing a better than expected energy rating for the dwelling is that the heating system has not been entered correctly in DEAP. In terms of an SEI audit, all errors are taken into consideration regardless of whether they improve or disimprove the rating.

For individual heating systems, all of the following parameters must be present in the BER assessment at a minimum:

- Energy requirements -> Space heating:
  - Efficiency of main heating system (not less than 20%);
  - Efficiency adjustment factor (may be a value of 1, unless adjustments in DEAP Table 4c apply);
- Energy requirements -> Water heating:
  - Efficiency of main water heating (not less than 20%);
  - Efficiency adjustment factor (may be a value of 1, unless adjustments in DEAP Table 4c apply);
- Energy requirements -> Fuel data:
  - Main space heating system fuel (value other than "none" must be selected);
  - Main water heating system fuel (value other than "none" must be selected).

For group heating systems, the September 2009 Technical Bulletin provides examples of data entry in DEAP. In particular, for group heating systems all of the following parameters must be present in the BER assessment at a minimum:

- Energy requirements -> Space heating:
  - Distribution loss factor taken from Table 9 in the DEAP Manual;
  - For at least one of Heating System 1, 2 or 3:
    - A fuel type other than "none";
    - An efficiency value (not less than 20%);
    - "Percentage of heat" value greater than 0%

1.5 Ratings which are worse than expected

Both new and existing dwellings would typically achieve a BER of less than 1000kWh/m^2/yr. Where the BER primary energy usage is higher than this, there may be an error in the assessment. Any errors in the assessment must be corrected prior to publication on the NAS database. In terms of an SEI audit, all errors are taken into consideration regardless of whether they improve or disimprove the rating. The most common cause of this issue is that heating system efficiency is incorrectly expressed as a fraction (between 0 and 1). Main space heating, water heating and secondary heating system efficiencies should be expressed as a percentage (not less than 20%). This issue is also detailed in the April 2009 Technical Bulletin.

2 Guidance relating to dwellings survey for BER purposes

2.1 Recording low energy lighting during survey

When collecting data relating to the percentage of low energy lighting on site, a room by room record of all fixed lighting and low energy lighting must be retained as part of the BER assessment records. The room by room record in the DEAP Survey Form details all fixed lighting and fixed low energy lighting in each room of the dwelling. Please refer to the May 2009 Technical Bulletin for a sample low energy lighting calculation.

2.2 Identifying works carried out on site

When performing a BER assessment of an existing dwelling, Assessors should always ask the homeowner if they know of any works which have been carried out on the dwelling which are liable to impact on the BER rating. While the homeowner's word is not sufficient proof to use non-default data in the BER, it will help the Assessor to gain a better understanding of what non-defaults might apply to the dwelling and to collate the necessary supporting evidence.

The DEAP Survey Guide (Section 1) provides further details on the use of invasive survey methods. These are not required under the DEAP methodology, but may be used as an acceptable source of evidence as outlined in the DEAP Survey Guide if the homeowner chooses this route to prove that certain insulation measures have been taken.

The BER Assessor should make it clear to the homeowner that proof, such as that outlined in the DEAP Survey Guide, is needed if non-default data is to be included in the BER assessment. Otherwise the default values apply.

2.3 Arranging access to the heating system prior to the BER assessment

Prior to performing a site survey for a BER assessment of an existing dwelling, BER Assessors should contact the client to ensure that access will be granted to the heating system at the time of the survey. In particular, access to group heating system boilers may be restricted unless it has been arranged prior to the site visit. If access still cannot be gained at the time of the site survey then the defaults listed in the DEAP Manual (Appendix S and Table 4) should be used.

2.4 Accessing documentary evidence to determine dwelling age

Documentary evidence of the dwelling age should be researched when determining the year of dwelling construction. This would typically include planning applications, planning permissions or commencement notices. In preparation for a Survey, the BER Assessor should check planning records prior to visiting the dwelling. Relevant planning records may be accessible by searching www.pleanala.ie or the relevant Local Authority website as listed under http://www.environ.ie/en/LocalGovernment/LocalGovernmentAdministration/LocalAuthorities/ .

The Ordnance Survey website also has a limited amount of information on its free map viewer under http://shop.osi.ie/Shop/MapViewer.aspx , indicating dwellings which were constructed prior to 2005, 2000, 1995.

As per the DEAP Survey Guide, if the documentation outlined above is not available to indicate the age of a dwelling or dwelling extension, then at least two of the following should be used to indicate the relevant year of construction:

- Stylistic evidence;
- Dwelling or development age plates or plaque indicating year of construction;
- Electricity meter age;
- Glazing age printed within double or triple glazing;
- Homeowner knowledge.

3 Identifying sealed or unsealed suspended floors

As per the DEAP Manual Section 2.3: "A suspended wooden floor is considered sealed if all joints in the floor (at the edges and the floor itself) are draught sealed using membranes or adhesives".

In the case of a carpet on a suspended floor, while the carpet itself is unlikely to be airtight, a carpet underlay if present may or may not be airtight. Proof that a carpet underlay has been installed may be determined from receipts or invoices. However, determining whether the underlay extends to the edges, and whether there is continuous coverage may be problematic.

Details of the material used in the linoleum or carpet underlay may be available from receipts, invoices or manufacturer's literature. However, this documentation may be of limited use in helping an Assessor determine if the product is airtight.

As is always the case with data substantiation in DEAP, if a BER Assessor does not have evidence that a suspended floor is sealed or unsealed then the more conservative option is chosen as the default (it must be assumed that the floor is unsealed).

Note that air vents under the level of the suspended floor, should not be included in the DEAP assessment under "intermittent fans and passive vents" in the Ventilation tab. The effect of these vents is already accounted for either by an air permeability test or by answering "Yes" to "Is there a suspended wooden ground floor?".

4 Achieving MPEPC and MPCPC compliance

DEAP checks several facets of the dwelling for compliance with Building Regulations 2008 TGD L. Included in these checks are the Energy Performance Coefficient (EPC) and Carbon Performance Coefficient (CPC). The Maximum Permissible Energy Performance Coefficient (MPEPC) is 0.6 of the value which would be achieved by a reference dwelling that is similar to the actual dwelling but with the characteristics described in Appendix C of Building Regulations 2008 TGD L. Likewise, the Maximum Permissible Carbon Performance Coefficient (MPCPC) is 0.69 of the value which would be achieved by the Appendix C house. DEAP indicates if the EPC and CPC exceed the values of the MPEPC and MPCPC outlined above.

Any aspect of the dwelling which affects the BER result is likely to have an impact on the EPC and CPC values. Consequently, dwelling designers should consider making improvements in a number of areas if the MPEPC and MPCPC values are not being complied with. Appendix E in Building Regulations 2008 TGD L gives a sample dwelling which meets the MPEPC and MPCPC requirements. Note that the Appendix E dwelling needs to significantly exceed some of the other TGD L requirements in order to meet the MPEPC and MPCPC values outlined above. For example, the floor U-value of 0.2W/m^{2}K is substantially lower than the value of 0.25W/m^{2}K outlined in Table 1 of TGD L.

5 The Window Energy Rating

The March 2009 BER Technical Bulletin provides details on sources of acceptable window U-values and solar transmittance data. In addition to this, the U-values and solar transmittance values listed under the Window Energy Performance (WEP) scheme are acceptable for DEAP assessments.
The scheme is accessible under the following link:
http://www.nsai.ie/index.cfm/area/page/information/window_energy_application_scheme

The U-value shown on the WEP certificate is for the entire window (including glazing and frame) so can be input directly into DEAP. The solar transmittance factor ($\mathbf{g_{window}}$) is also for the entire window, and must be ~~converted to $\mathbf{g_{glass}}$ using the formula in the DEAP Manual Table 6(b) note 2 prior to use in DEAP: $\mathbf{g_{glass} = g_{window} / Frame\ Factor}$~~

UPDATE JULY 2012 in DEAP Manual v3.2.1 Table 6b:
solar transmittance to be entered in DEAP as: $g^{\perp} = g_{window}$ / [Frame Factor*0.9]

Note that when entering U-values and solar transmittance for windows in DEAP, both values must be defaults or both values must be non-defaults. For example, do not use a non-default solar transmittance value with a default U-value.

As stated in the March Technical Bulletin, window data from the British Fenestration Rating Council (www.bfrc.org) is also acceptable for DEAP assessments.

BER Assessors – Dwellings Technical Bulletin #09

Issue No. 9/09 **November 2009**

Contents:

1 Demonstrating compliance with Building Regulations TGD L

1.1 Compliance with TGD L revisions prior to TGD L 2005

DEAP provides the facility to check that a new dwelling complies with various requirements in Building Regulations TGD L 2008 and 2005 including:

- Sufficient fabric insulation levels;
- Minimum level of energy provision from renewable sources (TGD L 2008 only);
- Maximum Permissible Energy Performance Coefficient is not exceeded (TGD L 2008 only);
- Maximum Permissible Carbon Performance Coefficient is not exceeded (TGD L 2008 only);
- Maximum Permitted CO_2 Emission Rate is not exceeded (TGD L 2005 only).

As stated in the Code of Practice for BER Assessors:
"If the Building Regulations Part L applies to the building being rated and the BER Assessor finds that it does not conform to the requirements of Part L, then the BER Assessor is obliged to notify the client and to identify which elements of the design do not conform to these Regulations." It is important that BER Assessors comply fully with this requirement.

Building Regulations TGD L 2008 is available under: http://www.environ.ie/en/TGD/ . The transition periods stating when this document came into effect are described in the July 2009 BER Technical Bulletin.

TGD L 2005 and 2002 are available under:
http://www.environ.ie/en/Publications/DevelopmentandHousing/BuildingStandards/ .

The May 2009 BER Technical Bulletin differentiates new dwellings from existing dwellings. DEAP can be used to check CO_2 emissions and energy consumption compliance for new dwellings under TGD L 2008 and TGD L 2005. If an Assessor is asked by a client to carry out a BER on a new dwelling to which TGD L 2002 applies, DEAP TGD L 2005 fabric insulation compliance checking can be used instead for Elemental Heat Loss and Overall Heat Loss method. TGD L 2002 and TGD L 2005 fabric insulation requirements are the same. Compliance checking using the Heat Energy Rating method should be calculated as per Section 1.4 of TGD L 2002. The BER Assessor should also ensure that the client is made aware of TGD L 2002 sections on:

- Thermal bridging (Section 1.5);
- Air Infiltration (Section 1.6);
- Heating Controls (Section 2);
- Insulation of Hot Water Storage Vessels, Pipes and Ducts (Section 3).

2 Guidance on DEAP data collection and data entry

2.1 Room in roof FAQ amendment

The "room in roof" approximation for existing dwellings in DEAP allows the BER Assessor to enter a room in roof as a single heat loss element with an approximated area and a single U-value.

In cases where a single U-value clearly does not apply to the entire room in roof heat loss area, then the approximation should not be used.

As an example, if a BER Assessor has clear evidence that the sloping heat loss facades of the room in roof have had additional insulation retrofitted, then the default U-value does not apply to those sloping facades. Conversely, if the horizontal heat loss roof facade is inaccessible, then the default U-value still applies to that horizontal section. Therefore, the single default U-value, as applied in the room in roof approximation method, cannot be used and the heat loss elements of the room in roof must be entered separately in DEAP.

In summary, if a non-default U-value applies to a heat loss façade, then that non-default U-value should be applied to that heat loss façade in DEAP. All other heat loss roofs or walls are entered with default U-values separately in DEAP.

Step 5 of the room in roof FAQ has been amended with this clarification:
http://www.sei.ie/Your_Building/BER/BER_FAQ/FAQ_DEAP/Building_Elements/How_do_I_enter_a_"room_in_roof"_in_DEAP_.html

2.2 When to select wood fuels in DEAP

As per section 10.3.3 of the DEAP manual, wood logs, pellets or chips may be selected as the fuel type for an appliance if its design is such as to prohibit the use of any other fuel type. This can be demonstrated by one of the following:

- Documentation showing that the product warranty is void if the product is used with any fuel type other than wood fuels ;
- Listing of the product under http://www.hetas.co.uk/pdfs/Part_1_Appliances.pdf showing that the appliance burns wood fuels only.

In cases where there is any doubt about fuel type selection, then wood fuels should not be selected as the fuel type in DEAP assessments or for the purposes of demonstrating TGD L compliance. The appropriate choice of fuel should be made from one of option 2, 3 or 4 in DEAP manual Section 10.3.3.

Further guidance on selection of the appropriate solid fuel type is given in the October 2009 Technical Bulletin under
http://www.sei.ie/Your_Building/BER/BER_FAQ/FAQ_BER/Assessors/October_Technical_Bulletin.pdf .

2.3 Open fires with "fire doors"

Some open fires may have been retrofitted with an enclosure or door to control air flow from the room to the fireplace. When accounting for this in DEAP, the ventilation loss can be entered as an open flue rather than a chimney provided the enclosure minimum open area is no more than the equivalent of a circle of diameter 200mm. The enclosure is likely to have controllable ventilators between the fireplace and the room.

It is unlikely that the efficiency of the enclosure combined with the exact type of fireplace in the dwelling will have been tested to the relevant standards by an accredited laboratory. When entering the efficiency of this fireplace and enclosure in DEAP, the default 30% efficiency from DEAP Table 4a is to be used.

2.4 Central heating pumps

The March and May 2009 BER Technical Bulletins provided guidance on entering gas boiler flue fans and oil boiler fuel pumps in the "Distribution System Losses and Gains" section of DEAP. In the case of wet heating systems (typically using radiators or underfloor heating), the heating system is likely to have one or more central heating pumps installed. These are accounted for under "Distribution System Losses and Gains" for individual heating systems in DEAP. Where no central heating pump is entered in DEAP, substantiating evidence needs to be retained by the BER Assessor to this effect. In the absence of this evidence, a central heating pump must be entered in the DEAP assessment.

2.5 Dwellings with chimneys and no secondary heating in DEAP

When a dwelling has a chimney or chimneys entered in DEAP, the dwelling will generally have secondary space heating entered in the DEAP assessment. This secondary space heater may or may not be the open fire associated with the chimney, subject to guidance in DEAP Appendix A. The following are sample scenarios where the open fire would not be considered as secondary heating:

- Another heat source is the secondary space heater (subject to guidance in DEAP Appendix A);
- The hearth below the chimney is not capable of supporting an open fire (the chimney is still counted in this case, but the actual fireplace cannot be used as a heat source);
- There are several open fireplaces in the dwelling and, based on guidance in Appendix A, these are chosen as the main space heating system.

With the exception of these cases, it is highly likely that a dwelling with one or more chimney would have an open fire selected as secondary space heating.

2.6 Entering primary circuit loss type

Table 3 in the DEAP manual defines different levels of heat loss between the main water heating system and the hot water store. While some of the Table 3 options have the same kWh/yr primary circuit energy loss as other Table 3 options the most appropriate option must be selected at all times.

In addition, when specifying that the primary pipework is insulated, bear in mind that this refers to **all** of the pipework between the primary water heater and the water storage. Where some of the pipework is not visible (if for example it runs through walls or floors), then it must be assumed to be uninsulated unless it can be proven to be insulated.

2.7 Floors above commercial premises

Section 3.5 of the DEAP manual provides options for determining the U-value of floors between a new dwelling and a non-domestic premises.

These floors are considered:
a) to have zero heat loss if the spaces directly below the dwelling are normally heated to similar levels as the dwelling (i.e. heated to a similar pattern and to similar temperatures), or

b) as heat loss elements to an unheated space if the spaces below are unheated, heated only infrequently or heated only to a low level, or

c) as if they were external elements but with their U-value halved if the spaces are heated to a different pattern to that dwelling (e.g. commercial premises).

Where an existing dwelling is above a space which is heated to a different pattern than that of a dwelling, then the default U-value of 1.0W/m^2K from Section S6.5 of the DEAP manual applies. This is half of a typical value which would be attained by an uninsulated exposed element. However, if there is enough information available (and proof thereof) to calculate the actual floor U-value, then this should be done, and the result halved as per DEAP Section 3.5(c) to attain the floor U-value for the purposes of the DEAP assessment.

3 BER assessment data access

3.1 What data should be supplied to the homeowner/client

After a BER Assessor carries out and publishes a BER for a client, the client is entitled to access to the BER Certificate and the Advisory Report.

In addition, Statutory Instrument No. 666 of 2006, Article 20(4)(c) details that the "building owner, or the agent of that building owner, via a BER Assessor" has access to "a data file or other extract from a register relating to a BER assessment for a particular building".

SI 666 is available under:
http://www.environ.ie/en/Legislation/DevelopmentandHousing/BuildingStandards/FileDownLoad,1700,en.doc

The "BER data file" referred to above is defined in SI 666 of 2006 as "an electronic file which contains a report on the outcome of a BER assessment of a building in a form approved by the issuing authority, which is completed by a BER assessor and provided to the issuing authority for the purpose of notifying it of the record to be made or updated on the BER register in respect of that particular building, and shall be deemed to include any calculations and related data or documents accompanying that report".

In other words, the client has a right to the BER "XML" file should they wish to obtain it.

3.2 Provision of data to other parties

Section 10 of the BER Assessor's Code of Practice details the obligations on BER Assessors in relation to BER data confidentiality and data protection:
http://www.sei.ie/Your_Building/BER/BER_Assessors/Code_of_Practice.pdf

In particular, a BER Assessor is required to abide by the following confidentiality requirements:

- To keep confidential the identity of applicants and BER records.
- To obtain in writing the consent of the client to hold discussions with third parties concerning BER assessments that he/she has been instructed to carry out, including discussions with architects, engineers, and prospective suppliers or suppliers of building materials, components or services.

In relation to determining compliance with Part L of the Building Regulations, TGD L 2008 states that "Those involved in the design and construction of a building may be required by the relevant building control authority to provide such evidence as is necessary to establish that the requirements of the Regulations are being complied with."

Consequently, a client may direct a BER Assessor to provide information to a Building Control Authority in relation to the dwelling's energy performance and/or in relation to compliance with the Building Regulations.

The Building Control Act described under
http://www.environ.ie/en/DevelopmentandHousing/BuildingStandards/ details the powers of enforcement and inspection for Building Control Authorities.

BER Assessors – Dwellings Technical Bulletin #10

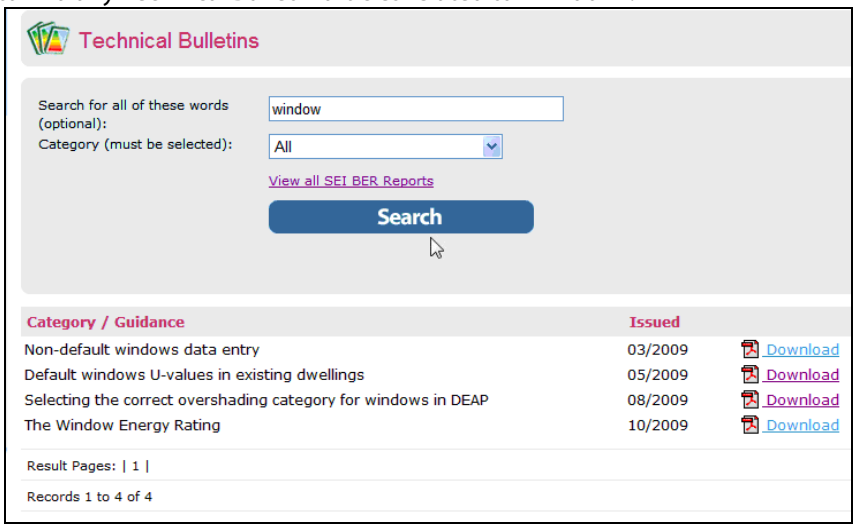
Issue No. 1/10 **January 2010**

Contents:

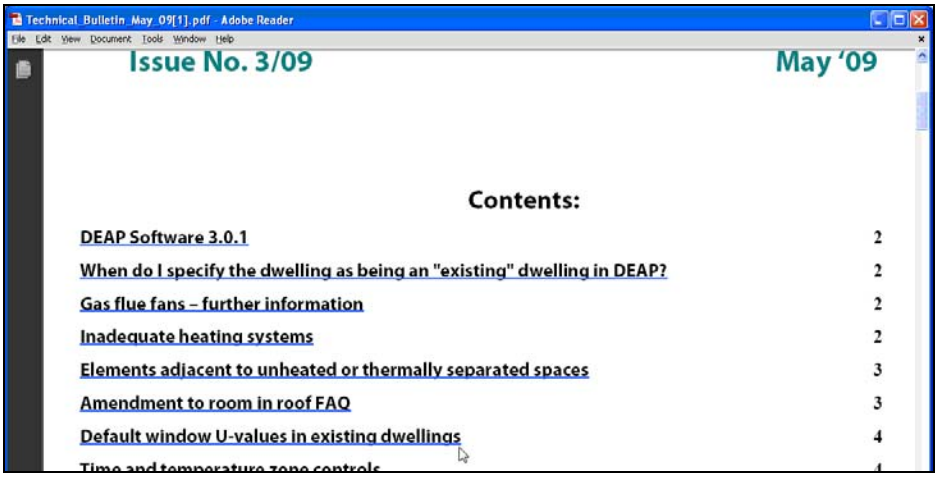
1 Technical Bulletin search function now available

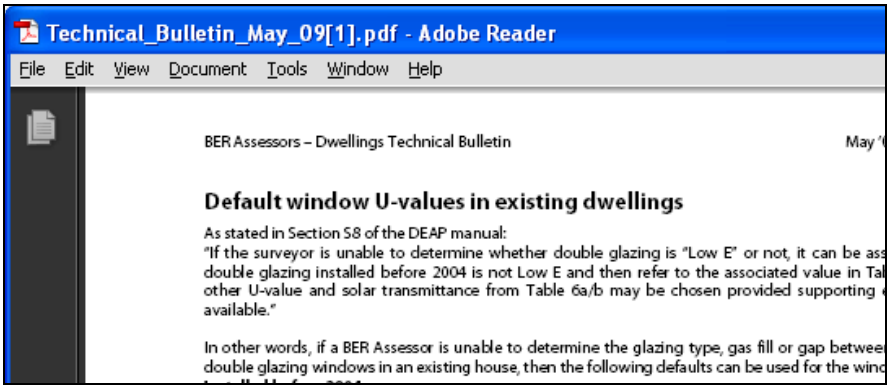
BER Technical Bulletins can now be searched using the Technical Bulletin Search Function. This search function allows the user to search the title of each Technical Bulletin article published since March 2009. Searches may be carried out across all categories, or filtered by the relevant category (such as "Dimensions", "Survey" etc.).

As an example, to find any Technical Bulletin articles related to "window":



Any relevant articles are listed below the search window as shown above. If the user wishes to view the article entitled "Default windows U-values in existing dwellings", select the associated "PDF" icon for this article. The PDF will open on the contents page of the relevant Technical Bulletin with links to each article. Click on the "Default windows U-values in existing dwellings" link to go directly to that article as shown in the diagrams below.





2 Updates to the National Administration System (NAS)

A number of updates have been made to NAS recently. These are summarised as follows:

Advisory Reports

- Minor changes have been made to the format and content of the Advisory Report.
- Advisory Reports can be recreated at anytime over the life of a published BER rating. Access to this functionality is via the following path:
  NAS > Ratings > Search Ratings > Search Results > Notice Details and select the Re-Create AR option.
  This enables the following:
  - Ratings published throughout 2008 – i.e. before automated Advisory Reports were available, can now have Advisory Reports generated for them retrospectively.
  - At any time, Assessors can regenerate any Advisory Reports that they have access to in order to incorporate new advice or to change any suppression options they may have selected.

  Note: The most recent Advisory Report rules and recommendations will be applied to the data in the specific XML for that dwelling. You will need to review the recommendations carefully as they may differ from the recommendations in the old Advisory Report. The new Advisory Report can be viewed without saving, but if saved will replace the existing Advisory Report. There are no charges associated with regeneration of Advisory reports.

Expired ratings

Ratings that are past their validity date are now marked with a status of "Expired". These ratings will be excluded from normal searches on the NAS but a tick box option on the Search Ratings screen will allow them to be included if you so wish.

Registration Certificates

Assessors may download a current Assessor Registration Certificate at any time through the "My Account" option on the top screen menu in NAS:

| Change Password | **My Account** | Logout

Dwellings with no MPRN number

Existing dwellings that are not connected to the electricity grid and therefore have no MPRN number allocated to them can now be accommodated for upload on an exceptions basis by allocation of a manual MPRN substitute number by SEI. Contact BER Admin for assistance, as required.

New technical tests and messages

New technical tests have been created and will give rise to the following notices when relevant on submission of an XML file to NAS:

093 "Same Assessor and DEAP Address lines 1, 2, 3 and County as a previous submission - Verify that this is a first submission" - refer to **Notice 014** on the BER FAQ for further details.
The purpose of this test is to highlight where an assessor may have accidentally uploaded the same rating twice. Message "093" is flagged as an error.

094 "One of the heating systems in this assessment has efficiency less than 20%"
The purpose of this test is to highlight where an assessor may have inputted an incorrect value for the heating system efficiency. Message 094 is a Notice (severity 3).

095 "The living area percentage of this dwelling is less than 10%. Please ensure that the living area has been measured correctly as per the guidance in the DEAP manual"
The purpose of this test is to highlight where an assessor may have inputted an incorrect value for the living area percentage. Message 095 is a Notice (severity 3).

096 "Efficiency adjustment factor cannot be set to 0 for space or water heating in individual heating systems"
The purpose of this test is to highlight where an assessor may have inputted an incorrect "zero" value for the efficiency adjustment factor. Message 096 is an Error.

098 "This dwelling has very high energy consumption"
The purpose of this test is to highlight where the energy consumption appears to be very high for the dwelling being assessed. Message 098 is a Notice (severity 2).

099 "This dwelling has lower than expected energy consumption"
The purpose of this test is to highlight where the energy consumption appears to be very low for the type/age of the dwelling. Message 099 is a Notice (severity 2).

100 "Group heating scheme "Percentage of Heat" column in DEAP must total 100%. This is not the case in this assessment."
The purpose of this test is to highlight that the Group Heating "percentage of heat" value is incorrect and must be amended. Message 100 is a Notice (severity 2).

Further explanation to these rules can be found under the BER FAQ as follows:

Amended technical tests and messages

The conditions triggering the technical tests below have been amended. A description of the notices can be found under the BER FAQ.

025 "Exposed Wall U Value differs from default U Value on N areas for Existing dwelling. Ensure that all non default U values are fully substantiated"
This notice now caters for adjusted default U-values of semi-exposed walls in existing dwellings.

060 "Ensure data entered in the Renewable and Energy Saving Technologies section conforms to Appendix M, N or Q"
This notice now checks for renewables in each of the "Renewable Energy 1/2/3" entries under the "Energy Requirements" section of DEAP.

3 Guidance on DEAP data collection and data entry

3.1 Electricity and Building Energy Rating

A number of homeowners and BER Assessors have commented on the high energy usage as reflected in BER assessments of dwellings which are primarily heated using electricity. There are significant inefficiencies in thermal electricity production (in the generation and transmission of electricity) resulting in a high primary energy factor for electricity as outlined in this BER FAQ.

Also, the DEAP methodology cannot take account of the homeowner's choice of electricity supplier. As is stated in the DEAP manual, the calculation is an asset rating. This enables the consumer to make a fair comparison between a dwelling's energy performance and that of other dwellings. For example, if a potential purchaser/tenant of a dwelling were interested in buying/renting a house, the current occupier's behaviour (including choice of electricity supplier) is irrelevant. Changing electricity supplier does not involve any physical change to the dwelling asset.

3.2 Calculating floor area in DEAP

Section 1 of the DEAP Manual describes the areas of a dwelling which should and should not be accounted for under the dimensions tab in DEAP as "floor area". The dimensions are measured from the internal faces of the dwelling's boundary walls. A number of previous technical bulletins provide details supplementary to that in Section 1 of the DEAP manual on various spaces which may or may not be included as part of floor area. It is critical that these areas are accounted for correctly in BER assessments as per the guidance set out by SEI. The floor area under the dimensions tab has a significant bearing on the BER result (which is expressed in kWh of primary energy per m^2 of **floor area** per year) and is therefore a key piece of data. This is an area which SEI pays close attention to during audits.

3.3 Mezzanine floors

A "mezzanine" or internal balcony is typically an area of floor in a dwelling which tends to overhang the storey below. The mezzanine/balcony should be accounted for under the "dimensions" tab in DEAP. If the only area of floor at the level of the mezzanine is the mezzanine floor area itself, then the mezzanine can be entered under "Other floors" in the DEAP "Dimensions" tab.

The average storey height for the mezzanine is the height between the ceiling surface under the mezzanine and the ceiling surface of the mezzanine.

The storey height for the storey below the mezzanine is weighted based on the following floor areas:

- The area below the mezzanine has height to the ceiling surface below the mezzanine.
- The remaining area is likely to extend in height to the same upper ceiling as that of the mezzanine.

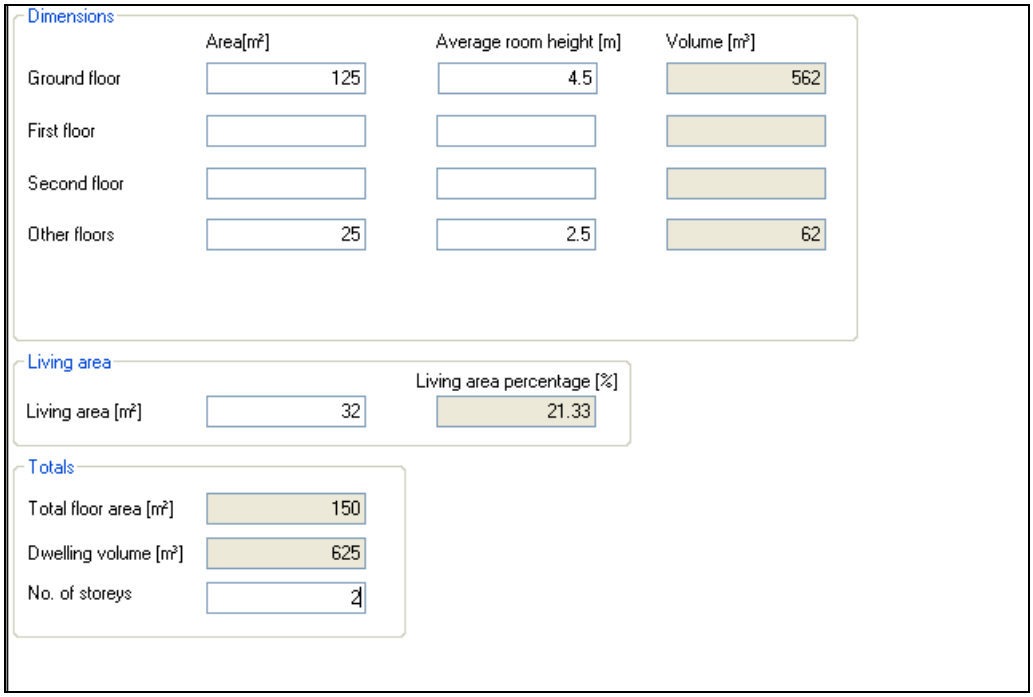
As an example, take a dwelling consisting of total ground floor area 125m^2, part of which is below a mezzanine of floor area 25m^2. The total storey height of the dwelling (from ground floor to upper ceiling) is 5m. The height from ground floor to the ceiling below the mezzanine is 2.5m. There are no other floor areas in this sample dwelling.

The storey height of the mezzanine is 2.5m (from the ceiling below the mezzanine to the upper ceiling).

The ground storey height (weighted by area) is:

$$\frac{(2.5*25)+(5*100)}{125} = 4.5m$$

The DEAP "Dimensions" tab is as follows in this case:



3.4 Room heaters with back boilers

Section 9.2.4 of the DEAP manual discusses gas, oil and solid fuel room heaters which are equipped with a back boiler for heating space and/or water. It is important to note that gas back boilers are treated differently to oil and solid fuel back boilers. The following text assumes there is no other system which would be considered as the main space heating system (such as a conventional central heating boiler).

Gas back boilers
Separate efficiencies apply to the boiler and to the associated room heater. This means that:

- if the back boiler provides space heating, it should be defined as the main heating system, and the gas fire should be indicated as the secondary heater subject to guidance under Appendix A;
- if the back boiler provides domestic hot water only, the boiler gross efficiency is used for water heating and the gas fire efficiency for space heating subject to guidance under DEAP Appendix A.

Oil and solid fuel room heaters with boilers
The gross efficiency is an overall value (i.e. sum of heat to water and heat to room). This means that:

- if the boiler provides space heating, the combination of boiler and room heater should be defined as the main heating system if the criteria in Appendix A are met;
- if the boiler provides domestic hot water (with or without space heating), the overall efficiency should be used as the efficiency both for water heating and for the room heater (room heater as main or as secondary heater).

3.5 Identifying extensions

Identifying an extension in an existing dwelling may well make a significant improvement in the BER result for the dwelling. This is particularly the case where the extension was constructed more recently than the original dwelling and therefore will be assigned a more recent age band. The July 2009 technical bulletin provides details on how to identify the year of construction of an extension.

In addition to this, there are a number of potential indicators as to the existence and area covered by the extension such as:

- Homeowner knowledge;
- Different windows to the original dwelling;
- Different roof type to the original dwelling;
- Different radiators to the original dwelling;
- Different room height to the original dwelling;
- Different natural ventilation (such as background wall/window vents) to the original dwelling;
- Change in rendering from the original dwelling;
- The presence of two heating systems may indicate the existence of an extension.

This list is not exhaustive, but is merely to give a suggestion as to how the extension might be identified.

BER Assessors – Dwellings Technical Bulletin #11

Issue No. 2/10 **March 2010**

Contents:

This month's technical bulletin details the accuracy of DEAP assessments and the Quality Assurance System and Disciplinary Procedure for BER Assessors.

1 Accuracy of DEAP assessments and audits

When publishing BER assessments on both new and existing dwellings it is crucial that BER Assessors follow the rules and guidance set out by SEAI. Incorrect assessments may need to be republished, and can cause difficulties for both the Assessor and their client along with increased costs.

On registering as a BER Assessor, the individual accepts and agrees to the obligations set out in the BER Assessor's Code of Practice.

As stated in the Code of Practice: "A BER Assessor is required to act with integrity and diligence to ensure that each BER assessment is executed competently, in an independent manner and in accordance with the Regulations, this Code of Practice and all other directions issued by SEAI."

As part of the process to maintain the integrity of the scheme, BER Assessors can be audited by SEAI. Where SEAI identifies errors, omissions or non-compliance by a BER Assessor with any procedures, directions, with the Code of Practice or the Regulations, SEAI may issue specific directions to the Assessor requiring them to correct and re-publish that rating and any other ratings where they have made this error. Substantial errors in ratings or breaches of the Code of Practice can result in revocation of ratings and/or suspension of the BER Assessors registration.

All BER Assessors must be fully familiar with the DEAP Manual and the DEAP Survey Guide. In addition to this, a number of frequently asked questions and issues are covered under the **BER FAQ,** as well as the various Domestic BER Technical Bulletins available under the BER Reports Section of the SEAI website.

Any information required on **Building Regulations Part L** (current or previous) can generally be found on the Department of Environment, Heritage and Local Government website.

In cases where there is doubt about the approach to be taken in a BER assessment, then Assessors should contact the BER Helpdesk on 1890 252 738 or registered@ber.seai.ie .

2 Disciplinary Process and the Penalty Points System

This section sets out the BER Quality Assurance (QA) disciplinary process for all BER Assessors.

As an integral part of the Quality Management System (QMS), the Disciplinary Process ensures that both the quality and integrity of the scheme is maintained. Disciplinary sanction can arise from audits or complaints. Audits can be selected on either a random or targeted basis at SEAI's discretion. While the Disciplinary Procedure is outlined below, the full detailed Disciplinary Procedure is available on the SEAI website.
The QMS currently comprises of a range data review audits, desk review audits and documentation and practice audits carried out on site or at the BER Assessor's premises, though SEAI is also free to ascertain compliance by any means at its disposal. Arising from audit findings it may in certain instances be necessary to undertake disciplinary action against Assessors.

Breach Classification and Penalty Points

SEAI classifies errors and breaches detected during QA audits on the basis of the seriousness of their impact on the integrity of the BER system with errors and breaches classified as one of three levels of Severity – Level 1, 2 or 3 for which a BER Assessor will be assigned points.

- ***Severity 1*:** A non-compliance that has a high potential to compromise the fundamental integrity of the BER scheme, damage public confidence or otherwise negatively impact the reputation of the scheme. Such a breach incurs **3 penalty points.**
- ***Severity 2:*** A non-compliance that is significant but, while not acceptable, is unlikely, on its own, to affect the reputation of the BER scheme. Such a breach incurs **2 penalty points.**
- ***Severity 3:*** A non-compliance that is less significant and would not affect the reputation of the BER Scheme. Such a breach incurs **1 penalty point.**

All findings of non-compliance are formally notified to the BER Assessor in writing in the Audit Report to the BER Assessor registered email address and filed on their record.

QA Points System and Registration Suspensions / Termination
A BER Assessor is assigned points for technical errors or breach of the Code of Practice on the following basis, depending on the severity of the error.

An Assessor's points tally shall be recorded on the BER Assessor's file. Points will remain on an Assessor's record for two years from the time the points are assigned by SEAI. Points accrue from any registrations held by the BER Assessor.

A decision on suspension or termination is based on points accumulated by Assessors. Assessors accumulate points, depending on the findings from the Audits.

Suspension or termination of registration of a BER Assessor is determined as follows:

- A suspension of 3 months will be invoked if a BER Assessor's record shows **10 points** or more accumulated within the previous 2 year period. Penalty points are removed from the BER Assessor's record on completion of the suspension period but the suspension remains on the BER Assessor's record.
- Suspension of registration for 1 year will be invoked if a BER Assessor receives a second suspension within a 2 year period of an initial suspension.
- Termination of registration will be invoked if a third suspension of registration results within two years of the second suspension.

Notwithstanding the above, SEAI reserves the right to summarily suspend or terminate the registration of a BER Assessor in specific circumstances involving a serious breach of the Code of Practice or technical error. An Assessor has the right to appeal all audit findings, penalty points resulting from findings, suspensions or terminations directly to the BER Steering Group within SEAI setting out any mitigating evidence or factors. Penalty point appeals must be made within 28 days of such points being formally notified to the Assessor.
SEAI will consider at the time of a suspension whether particular conditions should be imposed on BER Assessor concerned before lifting of such suspension.

In the case of termination of registration, SEAI will consider, on a case by case basis whether re-registration would be permitted and if so what requirements must be met to facilitate re-registration of such a person as a BER Assessor.

The penalty points system will be effective from 1st May 2010.

3 Audit Types

3.1 Data Review Audits

Data Review Audits are high volume audits, selected on both a random and targeted basis, in which audit requests are sent by email to BER Assessors to check their compliance with a particular element of the Code of Practice and/or the relevant BER technical methodology.

3.2 Desk Review Audits

Desk Review Audits involve the review of a set of BER assessments carried out by an individual BER Assessor. Selection is on the basis of risk analysis which identifies potential errors within data files. Such audits may require provision of evidence/substantiation by a BER Assessor in support of entries made in the BER data file for one or more BER assessments.

3.3 Documentation and Practice Audits

Documentation and Practice Audits are detailed audits, which review a BER Assessor's compliance with both the relevant BER technical methodology and the Code of Practice. Such a process will comprehensively audit all relevant aspects of a BER Assessor's BER activities. A number of the BER Assessor's assessments will normally be audited to determine if any error patterns exist.

The selection of BER Assessors for Documentation and Practice Audits is at the discretion of SEAI, but may be informed by, inter alia, the volume of BERs published, the results patterns of BERs published, findings from Desk Review Audits, findings from Data Review Audits, and complaints received.

Documentation and Practice audits are categorised into two sub-types, namely:

- Documentation and Practice Audits (Office Based);
- Documentation and Practice Audits (With Site Inspection).

An audit non-compliance is primarily due to a technical error or a breach of the Code of Practice. The Severity of the findings are defined as detailed in Section 2 above.

BER Assessors – Dwellings Technical Bulletin #12

Issue No. 3/10 **April 2010**

Contents:

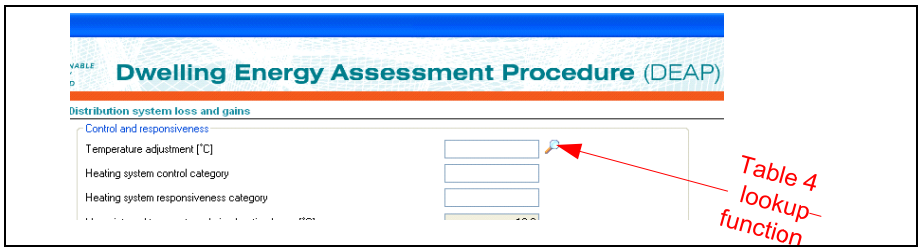
1 Guidance on DEAP data collection and data entry

1.1 Control and responsiveness entries in DEAP

The "Control and responsiveness" entries under "Distribution system losses and gains" in DEAP can have a significant bearing on the BER result for a dwelling. Assessors must take due care to ensure that they follow the guidance set out in Table 4 in deriving these entries for DEAP assessments.

The Table 4 lookup in DEAP is designed to help Assessors choose these entries correctly and determines the following parameters:

- Temperature adjustment
- Heating system control category
- Heating system responsiveness category
- Efficiency adjustment factors (for space and water heating in individual dwellings)



In compliance with Section 8 (Records, Data and Documentation) of the Code of Practice, BER assessors must ensure that acceptable evidence of heating controls is retained in support of entries in the DEAP assessment. Acceptable forms of evidence are listed below:

Existing Dwellings

- DEAP Survey form or equivalent BER Assessor survey form
  and
- Photographic evidence as detailed in the DEAP Survey guide.

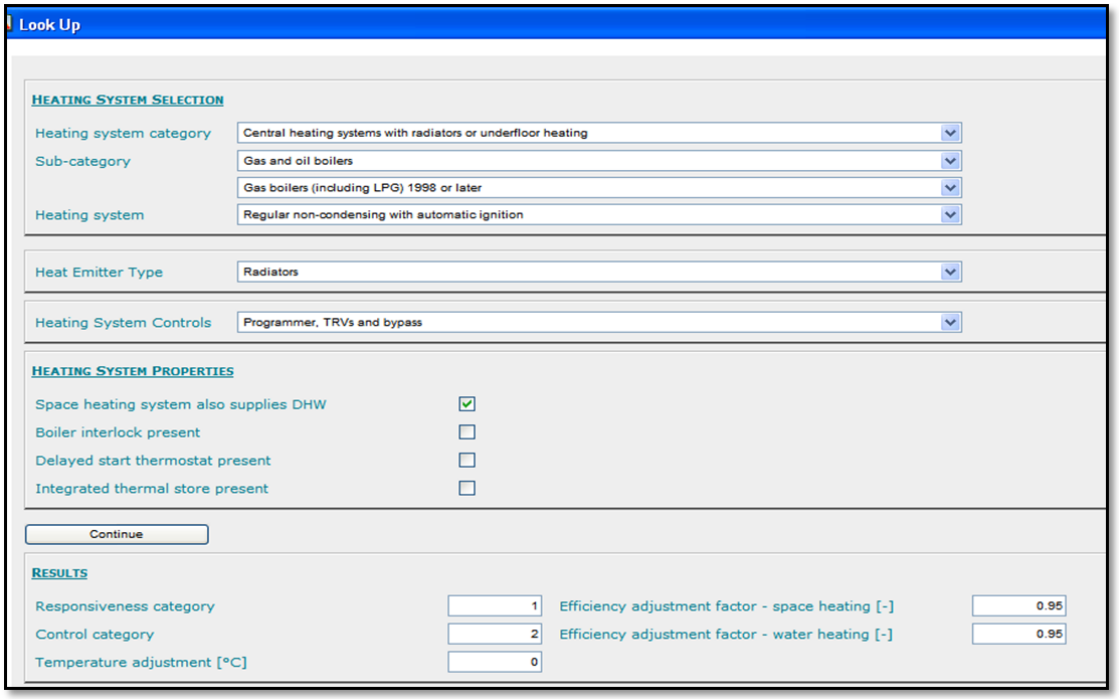
New Dwellings

- Plans and specifications submitted by or on behalf of the owner/client.
  and/or
- Specification owner/client sign off checklist.

1.2 TRVs and when they are accounted for

In dwellings with a boiler system and radiators, a control category of "2" may be specified if **50% or more** of the radiators in the dwelling are equipped with Thermostatic Radiator Valves (TRVs), bearing in mind that:

- A programmer is always needed for TRVs to be considered as control category 2 (programmers are detailed in the May 2009 technical bulletin and Section 9.3.3 of the DEAP manual).
- If there is no room thermostat in the dwelling and the main heating system is a gas or oil boiler, there is no boiler interlock as per Table 4c. This will reduce the efficiency adjustment factor. The Table 4 lookup above will enact this reduction in efficiency adjustment factor in this case as shown in the diagram below.



1.3 Group heating schemes and water heating

Appendix C of the DEAP manual provides guidance on entry of group heating schemes in DEAP assessments. The September 2009 technical bulletin provides further information on specification of group heating schemes in DEAP.

DEAP assumes that dwellings with main space heating based on group heating schemes obtain their entire hot water requirement from the group heating scheme. In other words, the entry for "supplementary water heating used in summer" in DEAP should be set to "No" where the dwelling's main heating system is a group heating scheme.

1.4 Additional information on lighting and internal gains

As additional guidance to that already issued in relation to low energy lighting in the BER FAQs, Appendix L of the DEAP Manual and the 2009 BER Technical Bulletins (May, June and October), the following guidance should be noted:

- Lights on cooker hoods and bathroom shaving mirrors should not be included in the count of lighting in the dwelling for either low energy lighting or conventional lighting.

- As detailed in Appendix L of the DEAP manual, light bulbs and light fittings outside of the dwelling should not be counted. Bulbs in unheated spaces of the dwelling (such as garages or porches) should be counted.

1.5 Floors above commercial premises

The November 2009 Technical Bulletin details how floors adjoining other premises should be treated in BER assessments.

These floors are considered:

a) to have zero heat loss if the spaces directly below the dwelling are normally heated to similar levels as the dwelling (i.e. heated to a similar pattern and to similar temperatures). In this context, adjoining premises should be heated to 18^0C or more for at least 7 of the 8 hours per day coincident with the dwelling's heating schedule outlined in Section 7.1 of the DEAP manual. The adjoining

premises should maintain this pattern for at least the 8 months of the heating season (seven days a week) outlined in DEAP Section 8. Otherwise option (c) below would be considered.

b) as heat loss elements to an unheated space if the spaces below are unheated, heated only infrequently or heated only to a low level, or

c) as if they were external elements but with their U-value halved if the spaces are heated to a different pattern to that dwelling (e.g. commercial premises). Section S6.5 of the DEAP manual applies a default U-value of 1.0W/m^{2}K for existing dwellings in the absence of supporting information for a non-default U-value.

1.6 Use of defaults in new dwelling assessments

When performing a BER assessment on a dwelling which has not been previously sold or occupied, the dwelling should be treated as a new dwelling in DEAP. Assessors may encounter dwellings which are considered "new" in this regard where there is a lack of availability of plans, U-values and other details. These cases should be approached follows by the BER Assessor:

- The assessor should always make every effort to obtain plans and insulation details for the new dwelling. Defaults should only be relied upon when there is insufficient supporting evidence to use non-defaults;
- Where details are not available from plans, the BER Assessor should carry out a site survey to determine any unavailable details for the new dwelling;
- The Assessor may use DEAP defaults from Appendix S to determine any details which are unavailable despite having carried out the steps above;
- The dwelling is entered as a "new dwelling" in DEAP. The assessor must evaluate the dwelling's compliance with the relevant building regulations as per the November 2009 Technical Bulletin;
- The Assessor should keep a record with the assessment detailing the reasons why defaults were chosen. This will help provide clarity if the assessment is audited by SEAI;
- The defaults in DEAP are conservative and could result in a failure of the TGD L compliance check. This therefore should encourage Assessors and clients to ensure that sufficient supporting evidence is provided to use non-default values.

Note that for new dwellings, the "room in roof" approximation should not be used. Treat the room in roof as you would for a regular new assessment from plans.

1.7 Using non-default window U-values: variations in window size

The March 2009 Technical Bulletin outlines the data required to use non-default window U-values in DEAP. Non-default U-values should be based on calculations or measurements carried out using IS EN SO 12567-1, IS EN ISO 10077-1 or IS EN SO 10077-2.

If the standard sized window (1.48 high * 1.23 wide) is used to establish the U-value using one of the standards above by testing or calculation as appropriate, then that U-value can be used for a window of the same type with different dimensions. If calculation or test outputs from the above standards are not based on the standard sized windows (1.48 high * 1.23 wide), then the windows in the tests or calculations must match the size of those in the actual dwelling. This is stated in Section 11 of BRE 443.

Note that non-default U-values for windows may only be used where certified solar transmittance data is included in the BER assessment.

1.8 Provisional and final BERs

As per Section 5 of the BER Assessor's Code of Practice, "A provisional BER can be carried out by BER Assessors based on design drawings and specifications of an uncompleted building provided that, on completion of the building in question, a non-provisional BER is carried out on the completed building". The non-provisional, or final BER on the dwelling, must be representative of the dwelling and DEAP methodology at the time of that final BER. The BER Assessor therefore must verify each item entered in the final BER. This includes the usual requirement of supporting evidence such as certified test reports, HARP listings, U-value calculations and so on.

As an example, if the client specifies that a different boiler is being installed in the constructed dwelling than had been specified at the time of the provisional rating, then the final BER would have a different boiler (and associated efficiency) to the provisional rating.

2 Guidance on publication of BER assessments

2.1 Dwelling floor area and the BER requirement

Statutory Instrument 666 of 2006 details the European Communities Energy Performance of Buildings Regulations. These regulations provide details on buildings for which a BER Certificate must be provided. While some buildings are exempt from the BER requirements (as detailed in S.I. 666), the owners of these buildings may choose to obtain a BER for the building on a voluntary basis. For example, a homeowner may choose to obtain a BER for an existing dwelling which is not for sale or rent.

S.I. 666 exempts a number of building types from the BER requirement including buildings which are "a stand alone building with a total useful floor area of less than 50m^2". In other words, a detached house with "useful floor area" of less than 50m^2 does not require a BER.

In this context, the "useful floor area" should be considered as a space within the dwelling which can be occupied and serves a purpose within the dwelling. Areas which should be considered as potential "useful floor area" in the context of SI 666 include:

- All conservatories (including those which can be excluded from the BER assessment as per DEAP section 3.3.3);
- All porches;
- All basements;
- All converted attics (accessible via fixed staircases);
- Heated garages;
- All habitable rooms;
- Other rooms (such as kitchens, utility room, hallways, landings, bathroom, cloakroom, en-suite accommodation and similar).

2.2 BER certificates on the National Administration System

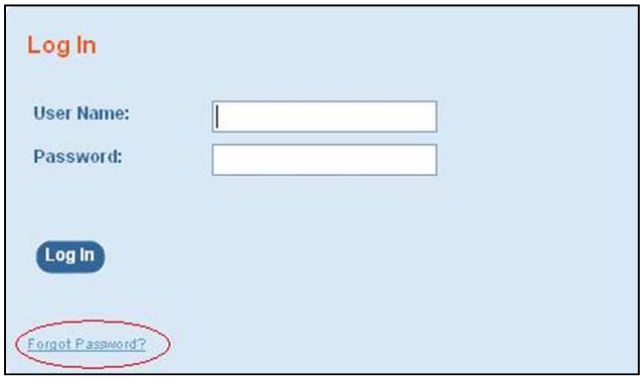
The National Administration System (NAS) holds the BER certificate associated with the latest published version of each BER number's assessment. In the cases where more than one rating is associated with a single BER number, only the most recent published rating's certificate is available on NAS.

The BER certificate should not be altered after it is downloaded from the NAS. Changes such as addition of the client or BER Assessor's name should not be made to the certificate.

2.3 NAS login

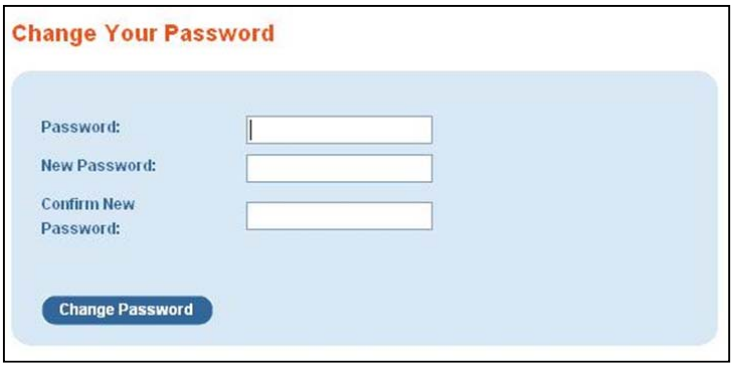
In cases where an Assessor attempts to login to NAS and uses an incorrect password three times in succession, then their NAS account will become locked. The Assessor should then contact the BER Helpdesk to have the account unlocked, and, if required, the helpdesk can then assist in getting a new password.

If an Assessor has lost their password, then they should select the "Forgot Password?" option on the NAS login window.



The assessor is then required to enter their user name (Assessor number) and date of birth (dd/mm/yyyy format).

A new password is then emailed automatically to the Assessor's registered email address. This password is case-sensitive and can be copied+pasted into the NAS login window. Once logged in, the assessor can change to a new password if they wish to do so. The password must be at least six characters in length containing at least one "symbol" character.



In the case of any difficulties with passwords or login, assessors are advised to contact the BER Helpdesk for assistance.

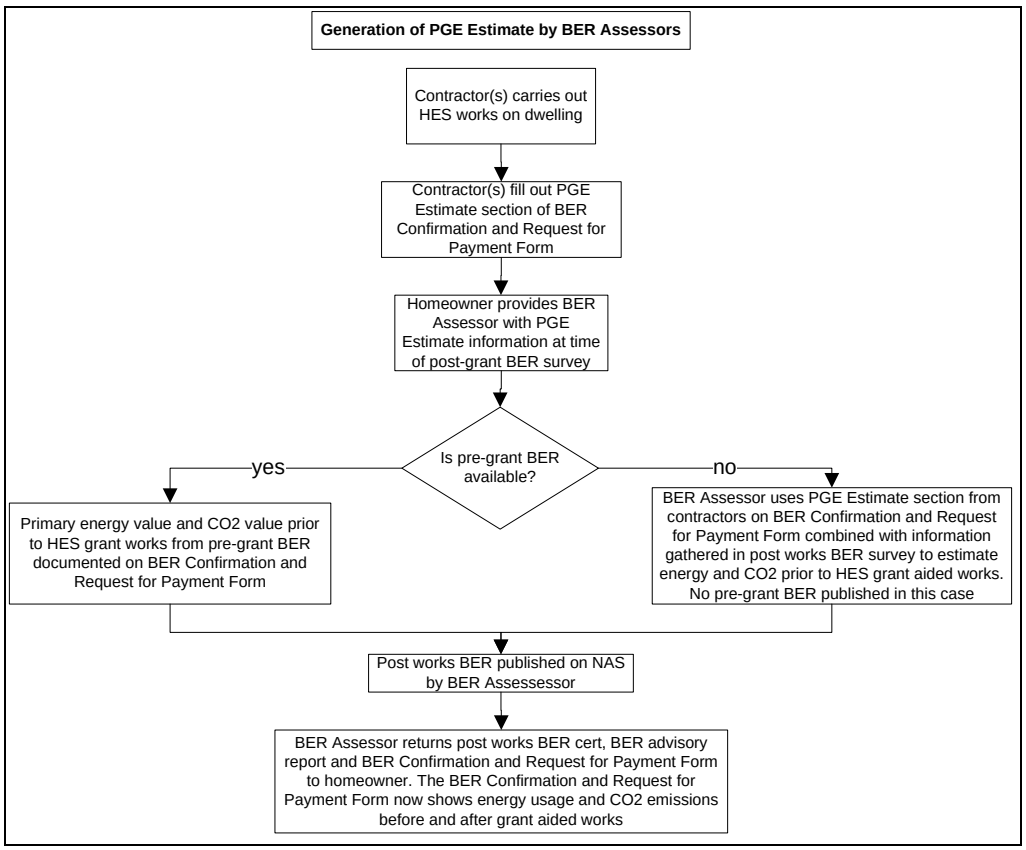
BER Assessors – Dwellings Technical Bulletin #13

Issue No. 4/10 **May 2010**

1 Introduction

From 8th June 2010, a Building Energy Rating (BER) is to be an integral part of all grant applications under the Home Energy Saving scheme, whereby homeowners must undertake a BER on their home **after** grant aided works have been completed in order to measure the impact of the upgrade works. This will give homeowners a thorough and objective assessment of the energy performance of their home following upgrade works, including a rating on an A-G scale. The first such BER assessment will attract grant aid of €100. A published BER certificate is required for **each** application and therefore it is advisable that homeowners apply for, and undertake, all planned grant aided works at the same time to minimize the costs associated with multiple BER assessments. Please note that grant payment can only be claimed once all measures associated with an application have been completed, including the BER assessment.
As part of the BER Confirmation and Request for Payment process, the homeowner will require a Pre-Grant Evaluation (PGE) Estimate. The PGE Estimate is detailed as follows:

- The PGE Estimate information on the "BER Confirmation and Request for Payment Form" when combined with the mandatory post grant works BER allows the typical annual primary energy usage and CO_2 emissions prior to the HES grant measures to be calculated.
- The post works BER must always be carried out strictly within the rules provided in the BER Assessor's Code of Practice, The DEAP Methodology and the DEAP Survey Guide. This includes the requirements on provision of adequate supporting evidence for any use of non-defaults in the post works BER.
- Publication of a pre-grant BER is not a mandatory requirement, but, if a pre-grant BER has been carried out, it may be used to show the annual energy usage and CO_2 emissions prior to the grant aided works. Where the pre-grant BER is not available, then a brief description of the status of roofs, walls, heating system and heating controls prior to the grant works being carried out is used to determine the estimated energy usage of the house prior to works being carried out. This description is given on the BER Confirmation and Request for Payment Form (Section 4) as detailed under www.seai.ie/hes. The information is provided by the contractors who have carried out the HES grant aided works on the dwelling. The process is illustrated in the following diagram:



The guidelines in this document are to be used by BER Assessors to estimate the annual energy use and CO_2 emissions of the dwelling prior to the HES Grant works. This information is entered under Section 3 of the BER Confirmation and Request for Payment Form by the BER Assessor.

2 Estimating energy and CO_2 prior to grant aided measures

Once the BER Assessor has completed the post works BER, one of the following two steps is taken to determine the annual primary energy usage and CO_2 emissions of the dwelling prior to the HES grant works:

- Where a BER is published reflecting the dwelling prior to the grant works being carried out, the primary energy (kWh/m^2/yr) and the CO_2 emissions (kg/m^2/yr) for the pre-grant BER are to be entered under Section 3 of the BER Confirmation and Request for Payment Form by the BER Assessor.

- In cases where there is no pre-grant BER available, then the assessor must use Section 4 of the BER Confirmation and Request for Payment Form, combined with the information gathered on site during the post works BER survey to estimate the energy and CO_2 emissions of the dwelling. This is entered under Section 3 of the BER Confirmation and Request for Payment Form. This is best done by the following sequence of actions:

    1. Complete the post works BER following the rules in the BER Assessors Code of Practice, the DEAP Methodology and the DEAP Survey Guide. As always, collate supporting evidence for any non-defaults entered in the post works BER assessment. This BER is published on the NAS, reflecting the dwelling as it now stands after the HES works have been carried out.

    2. Use the post works BER XML file as the starting point to estimate the primary energy usage and CO_2 emissions (per m^2/yr) of the dwelling prior to the HES grant being carried out. Read the post works assessment XML file into DEAP, and make any changes to the roofs, walls and heating system/controls as shown in Section 4 of the BER Confirmation and Request for Payment Form. The DEAP primary energy usage and CO_2 emissions now reflect the dwelling as it was prior to the HES grant measures being carried out. This file is NOT to be published on NAS as it is not a full BER assessment, and merely is to provide estimated energy usage prior to grant works. This information is entered by the BER Assessor on Section 3 of the BER Confirmation and Request for Payment Form.

    3. In some cases, the homeowner may indicate that an extension was added to the dwelling at the same time as the HES works being carried out. This extension floor area should be copied by the assessor to Section 3 of the BER Confirmation and Request for Payment Form. However, as this new extension is not HES Grant Aided, it does not have an impact on the estimate of energy usage or CO_2 emissions prior to HES grant aided works being carried out.

2.1 Use of the PGE Estimate Information: Part 1: Roofs

Section 4 of the BER Confirmation and Request for Payment Form details the information for carrying out the Pre-Grant Evaluation (PGE) Estimate. Part 1 (Roof area information) shows the roof type, area (m^2) and estimated U-value (W/m^2K) only for the section of roof which has been upgraded under the HES grant aided works. These values are entered in DEAP under building elements -> roofs, replacing the associated values shown in the post works BER assessment. Typically this would mean that the U-value of a section of roof changes from a lower U-value (with insulation) to a higher U-value (without insulation). This is illustrated in Section 3 of this document.

2.2 Use of the PGE Estimate Information: Part 2: Walls

Section 4 of the BER Confirmation and Request for Payment Form details the information for carrying out the Pre-Grant Evaluation (PGE) Estimate. Part 2 of the PGE Estimate information (Wall area information) shows the insulation type, area (m^2) and estimated U-value (W/m^2K) only for the section of wall which has been improved under the HES grant aided works. These values are entered in DEAP under building elements -> walls, replacing the associated values shown in the post works BER assessment. Typically this would mean that the U-value of a section of wall changes from a lower U-value (with insulation) to a higher U-value (without insulation). This is illustrated in Section 3 of this document.

2.3 Use of the PGE Estimate Information: Part 3: Heating System

Section 4 of the BER Confirmation and Request for Payment Form details the information for carrying out the Pre-Grant Evaluation (PGE) Estimate. Part 3 of the PGE Estimate information (Heating system information) shows information related to the heating system controls and the heat source itself prior to grant works being carried out. These values are entered in DEAP as outlined in the table below replacing the associated values shown in the post works BER assessment. This is illustrated further in Section 3 of this document. The following table provides further detail:

DEAP Tab	Section in PGE Estimate Form	DEAP Field	How to fill out DEAP field
Water heating	Hot water controls	Is supplementary electric water heating used in summer?	Follow guidance in DEAP manual section 4.6
		Temperature factor unadjusted	Follow guidance in DEAP Table 2
		Temperature factor multiplier	Follow guidance in DEAP Table 2
		Primary circuit loss type	Select appropriate option from DEAP Table 3 (e.g. boiler with uninsulated primary pipework and no cylinder thermostat)
Distribution System Losses and Gains	.Heating controls .Primary space heating system .Primary heating distribution system	Temperature adjustment	Follow guidance in DEAP Table 4
		Heating system control category	
		Heating system responsiveness category	Generally follow guidance in DEAP Table 4. Assume that: . Underfloor heating in screed/timber : responsiveness = 2 . Underfloor heating & radiators mixture: responsiveness = 2 . Electric storage heating has responsiveness = 4
	Heating controls	Boiler controlled by room thermostat	Set to "yes" if there are room thermostats
Energy requirements	Primary space heating system	Space heating efficiency	For Gas/oil/LPG boiler: HARP efficiency where available. Otherwise assume the following efficiencies: . Cooker boiler: 60% . Pre-1998: 65% . Non-condensing 1998 or later: 75% . Condensing 1998 or later: 85%
			Electric storage or direct acting electric heaters assumed to be 100% efficient
			Solid fuel appliance efficiency is assumed to be: . Open fire without back boiler: 30% . Open fire with back boiler: 50% . Closed room heater without back boiler: 60% . Closed room heater with back boiler: 65% . Centralised solid fuel boiler: 60% . Solid fuel cooker boiler: 50%
			Renewable appliance efficiency assumed to be: . Ground source heat pump: 300% . Air source heat pump: 250% . Wood pellet/chip boiler: 65%
	.Heating controls .Hot water controls .Primary space heating system .Primary heating distribution system	Efficiency adjustment factor	Follow guidance in DEAP Table 4, paying particular heed to the thermostats and boiler interlock entries in the PGE Estimate Form.
		Secondary space heating	Same values as for post works BER
	Hot water controls	Water heating efficiency and efficiency adjustment factor	Generally the same as for space heating above unless "Immersion is the only water heater" is selected (then water heating efficiency is 100%)
		Fuel types	Usually the same as the post works BER unless entire heating system has changed (e.g. HES works replaced electric heating with a condensing boiler and controls)

3 Example of energy and CO_2 annual estimate prior to HES works

This example shows how an Assessor uses a published BER of a dwelling (post HES grant aided works) combined with the information from the HES grant contractors to estimate the dwelling's energy usage (and CO_2 emissions) prior to the grant aided works being carried out.

3.1 Sample dwelling: background of works carried out

The example is based on a 160m^2 1920s house which has HES grant aided work carried out as follows:

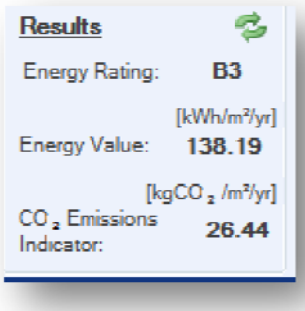
- 100m^2 stone walls dry lined with polyurethene board (65mm) and plasterboard (12.5mm);
- 60m^2 insulated attic ceiling with 300mm mineral fibre quilt between and above joists;
- Installation of condensing mains gas boiler with 90.2% efficiency (taken from HARP database);
- Separate time/temperature control for hot water cylinder and 2 space heating zones.

The BER Assessor has been supplied with invoices/receipts detailing the type and thickness of wall insulation.

The house has a 2005 extension with 20m^2 floor area, 20m^2 flat roof and 25m^2 cavity walls. The extension has not been retrofitted with insulation under HES as it is relatively new. All of the original stone walls (100m^2) and attic ceiling (60m^2) have been retrofitted with insulation as detailed above.

The BER assessor carries out the post grant BER survey and publishes the subsequent BER assessment on NAS. As always the DEAP Survey Guide is followed to determine the various non defaults, heating system controls and boiler efficiency for the published post grant BER. Any published BER assessments must follow the usual rules as set out by SEAI in the DEAP survey guide, DEAP methodology and Code of Practice.

The primary energy usage and CO2 emissions for the post grant BER as indicated by DEAP are as follows:



3.1.1 Entry of pre-grant roofs in DEAP

In this case, the BER assessor has deemed that the section of roof insulated as a result of the HES grant works has a U-value of 0.13W/m²K. This figure is derived as a result of the site survey carried out using the DEAP methodology as would be the case for any existing dwelling BER assessment. The usual rules apply in relation to supporting evidence for use of non defaults as outlined in the DEAP Survey Guide. The 60m² newly insulated roof and 20m² roof on the extension are as shown below. These are reflected in the published post grant BER.

Delete	Copy	Roof Type	Roof Description	Age Band	Insulation Thickness	Area m²	U-Value [W/m²K]	AU V [W/
X		Pitched Roof - Insulated on Cei...	300mm fibre insulated ceiling	1900 - 1929	>= 300 mm	60.00	0.13	7.80
X		Flat Roof	Flat roof section on 2005 extension	2005 onwards	Unknown	20.00	0.25	5.00

The information shown in the PGE Estimate Form (Part 1) from the roof insulation contractor shows the area of roof which was grant aided and the estimated U-value prior to grant works being carried out:

Part 1: Roof area information (prior to grant measures)

Tick roof type being insulated	☐ Flat Roof ☐ Sloping rafters ☒ Ceiling in attic	Enter area of roof with new insulation added (m²)	60
		Estimated average U-value prior to addition of new insulation (W/m²K)	2.2

The pitched roof (insulated on ceiling) is therefore changed in DEAP to represent the roof prior to the grant works being carried out. This will be used as part of the estimate of energy usage of the dwelling prior to the grant aided works:

Delete	Copy	Roof Type	Roof Description	Age Band	Insulation Thickness	Area m²	U-Value [W/m²K]	AU V [W/
X		Pitched Roof - Insulated on Cei...	pre grant ceiling insulation (from contractor estimate)	1900 - 1929	Unknown	60.00	2.2	132.0
X		Flat Roof	Flat roof section on 2005 extension	2005 onwards	Unknown	20.00	0.25	5.00

3.1.2 Entry of pre-grant walls in DEAP

Similar to roofs, the BER assessor has deemed that the section of wall insulated as a result of the HES grant works has a U-value of 0.27W/m²K. This figure is derived as a result of the site survey carried out, following the DEAP methodology (and survey guide) as would be the case for any existing dwelling BER assessment. The 100m² newly insulated wall and 25m² wall on the extension are as shown below.

Delete	Copy	Wall Type	Wall Description	Age Band	Wall is semi-exposed	Area m²	U-Value [W/m²K]	AU Value [W/K]
X		Stone	Solid with 65mm polyurethene, 12.5mm plaster	1900 – 1929	NO	100.00	0.27	27.00
X		300mm Cavity	2005 insulated cavity wall in extension	2005 onwards	NO	25.00	0.37	9.25

The information shown in the PGE Estimate Form from the wall insulation contractor shows the area of wall which was grant aided and the estimated U-value prior to grant works being carried out:

Part 2: Wall area information (prior to grant measures)

Tick grant type being insulated	☐ Cavity wall insulation ☒ Internal dry lining ☐ External wall insulation	Enter area of wall with new insulation added (m²)	100
		Estimated average U-value prior to addition of new insulation (W/m²K)	1.8

The stone wall is therefore changed in DEAP to represent the wall prior to the grant works being carried out. This will be used as part of the estimate of energy usage of the dwelling prior to the grant aided works:

Delete	Copy	Wall Type	Wall Description	Age Band	Wall is semi-exposed	Area m²	U-Value [W/m²K]	AU Value [W/K]
X		Stone	pre grant stone wall (info from contractor estimate)	1900 – 1929	NO	100.00	1.8	180.00
X		300mm Cavity	2005 insulated cavity wall in extension	2005 onwards	NO	25.00	0.37	9.25

3.1.3 Entry of pre-grant heating and controls in DEAP

Section 3.1 above outlines the controls and heating system which are entered in DEAP for the published BER (post grant aided works). The key features of these upgrades are:

- No supplementary electric water heating specified due to independent water heating from the boiler
- Time and temperature control of the hot water cylinder
- Time and temperature control of 2 space heating zones, providing heat to radiators giving:
  - Temperature adjustment of 0°C
  - Heating system control category of 3
  - Responsiveness category of 1
- The boiler is controlled by a room thermostat
- Boiler interlock present
- 90.2% efficiency for main space and water heating (mains gas fuel)

The boiler and controls contractor filled out the relevant section in the PGE Estimate Form as follows:

Part 3: Heating System information (prior to grant measures)

Tick grant type being insulated | Heating Controls Upgrade ☐ | High efficiency boiler with controls upgrade ☒

Details of Pre-works Primary Space Heating System (heats most of dwelling space)

Select one of A, B, C or D and fill out associated entries

☒ Gas, oil or LPG central heating boiler (A)	☐ Electric Heating (B)	☐ Solid fuel (C)	☐ Renewable (D)
Make and Model: Flamebrite 2000 ☒ Efficiency (from HARP database) 76.6 (%) ☒ Pre 1998 ☐ Cooker/range boiler ☐ 1998 or later, non-condensing ☐ 1998 or later, condensing	☐ Electric storage heating ☐ Standard Electric heating	☐ Open fire ☐ Closed room heater ☐ With back boiler ☐ Without back boiler ☐ Centralised solid fuel boiler ☐ Solid fuel cooker / range	☐ Heatpump (air source) ☐ Heatpump (ground source) ☐ Wood pellet/chip boiler

Primary Heating Distribution System

☒ Radiators only
☐ Underfloor heating in concrete slab
☐ Underfloor heating in screed/timber
☐ Underfloor heating & radiators

Heating Controls (tick all that apply)

☐ No controls
☒ Programmer / timeclock
☐ Full zone control
☐ Load or weather compensator
☐ Boiler energy management system
☐ Delay start thermostat
☐ Boiler interlock
☐ Appliance thermostat

Number of room thermostats:
20 Percentage of rads with TRVs (%)

Hot Water Controls (tick all that apply)

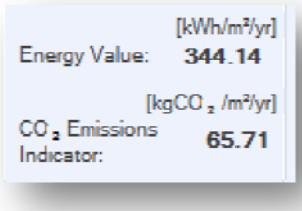
☐ Cylinder thermostat
☐ Independent time control
☒ Primary space heating provides hot water
☐ Hot water from central heating seperable from main space heating
☐ Immersion is the only water heater

Using Section 2.3 of this document as guidance, the BER Assessor makes the relevant changes in DEAP to represent the heating system and controls prior to the grant works being carried out. This, combined with the steps above is used to estimate the energy usage of the dwelling prior to the grant aided works.

DEAP Tab	Section in PGE Estimate Form	DEAP Field	Value for pre grant representation of dwelling
Water heating	Hot water controls	Is supplementary electric water heating used in summer?	YES (no independent control of water heating from space heating)
		Temperature factor unadjusted	0.6 (same as the value in post works BER)
		Temperature factor multiplier	1.3 (No separate time or temperature control on cylinder)
		Primary circuit loss type	Boiler with uninsulated primary pipework and no cylinder thermostat
Distribution System Losses and Gains	.Heating controls .Primary space heating system .Primary heating distribution system	Temperature adjustment	0.6 (programmer only without room stats or TRVs on more than half of radiators)
		Heating system control category	1(programmer only without room stats or TRVs on more than half of radiators)
		Heating system responsiveness category	1 (radiators as heat distribution)
	Heating controls	Boiler controlled by room thermostat	No (no room thermostats present)
Energy requirements	Primary space heating system	Space heating efficiency	76.6% (efficiency taken from HARP by contractor)
	.Heating controls .Hot water controls .Primary space heating system .Primary heating distribution system	Efficiency adjustment factor	0.95 (no boiler interlock or thermostatic control)
		Secondary space heating	Same values as for post works BER
	Hot water controls	Water heating efficiency and efficiency adjustment factor	Same as for space heating above (76.6% and 0.95 respectively)
		Fuel types	Same as the post works BER (mains gas) but with electricity for supplementary electric water heating fuel type

3.1.4 PGE Estimate

The estimated pre grant primary energy usage and CO_2 emissions for this dwelling based on the above changes to the post works BER are as follows (as shown in DEAP):



The final step is for the BER assessor to fill out the information on page 2 of the PGE Estimate Form as shown below. This is returned to the homeowner:

Pre Grant Evaluation Results (to be completed by BER Assessor)

BER number of dwelling	X X X X X X X X X X	Primary Energy value (kWh/m²/yr)	CO² emissions value (kg/m²/yr)
Dwelling total floor area (m²) from published BER	160	Prior to HES works	344.14 / 65.71
Extension floor area (m²) detailed by homeowner*	0	Published BER after works	138.19 / 26.44

*This only applies to extension(s) added at the same time as the HES works being carried out

3.2 Extensions built at the same time as HES works

In cases where the dwelling has a new extension added at the time of the HES works, the homeowner details the new extension floor area on Section 2 of the BER Confirmation and Request for Payment Form. Taking the following example (for a different dwelling to that outlined in the previous sections), assume a dwelling to be 242m² total floor area including a 27m² extension added at the time of the HES grant aided works. This would appear on Section 2 of the BER Confirmation and Request for Payment Form as follows:

(a) Homeowner Declaration and Request for Payment

Was dwelling floor area extended at the same time as HES Grant Works carried out? (Yes/No)	yes
If the answer is yes to the above, what is the floor area of the extension? (m²)	27

The BER Assessor enters this along with the PGE Estimate results as shown here:

Pre Grant Evaluation Results (to be completed by BER Assessor)

BER number of dwelling	N N N N N N N N N N	Primary Energy value (kWh/m²/yr)	CO² emissions value (kg/m²/yr)
Dwelling total floor area (m²) from published BER	242	Prior to HES works	402.28 / 74.22
Extension floor area (m²) detailed by homeowner*	27	Published BER after works	176.45 / 35.54

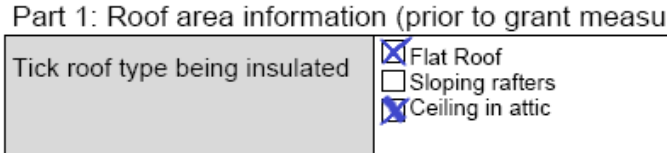
*This only applies to extension(s) added at the same time as the HES works being carried out

When the BER assessor generates the estimated figures for primary energy usage and CO_2 emissions for the dwelling prior to HES grant works, the floor area of the new extension (27m²) is included in the dwelling floor area in DEAP.

In other words, the floor area in DEAP should be 242m² for both the post grant BER and the PGE Estimate calculation.

3.3 Retrofit of more than one roof type

In some cases the contractor may have added insulation to more than one roof type as part of the HES grant works. For example a dwelling may have a roof which is partially sloping roof (with retrofitted ceiling insulation) and a flat roof (also retrofitted with insulation). In this case, both the flat roof and ceiling are shown as retrofitted by the contractor:



In order to account for insulation in the post grant BER assessment, the BER Assessor will have details of the areas which have been retrofitted with insulation either by receipts from the contractor or by observing the newly installed insulation. The Assessor can therefore apply the estimated U-value (prior to retrofit works) to the relevant areas of flat roof and ceiling when calculating the PGE Estimate.

BER Assessors – Dwellings Technical Bulletin #14

Issue No. 5/10 **August 2010**

Contents:

The archive of previous bulletins is available on the SEAI website.

1 DEAP Version 3.1.0 Release

DEAP Software Version 3.1.0 is now available for download from
http://www.seai.ie/Your_Building/EPBD/DEAP/Download/ .

This release contains several new features:

- Upload of assessments from DEAP directly to the National Administration System (NAS)
- Download of published assessments from NAS directly to DEAP
- Generation of a new report file providing a summary of the dwelling and details of the Building Regulations Part L Technical Guidance Document conformance achieved
- Compatibility with Windows 7 and 64 bit Windows

The release notes on the website provide instructions which must be followed during the DEAP installation process. The release notes also provide details on the new features available in DEAP Version 3.1.0.

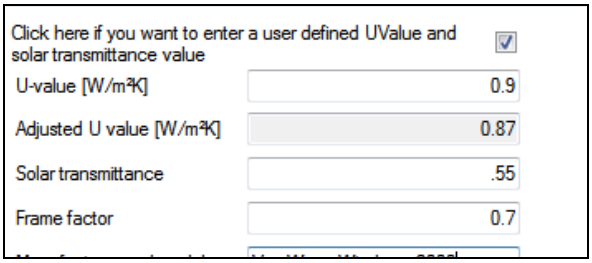
Note regarding prior versions of DEAP (V3.0.0 and V3.0.1)
While BER assessments from prior versions of DEAP will continue to be accepted by NAS for the next number of weeks, it is planned that NAS will only accept assessments uploaded directly from DEAP Version 3.1.0 from the end of the third quarter of 2010. With immediate effect, user **login** in the prior DEAP versions will no longer be available. This disables the **MPRN lookup** and **BER number validation lookup** on the **Start** tab. These functions remain available on the NAS website https://ber.seai.ie and also in the new DEAP release. Prior versions of DEAP may also exhibit a security alert when the **Table 4** lookup function in the **Distribution System Losses and Gains** tab is accessed. This warning is known to SEAI and it is safe to click "Yes" and proceed with the Table 4 Lookup function.

Troubleshooting and installation issues
The release notes have been updated to include "Appendix A: Issues and Troubleshooting" to address commonly asked questions and known issues within DEAP 3.1.0.

Issues now addressed in Appendix A of the release notes include:

- Instructions on DEAP Version Download using Google Chrome browser;
- Instructions on DEAP Version Download using Mozilla Firefox browser;
- Entering window U-Values < 1.0W/m^{2}K:

If DEAP users encounter a window with accredited test data for U-value and solar transmittance in a dwelling, this accredited data can be entered as per the following diagram:



It is likely that DEAP Version 3.1.0 will close down (without warning) due to an internal error in cases where the entered non-default window U-value is < 1W/m^{2}K.
This can be avoided as follows:

1. The user wishes to enter a window U-value of "0.x"
2. In the U-value box for the window in DEAP, enter "x"
3. Then enter "." To make the U value "0.x".

For example, when entering a window U-value of ".9", first enter "9" and then change the entry to ".9". The window U-value <1 is then entered without further issues. For any assistance on this matter, please contact the BER helpdesk.

2 Basements in DEAP in Existing Dwellings

This section discusses the treatment of heated and unheated basements in BER assessments for existing dwellings. In particular, examples are provided in relation to the relevant heat loss surfaces and the impact on dwelling floor area.

2.1 Unheated Basements

An unheated basement is not considered part of the Total Floor Area of the dwelling in a BER assessment. The ground floor above the unheated basement is a heat loss area, i.e. the Assessor must account for heat lost from the dwelling down through the ground floor into the unheated basement.

In DEAP, the Assessor selects "Ground Floor – Above Unheated Basement" from the list of possible floor types. In cases where there is insufficient information to calculate the actual U-value of the heat loss ground floor above the unheated basement, the Assessor must use the defaults provided by DEAP. The example below is of a floor above an unheated basement. It was built in 1979 having an area of 56m^2 and an exposed perimeter of 22m.

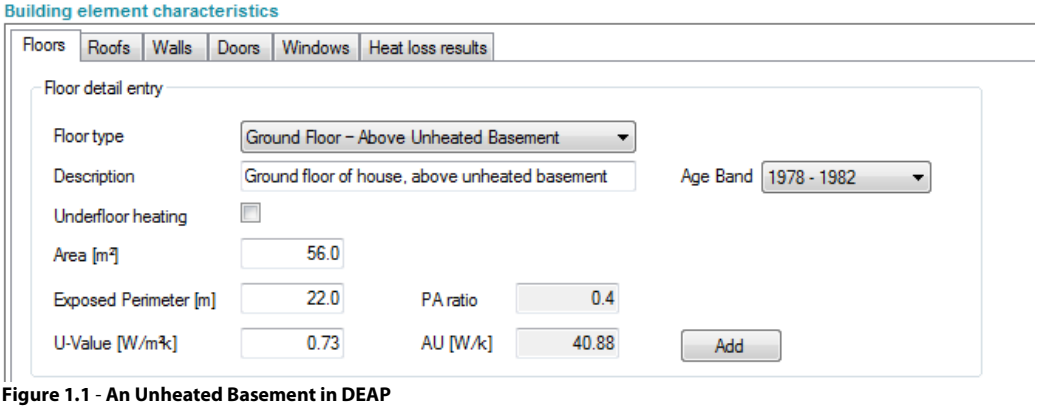


Figure 1.1 - **An Unheated Basement in DEAP**

2.2 Heated Basements

If a basement is heated and consists of habitable rooms then it is included in the Total Floor Area of the dwelling in the DEAP assessment. The ground floor above the heated basement is not a heat loss area as it is not above an unheated area. Heat is lost through the walls and floor of the basement as they are exposed, so the U-values of the basement walls and floor must be calculated and accounted for in DEAP.

The following cases may arise:

- Basement fully underground
- Basement partially underground

Heated Basement Fully Underground

If the basement floor and walls are fully underground then the Assessor selects, "Heated Basement – walls exposed to ground" when accounting for the heat loss areas of the basement under "Building elements – Floors" in DEAP. In this case the Assessor must provide:

- the floor area between the basement floor and the ground below (55m^2 in this example);
- the area of the basement wall exposed to ground (75m^2 in this example);
- the exposed perimeter of the **basement floor** (22m in this example);
- the Age Band of the basement.

DEAP then selects a default U-value which is overwritten by the Assessor when a non-default U-value is available.

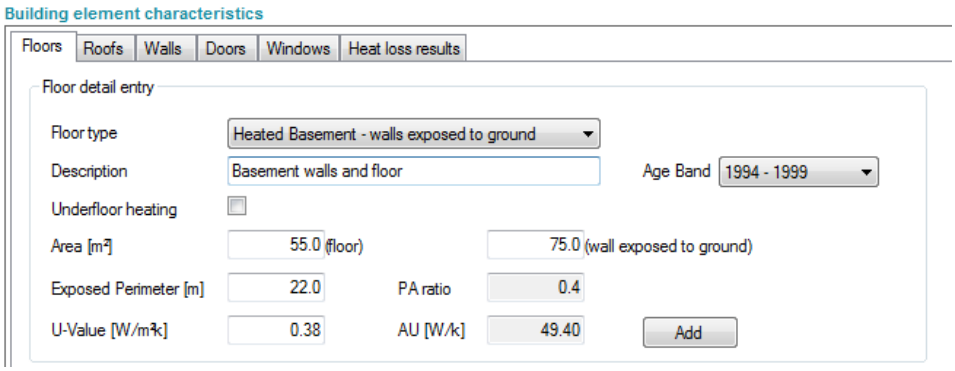


Figure 1.2 - A Heated Basement Fully Underground in DEAP

Heated Basement Partially Underground

In cases where some of the basement's outer walls are below ground, and some are above ground, it is necessary to calculate the average basement depth. Average basement depth means the average depth of the internal basement floor level below the external ground level.
As stated on page 88 of the DEAP Manual, if the average basement depth is *greater than or equal to* 1.2m then the floors and walls which are exposed to ground are entered under "Building Elements – Floors".
However, the walls (or sections of walls) of the heated basement that are above ground are always entered under the "Building Elements - Walls" section of DEAP.

As an example, Figure 1.3 shows a detached house with a heated basement. The external ground is 1.3m above the basement floor level on all sides of the house giving an average basement depth of 1.3m.

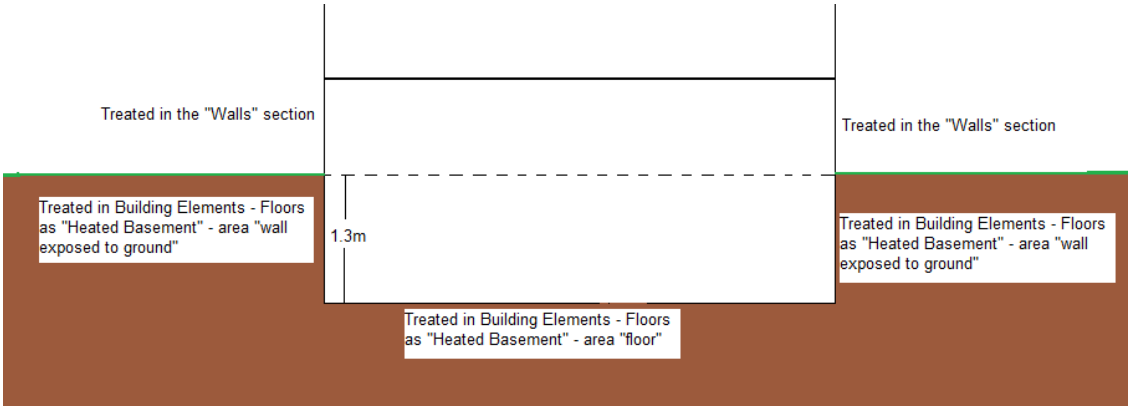


Figure 1.3 - A Heated Basement Partially Underground – Average Basement Depth greater than 1.2m
Floors and Walls exposed to ground are entered in "Building Elements – Floors".
Walls above ground are entered in "Building Elements – Walls".

If the average basement depth is *less than* 1.2m then the basement floor is treated as a solid ground floor and the basement walls are treated as normal walls exposed to air under "Building Elements – Walls".
As an example, consider a heated basement in a detached dwelling with floor area 7m by 10m.
At the back of the house the external ground level is 2.6 metres above the basement floor.
At the sides and front of the house the external ground level is at the basement floor level, i.e. the walls are above ground, see Figure 1.4.

The dimensions of the basement walls are:

- back wall = 10m wide * 2.6m high (below ground)

- front wall = 10m wide * 2.6m high (above ground)
- each side wall= 7m wide * 2.6m high (above ground)

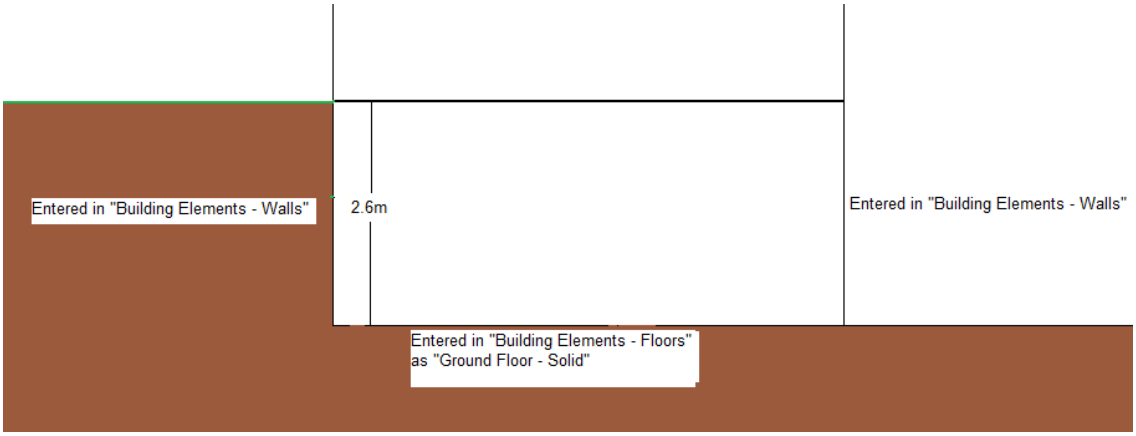


Figure 1.4 - A Heated Basement Partially Underground – Average Basement Depth less than 1.2m
Basement floor entered in "Building Elements – Floors" as "Ground Floor – Solid".
All walls entered in "Building Elements – Walls".

The average of the basement depth is weighted by the wall length,

$$\text{Ave. Basement Depth} = \frac{(10*2.6)+(7*0)+(7*0)+(10*0)}{(7+10+7+10)} = 0.76\text{m}.$$

This is less than 1.2m so,

- the basement floor is treated like a standard solid ground floor, and,
- the basement walls are treated as standard walls exposed to air,

with the appropriate default U-values for that Age Band if defaults are being applied.

Heated Basements in Semi-detached or Terraced Dwellings

When surveying a semi-detached or mid-terrace dwelling with a heated basement, it may not be possible to examine the adjoining dwelling to establish whether a basement is present.

It is likely that the adjoining house has a basement and that unless proven otherwise, the adjoining basement should be assumed to be unheated.

If the adjoining basement is unheated or assumed to be unheated, then the basement party-wall is treated as a heat loss basement wall. If the adjoining basement is known to be heated, then there is no heat loss through the basement party-wall.

The party wall is always included in the average depth calculation for the heated basement, regardless of whether the adjoining basement is heated or unheated.

3 Existing Windows with Retrofitted Glass

When an Assessor encounters retrofitted / upgraded glass in an existing window frame, they will most likely need to resort to the default window U-values in DEAP.
Non default values are used where there is sufficiently evidenced information to carry out a calculation to EN10077-1. It is unlikely that EN10077-2 (detailed calculation) or EN12567 (measurement) would be feasible in this case.
Also, to use a non default U-value, an Assessor would require a certified solar transmittance value (covered in the DEAP manual Table 6b and the March 2009 Technical Bulletin).

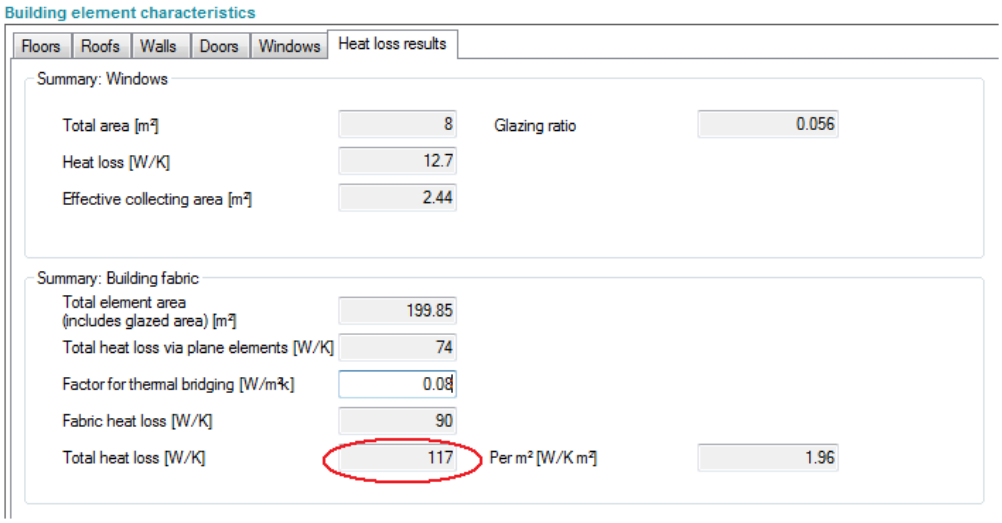
4 Heating Systems in Highly Insulated Small Dwellings

Section A3.2 of the DEAP manual provides guidance on selecting the primary and secondary heating systems in existing dwellings with inadequate heating systems, i.e. dwellings in which one or more habitable rooms have no heat emitters. Generally speaking, rooms without heaters are assumed to be heated by electric heaters.

An exception is made in the case of small, highly-insulated dwellings where the Design Heat Loss of the entire dwelling is less than 3kW, as outlined in section A3.3 of DEAP. In such cases a single heat emitter, e.g. a stove or a gas-fire, situated in the main room is assumed to be sufficient to heat the entire dwelling.

As an example, consider a small cottage insulated according to Building Regulations Part L, 2008.
The cottage has a living room, kitchen/diner and two bedrooms (4 habitable rooms). The only heating is provided by a solid fuel stove in the living room. As such 25% of the habitable rooms are actually heated.
Normally the guidance given in DEAP manual Section A3.2 would be appropriate but as this is a well-insulated dwelling it is necessary to see if the guidance in A3.3 applies.

The Design Heat Loss (DHL) is calculated by multiplying the Total Heat Loss of the dwelling by a reference temperature-difference, taken to be 22°C. The Total Heat Loss of the dwelling is taken from the Heat Loss Results page of Building Elements. DEAP includes heat lost through the fabric and ventilation heat losses (such as that associated with the open flue connected to the stove) in the Total Heat Loss figure.



So in this case,

- Design Heat Loss = Total Heat Loss x 22,
- Design Heat Loss = 117 x 22 = 2574 W = 2.574 kW

The Design Heat Loss for the dwelling is less than 3kW as required by A3.3.
In this case the solid fuel stove is taken to be the Primary Space Heating System and there is no Secondary Space Heating System.

If the Design Heat Loss was greater than 3kW then the guidance in A3.2 applies, namely that Direct Acting Electric heaters are the Primary Space Heating System and the solid fuel stove is the Secondary Space Heating System.

5 Calculating Average Storey Height

Storey Height is defined in Section 1 of the DEAP manual as "the total height between the ceiling surface of a given storey and the ceiling surface of the storey below". In some dwellings this height may vary across a single storey, e.g. if an extension of different ceiling height has been added.
In cases such as this the area-weighted average storey height must be calculated.

As an example, take a two-storey detached house built in the 1940s to which a single storey ground floor extension was added in 2000. An Assessor carried out a BER survey of the dwelling and noted the following:

Ground Floor – Original Section: Area: 42m^2 Floor-to-ceiling Height: 2.7m	*Ground Floor - Extension* Area: 16m^2 Floor-to-ceiling Height: 2.4m
First Floor – Original Section Area: 42m^2 First floor ceiling has flat and sloped sections – see below	Thickness of intermediate floor: Could not be measured

The area-weighted average height of the ground floor, h_{AVE}, must be calculated using the formula,

$$h_{AVE} = \frac{h_1 * A_1 + h_2 * A_2}{A_1 + A_2}$$

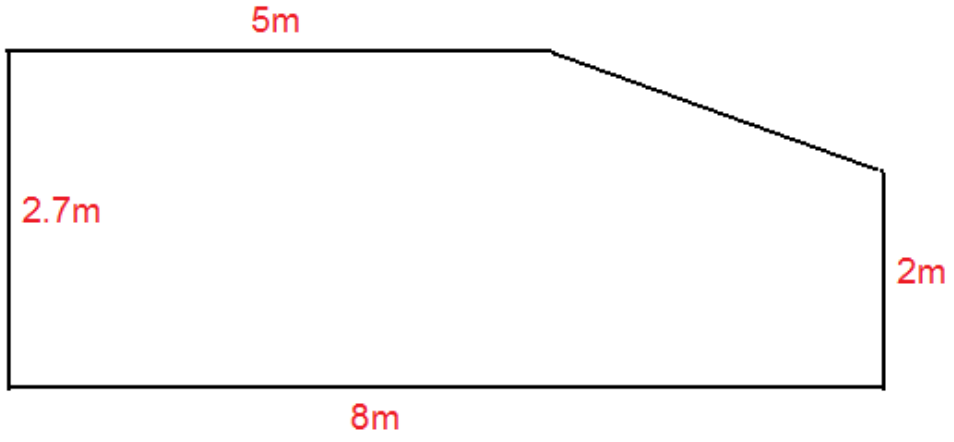
where,

h_1 = storey height of the original part of the ground floor = 2.7m,
A_1 = the Area of the original part of the ground floor = 42m^2,
h_2 = storey height in the ground floor extension = 2.4m,
A_1 = the Area of the ground floor extension = 16m^2.

So, the average storey height of the ground floor is,

$$h_{AVE} = \frac{(2.7 * 42) + (2.4 * 16)}{(42 + 16)} = 2.62\text{m}.$$

Below is a cross section of the first floor drawn by the Assessor,



The average height of the section with the flat ceiling is 2.7m.
The average height of the sloped section is,

$$(2.7 + 2)/2 = 2.35\text{m}.$$

The average height of the whole storey is,

$$h_{1st} = \frac{(5 * 2.7) + ((8 - 5) * 2.35)}{8} = 2.57 \text{ m}.$$

(In this case the average is weighted by the width of the section rather than the area but either method would give the same result.)
From the definition of storey height, we must remember to include the thickness of the intermediate floor. The Assessor noted that this could not be measured so the default value of 0.25m is used (from Section S4 of the DEAP manual). Thus, the average storey height of the first floor is,

h_{1st} = 2.57 + 0.25 = ~~2.72m.~~ **2.82m (corrected November 2012).**

In cases where the Assessor first calculates the volume of the storey, the average height can also be derived by dividing the volume of the storey by the storey floor area.

6 Lighting in Partially-lit Dwellings

The calculation of the electricity demand for lighting in a dwelling, as explained in Appendix L of the DEAP manual, assumes that the dwelling is fully lit, i.e. that there are fixed lighting outlets in every room.

In *partially-lit* dwellings, where fixed lighting is not present in every room, an adjustment must be made to calculate the electricity demand for lighting correctly.

To calculate the lighting demand in a partially-lit dwelling,

- the percentage of low energy fixed lighting outlets is calculated as before;
- the result is multiplied by a correction factor:

  Correction Factor = Number of rooms with fixed lighting outlets / Total number of rooms

As an example, take a dwelling with 10 rooms. 6 rooms have fixed lighting, 4 rooms have no fixed lighting.
In the 6 rooms that have fixed lighting there are a total of 12 fixed outlets; 7 of these contain low energy bulbs.
Percentage of low energy fixed lighting outlets in the 6 rooms with fixed lighting = (7/12) x 100 = 58.3%

This must be adjusted to account for the fact that only 6 of the 10 rooms have fixed lighting.
Percentage of low energy fixed lighting outlets = 58.3% x (6/10) = 35%.

This correction only needs to be made in dwellings that are partially lit by fixed lighting. In all other cases the usual calculation applies.
In all cases where Assessors carry out supplementary calculations in completing BER assessments, the calculations should be kept on file with the assessment records.

7 Declaration of Relevant Interests by Assessors

An Assessor who has other business interests, e.g. as a supplier of building products or services, is not prohibited from carrying out BER assessments. However, the BER assessment must be carried out in an independent and transparent manner and in compliance with all of the requirements in the Code of Practice. In particular, an Assessor is obliged under Section 11 of the Code of Practice "to disclose to clients....any and all direct or indirect commercial connections which he/she or his/her principal may have to

manufacturers, suppliers or other third parties who may be engaged directly or indirectly by a client arising from recommendations in the advisory report". Note that, as detailed in Section 6 of the Code of Practice, there are scenarios in which an Assessor is prohibited from carrying out a BER assessment on a dwelling. Further details on disciplinary procedures in relation to the BER Assessor's Code of Practice are detailed in the March 2010 Technical Bulletin.

BER Assessors – Dwellings Technical Bulletin #15

Issue No. 5/10 **September 2010**

Contents:

The archive of previous bulletins is available on the SEAI website.

1 BER Quality Assurance

The quality of service delivery by BER Assessors is central to the reputation and effectiveness of the BER scheme, both for the purposes of fulfilling legal obligations to building owners and in stimulating action to improve the energy performance of buildings. That quality of service has two key dimensions: competence and conduct.

As the Issuing Authority responsible for the BER scheme, and as part of an overall suite of provisions governing the registration and performance of BER Assessors, SEAI has in place a quality assurance system for BER Assessors, and a related disciplinary procedure. Through this system and procedure, SEAI will maintain a strong focus on monitoring the technical performance and professional conduct of BER Assessors, and taking appropriate corrective action. This policy is designed to serve the interests of clients for BER services and of all reputable BER Assessors.

The Quality Assurance system and The Disciplinary Procedure, effective since the 1st May 2010, outlines the key elements and processes of the Quality Assurance System and of the Disciplinary Procedure for BER Assessors. It applies equally to BER Assessors operating in either the domestic or non-domestic buildings sector. Disciplinary sanction can arise from audits or complaints. Audits can be selected on either a random or targeted basis at SEAI's discretion.

Audit Selection:

As stated in Section 15 (Monitoring and Compliance) of the Code of Practice, SEAI shall not be required to show cause for the selection of any BER assessment or BER Assessor for audit and where a particular BER assessment or BER Assessor is selected for audit, no implication shall be drawn that SEAI has cause for concern about the accuracy of that BER assessment or of the integrity or competence of the relevant BER Assessor or principal.

Audit Process

Auditing is a key tool through which quality control of BER Assessors is implemented. The aim of the BER Audit Programme is to identify technical, procedural or system faults in a timely manner so that:

- Any errors identified can be corrected or other appropriate action taken in relation to published assessments;
- Such faults are avoided in future through feedback directly to the BER Assessor concerned and to other BER Assessors as appropriate through the relevant communication channels; and
- Such faults are avoided in future through disciplinary action as appropriate.

It is required that a BER Assessor responds to SEAI within 28 days from the issuing of notification of an audit request. It is important that Assessors carefully review an audit request which is sent to the Assessor registered email address as failure to respond to an audit request results in penalty points.

Audit Status:

Audits completed to date since 1st May 2010 comprise of Data Review Audits, Desk Review Audits and Documentation and Practice audits selected on both a random and targeted basis. Selection of BER Assessors/ assessments for audit is on both a targeted and a random basis, and is at three sequential levels of progressively increasing intensiveness as detailed in Section 1.3 in the Quality Assurance system and The Disciplinary Procedure.

The following is the breakdown of audit completed under the Quality Assurance system and The Disciplinary Procedure.

Audit Type	Audits Completed
Data Review	1493
Desk Review	33
Documentation and Practice	18

Figure 1 below illustrates the breakdown of audit findings.

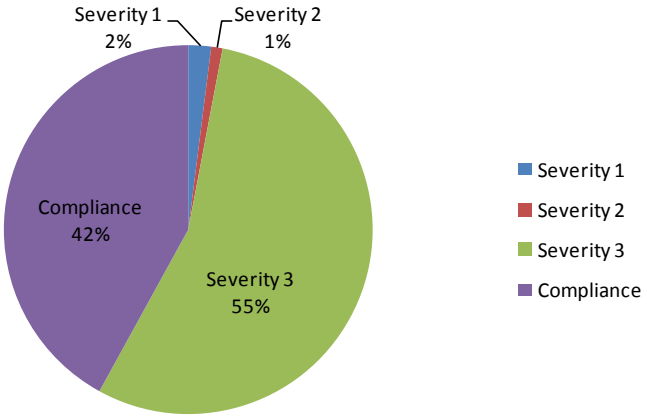


Figure 1: Severity of audit non-compliance for all audits

- **Severity 1**: A non-compliance that has a high potential to compromise the fundamental integrity of the BER scheme, damage public confidence or otherwise negatively impact the reputation of the scheme. Such a breach incurs 3 penalty points.
- **Severity 2:** A non-compliance that is significant but, while not acceptable, is unlikely, on its own, to affect the reputation of the BER scheme. Such a breach incurs 2 penalty points.
- **Severity 3**: A non-compliance that is less significant and would not affect the reputation of the BER Scheme. Such a breach incurs 1 penalty point.

Audit Findings:
The core role of the BER Quality Assurance System is to monitor and ensure widespread operational compliance by BER Assessors with the Code of Practice and the relevant technical methodology. The system will thus help to assist BER Assessors in the effective discharge of their duties and to ensure the accuracy of assessments. The following are the most common findings relating to each audit type to date:

Data Review Findings (High volume, desk based audits on single BER assessments):

Issue	Examples of errors and further guidance
No response to the audit request by the required deadline.	Each audit request will be issued along with a deadline date. Assessors must respond to the request for audit data by the deadline date.
Incorrect Building Type entered.	• Mid-floor apartment recorded as a top-floor apartment. • Top-floor apartment recorded as a mid-floor apartment. A mid-floor apartment has a floor above and below.
Assessor details not completed on the DEAP Survey form.	The DEAP Survey Form has an entry for BER Assessor number or name. This information must be provided on the DEAP Survey Form.
% of low energy lighting calculated incorrectly.	• Total count of % low energy lighting not recorded correctly; • Total number of lights not recorded correctly; • Calculation of % low energy lighting incorrect; • % figure not detailed on the survey form. DEAP Appendix L, along with several of the BER Technical Bulletins provide guidance on specification of the percentage of low energy lighting.
Unacceptable photo provided in support of number of storeys and dwelling type.	• Photographs taken not showing adjacent properties in support of the dwelling type. For example: o the photograph should show clearly the adjacent house in support of a semi-detached house; o the photograph should show clearly that there is no adjoining house in support of a detached house; • The boundary separation from neighbouring properties either side, above and below, are not clearly visible; • Photographs not supporting the presence of an external main entrance at ground in support of a maisonette; • Room in roof not included as a storey.
Thermal bridging factor sign off dated after the BER publication date.	• Sign-off does not explicitly address the detail requirements set out in Appendix K and the Technical Bulletin (April 2009); • Sign-off is dated after the publication date of a rating.
Water heating cylinder volume calculations not included as part of the site survey.	The DEAP Survey Form provides an entry for hot water cylinder volume. Calculations used in deriving this figure must be kept on file with the BER assessment records.

Desk Review Findings (Medium volume, desk based audits on single BER assessments):

Issue	Examples of errors and further guidance
No response to the audit request by the required deadline.	Each audit request will be issued along with a deadline date. Assessors must respond to the request for audit data by the deadline date.
Unacceptable information provided in support of building elements heat loss floor U-value.	The DEAP manual (Section 3) provides detail on the relevant standards for U-value calculations. In addition, several of the BER Technical Bulletins provide guidance on derivation of U-values and where to obtain certified thermal conductivity values. DEAP Appendix S and the DEAP Survey Guide provide guidance on acceptable evidence when entering non default and default U-values in DEAP.
Unacceptable information provided in support of building elements roof U-value.	The DEAP manual (Section 3) provides detail on the relevant standards for U-value calculations. In addition, several of the BER Technical Bulletins provide guidance on derivation of U-values and where to obtain certified thermal conductivity values. DEAP Appendix S and the DEAP Survey Guide provide guidance on acceptable evidence when entering non default and default U-values in DEAP.

Documentation and Practice Audit Findings (Low volume intensive audits entailing detailed inspection at a BER Assessor's office and/or at the site of a building or buildings which have been the subject of a BER assessment):

Issue	Examples of errors and further guidance
Unacceptable information provided supporting floor area.	Dwelling sketches or plans must be provided and show sufficient detail to support all relevant areas.
No response to an audit request by the required deadline.	Each audit request will be issued along with a deadline date. Assessors must respond to the request for audit data by the deadline date.
Unacceptable information provided in support of space and water heating efficiency.	All efficiencies entered must be based on data from the HARP database, certified test data or the defaults in DEAP Table 4a or 4b. Further guidance is available in the BER Technical Bulletins and the DEAP manual.
Unacceptable information provided in support of heat loss floor areas.	Dwelling sketches or plans must be provided and show sufficient detail to support all relevant areas.
Unacceptable information provided in support of roof area.	Dwelling sketches or plans must be provided and show sufficient detail to support all relevant areas.
Unacceptable information provided in support of window performance.	The DEAP manual (Section 3) provides detail on the relevant standards for U-value calculations. In addition, several of the BER Technical Bulletins provide guidance on derivation of U-values where to obtain certified thermal conductivity values. DEAP Appendix S and the DEAP Survey Guide provide guidance on acceptable evidence when entering non default and default U-values in DEAP. In addition, as detailed in the DEAP manual, non-default window U-values must be accompanied by certified solar transmittance values.
Unacceptable information provided in support of the number of sheltered sides.	Section 2.5 of the DEAP manual provides guidance related to the number of sheltered sides to be entered in the DEAP Ventilation tab. For new dwellings, the dwelling plans can be used in support of this entry. For existing dwellings, photographs and dwelling sketches can be used in support of this entry.

Assessors should review any non-compliance with reference to the Code of Practice and relevant guidance as published by SEAI reducing the likelihood of re-occurrence of these non-compliance in future audits.

BER Appeal Process:
As detailed in the Quality Assurance System and Disciplinary Procedure, an Assessor has the right to appeal all audit findings, penalty points resulting from findings, suspensions or terminations. Penalty point appeals must be made within 28 days of such points being formally notified to the Assessor. All appeals must be made in writing to BER.QA@seai.ie clearly detailing the audit number and any grounds for appeal. Decisions resulting from the appeals process are final.

2 Sheltered Sides

Section 2.5 of the DEAP manual describes the conditions for deciding whether a particular side of a dwelling is sheltered by adjacent obstacles such as neighbouring buildings or trees. Specifically it details how high, wide and near to the dwelling the obstacle(s) must be for that side to be sheltered. This Technical Bulletin article focuses on the requirements of object width for sheltered sides. All objects in the following examples are assumed to meet the height and distance requirements for sheltered sides as detailed in DEAP manual Section 2.5. The importance of the position of the obstacle relative to the dwelling is highlighted in Figure 2.

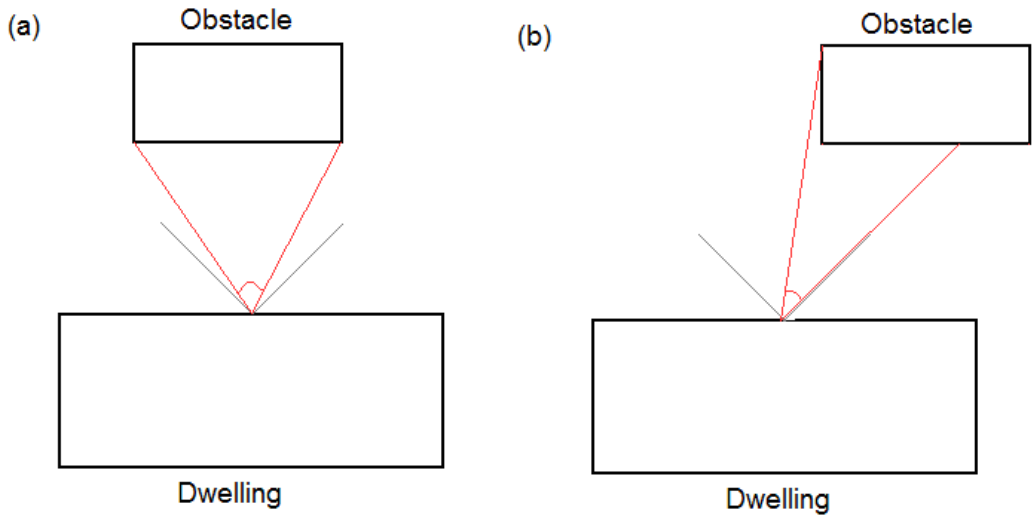


Figure 2: The red lines indicate the angle the obstacle subtends to the midpoint of the side of the dwelling within the central 90° (marked by the grey lines). Anything outside the grey lines is ignored.

(a) In this case, the whole of the obstacle is contained within the central 90° (marked by grey lines). It subtends an angle greater than 60° so that side of the dwelling is considered to be sheltered by the obstacle.

(b) Because the position of the obstacle is shifted relative to the dwelling, only part of the obstacle contributes to the sheltering angle. In this case the angle is less than 60° so the side is considered to be unsheltered.

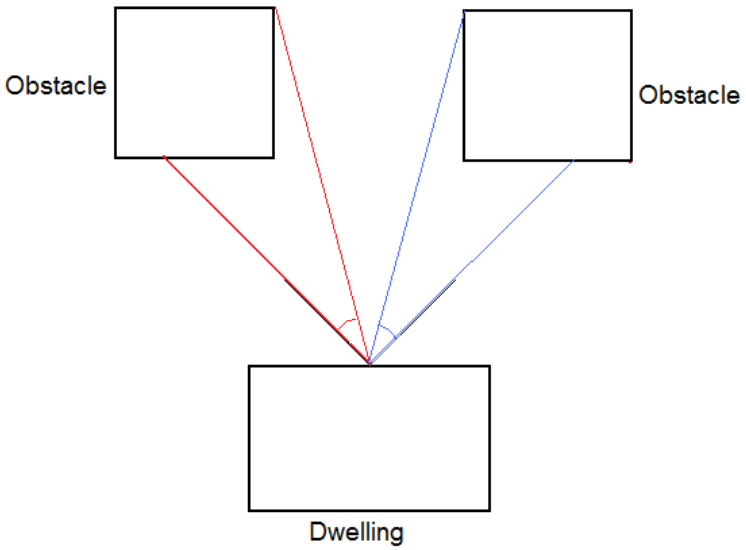


Figure 3: Two obstacles providing shelter to one side of a dwelling. The subtended angles of each obstacle (red and blue) are added to give the total sheltering angle.

In some situations more than one obstacle needs to be considered when evaluating whether a side is sheltered as shown in Figure 3. The angle subtended by the first obstacle is shown between the red lines and the angle subtended by the second obstacle is shown between the blue lines. These two angles are added together to get the total sheltering angle for this side.

- If the total sheltering angle is 60° or greater then the side is sheltered.
- If the total sheltering angle is less than 60° then the side is not sheltered.

Figure 4 shows a dwelling with two "partially sheltered" sides. In this case if the total angle subtended by the two obstacles, i.e. the red angle plus the blue angle, is greater than or equal to 60° then their combined effect is equivalent to one sheltered side. If it is less than 60° then the dwelling has no sheltered sides.

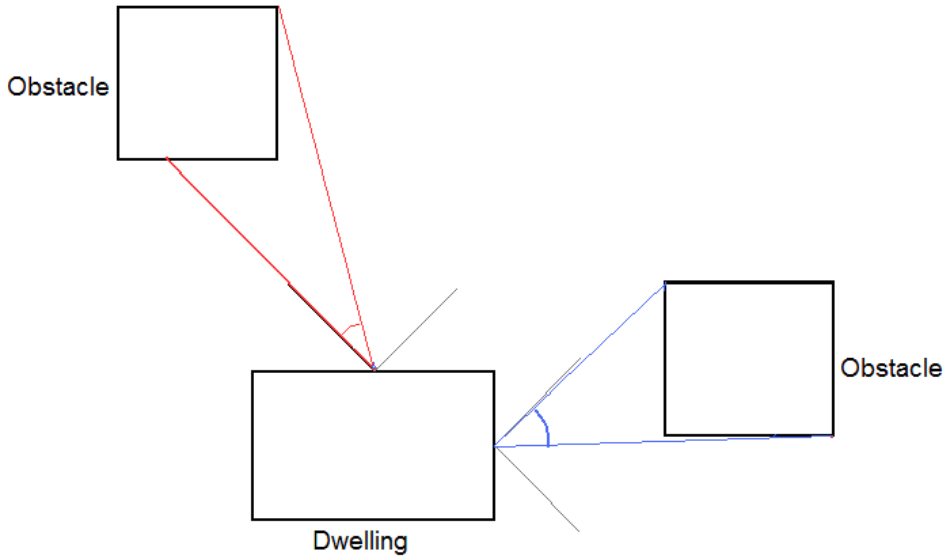


Figure 4: A dwelling with two partially-sheltered sides. Taken together they count as one sheltered side.

DEAP manual Section 2.5, Appendix S and the DEAP Survey Guide provide further guidance on assessing the number of sheltered sides.

3 When to include conservatories in dwelling floor area in DEAP

A conservatory is defined in DEAP as an extension attached to a dwelling which has at least 75% of its roof and 50% of its external walls made of material that allows the transmission of light. The July 2009 Technical Bulletin (Page 4) dealt with the issue of when to include a conservatory in the dwelling floor area if the Building Regulations Part L of 2008 applies. For existing dwellings or new dwellings prior to TGD L 2008, the decision to include a conservatory in the dwelling floor area depends on whether the conservatory is thermally separated from the dwelling.

As indicated in DEAP manual Section 3.3.3, for a conservatory to be thermally separated it must meet 2 conditions:

(i) The U-value of the partition separating the conservatory from the rest of the house must not be more than 10% larger than the corresponding exposed elements in the rest of the dwelling.

In the case shown in Figure 5 the partition is a sliding glazed door. The door has 70% glazing which means that in DEAP it is treated as a window. To test the first condition the U-value of this sliding window (marked in red) is compared to the average U-value of the other windows in the house (marked in blue).

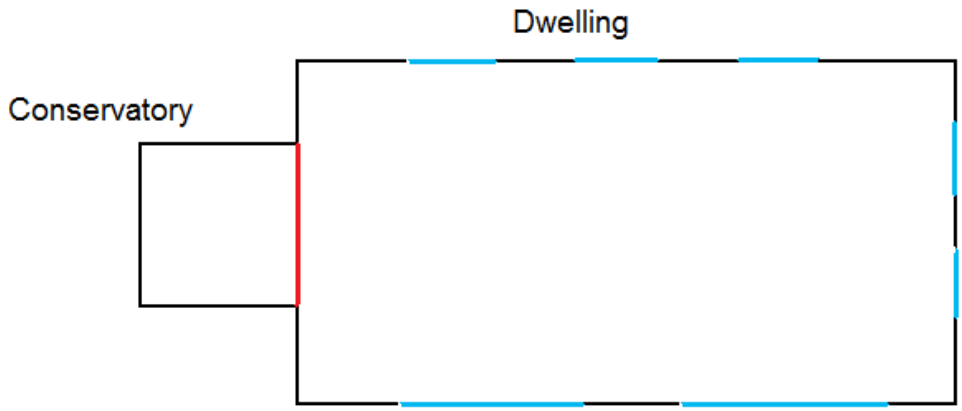


Figure 5: Dwelling with glazed door to conservatory

As an example, assume the sliding window is single-glazed with U = 4.8 W/m^{2}K and the other windows are double-glazed with U = 2.6 W/m^{2}K. The limit for thermal separation is 10% greater than the U-value of the windows,

i.e. 2.6 + 0.26 = 2.86 W/m^{2}K.

The U-value of the sliding window, 4.8 W/m^{2}K, is obviously larger than this so the condition for thermal separation of the conservatory is not met. This means that heat will pass through the sliding window into the conservatory more easily than heat will flow out of the other windows. As a result the conservatory will heat up to the same temperature as the rest of the house in which case it must be *included* in the dwelling floor area.

Now, assume that the single-glazed sliding window was replaced by a modern double-glazed sliding window with U = 2 W/m^{2}K.

The U-value of the sliding window, U = 2 W/m^{2}K, is less than the limit for thermal separation in this example which is still 2.86 W/m^{2}K. This means that the new double-glazed sliding window acts as a sufficient barrier to the flow of heat from the house to the conservatory for the first condition for thermal separation to be satisfied.

Similar to the above, any walls in the partition between the dwelling and conservatory would be compared to other external dwelling walls. Likewise, doors in the partition between the dwelling and conservatory are compared to other external dwelling doors. The condition is met if the U-value of each of the partition elements is not 10% greater than the corresponding external elements elsewhere in the dwelling.

(ii) The second condition for thermal separation states that the conservatory must be either unheated or have a heating system with independent time and temperature control (see Section 3.3.3 of the DEAP manual).

An unheated conservatory (no fixed heaters) meets the second condition for thermal separation. A conservatory that is heated by the main space heating system of the dwelling and has automatic time and temperature control independent of the dwelling also meets the second condition for thermal separation. In practice this means the conservatory forms a separate zone on the main heating system with its own room thermostat and timer or programmer channel.
In both cases, if the first condition for thermal separation is also satisfied then the conservatory is thermally separated and is excluded from the BER assessment.

A conservatory that is heated by the main space heating system of the dwelling but which does not have independent automatic time and temperature control does not meet the second condition for thermal separation and as such must be included in the BER assessment.

The various situations an Assessor is likely to encounter are summarised in the following table:

Situation	**Automatic, independent temperature control**	**Automatic, independent on/off control**	**Meets Second Condition for Thermal Separation**
Conservatory, no fixed heating	n/a	n/a	Yes
Conservatory with fixed heating (from main heating system). No radiator valve.	No	No	No
Conservatory with fixed heating (from main heating system). Radiator valve only	No	No	No
Conservatory with fixed heating (from main heating system). TRV only	No	No	No
Conservatory with fixed heating (from main heating system). Room thermostat only	Yes	No	No
Conservatory with fixed heating (from main heating system). Own zone (time and temperature control using time control and room thermostat)	Yes	Yes	Yes
Conservatory with fixed standalone heating system without time switch and room thermostat.	No	No	No
Conservatory with fixed standalone heating system with time switch and room thermostat.	Yes	Yes	Yes

In the example of the conservatory separated from the dwelling by the double-glazed sliding window, if the conservatory had no fixed heating then both conditions for thermal separation would be fulfilled and the conservatory would not be included in the dwelling floor area in the BER assessment.
On the other hand, if the conservatory had a radiator running from the main heating system controlled by a TRV (without room thermostat) then the second condition for thermal separation would not be met so the conservatory would be included in the BER assessment.
The May 2009 Technical Bulletin (Page 3) provides guidance on treatment of elements between the dwelling and a thermally separated conservatory.

4 Compliance with TGD L revisions prior to TGD L 2005

The Technical Bulletin of November 2009 (Section 1.1) discusses new dwellings complying with Building Regulations prior to TGD L 2005. Assessors should note that they do not have a role in carrying out the Heat Energy Rating on such a new dwelling, although they should make the client aware of any compliance issues as outlined in the technical bulletin.

BER Assessors – Dwellings Technical Bulletin #16

Issue No. 1/11 **January 2011**

Contents:

The archive of previous bulletins is available on the SEAI website.

1 Dwelling Survey Requirement for Existing and New-Final Dwelling BERs

As of 1st February 2011, BER assessments for both "Existing" and "New-Final" buildings will require that BER Assessors carry out a full building survey before the rating is published. A BER Assessor will be required to visit the premises to collect the data for the assessment. The BER Assessor may also review plans and specifications for new or existing buildings. Plans and specifications are particularly useful in providing supplementary information not available from site survey.

Provisional ratings do not require a site survey and are based entirely on plans/specifications.

The following documents have been updated on www.seai.ie/ber to reflect this change:

- The DEAP Survey Guide and Survey Form have been updated to reflect the requirement to survey new-final as well as existing dwellings. In addition, the survey guide includes minor clarifications previously detailed in BER Technical Bulletins.

- The BER Assessor's Code of Practice has been updated to align with the requirement for new building survey. Other changes in the Code of Practice include:
    - SEAI requires, as mandatory, that each BER Assessor and/or each BER Assessor's principal, as appropriate, in relation to the exercise of his/her BER functions, takes out and maintains levels of insurance as detailed in the Code of Practice.
    - Reference to the Quality Assurance System and Disciplinary Procedure is detailed in the Code of Practice.
    - If the Building Regulations Part L applies to a building being rated and the BER Assessor finds that it does not conform to the requirements of Part L, then the BER Assessor is obliged to notify the client in writing, and to identify which elements of the design do not conform to these Regulations.

- The template letters of engagement published on the SEAI site have been updated to reflect these changes. The two templates are for:

    - New-provisional building ratings (not requiring survey);
    - New-final and existing building ratings (requiring survey).

2 Heat Pumps – Renewable Contribution to Part L

TGD L states that a minimum level of renewable technologies should be provided in a dwelling to comply with Part L of the Building Regulations. The minimum contribution to heating from renewable heat sources is 10kWh/m^2/annum.

TGD L also states that "In the case of electrically powered heat pumps, only energy in excess of 2.5 times the electrical energy directly consumed by the heat pump can be counted towards meeting the minimum level of energy provision from renewable technology".
In practice, for a heat pump to make a contribution towards the renewable energy requirement it must have an adjusted efficiency (the efficiency after any relevant efficiency adjustments from DEAP Table 4 are accounted for) of at least 250%. Only the excess over 250% contributes towards the renewable requirement.

As an example, the following table shows the renewable contribution of different heat pumps in a specific dwelling. In calculating the BER of this dwelling it is found that the heat demand from the main space heater (the heat pump) is 10,000kWh/y.

This value is used by the DEAP software to calculate the renewable contribution from the heat pump. In the table below, the renewable portion of the space heat produced by the heat pump with 350% adjusted efficiency is given by the following formula:

[(350-250)/350] * [Space heating demand from heat pump].

DEAP divides the result of this calculation by the dwelling total floor area.

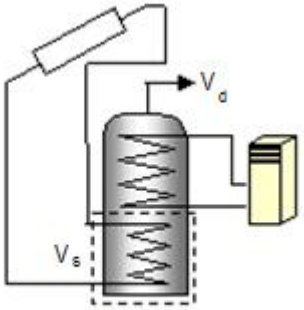
Adjusted Efficiency of Heat Pump	Renewable Contribution (%)	Total Renewable Energy Contribution For Space Heating from Heat Pump
350%	(350-250) = 100	100 / 350 x 10,000 = 2857 kWh/yr
245%	0 (because adjusted efficiency is less than 250)	0 / 245 x 10,000 = 0 kWh/yr
262.5%	12.5	12.5 / 262.5 x 10,000 = 476 kWh/yr

This calculation is carried out by the DEAP software in checking compliance with Part L of the Building Regulations.

The same logic applies to water heating using the appropriate Efficiency Adjustment Factors from Table 4c.

3 Solar Storage in Combined Hot Water Cylinders

Solar thermal collectors are commonly used in conjunction with dual-coil combined hot water cylinders particularly when upgrading water heating systems in existing dwellings. The dual-coil arrangement allows the solar collector and the boiler to heat the same volume of water, as can be seen in this diagram.



To calculate the solar contribution to water heating in a dwelling it is necessary to know the volume of water heated by the solar collector. In the diagram above the dedicated solar storage, Vs, is that volume contained within the dashed line where the water is only being heated by the coil from the solar collector.

DEAP requires the user to enter the dedicated solar storage value. The dedicated solar storage volume may be calculated by the following means:

(i) The dedicated solar volume can be derived from indication of heating coil locations on a cylinder datasheet. The datasheet may contain a diagram of the cylinder showing the location of the internal cylinder coils or location of upper and lower coil connections to the cylinder. The dedicated solar storage applies to the volume of storage below the coil lying directly above the solar heated coil.

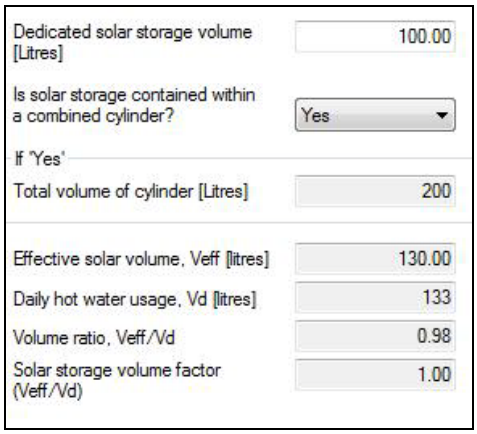
If for example, the combined cylinder is 300L and the connections of the upper coil are halfway down the cylinder side, then the dedicated solar storage can be assumed to be 150L.

(ii) It may also be possible to determine the location of the coil connections on site. Again, the dedicated solar storage is the cylinder volume which lies below the coil directly above the solar coil. Photographs of coil connections from piping to the cylinder and their location on the cylinder body may be used to support the dedicated solar storage derivation.

(iii) It is possible that the cylinder documentation/datasheet would state the volume dedicated to solar storage. This is acceptable, but the assessor should cross check that the stated dedicated solar storage volume does not include sections of the cylinder heated by coils above the solar heated coil.

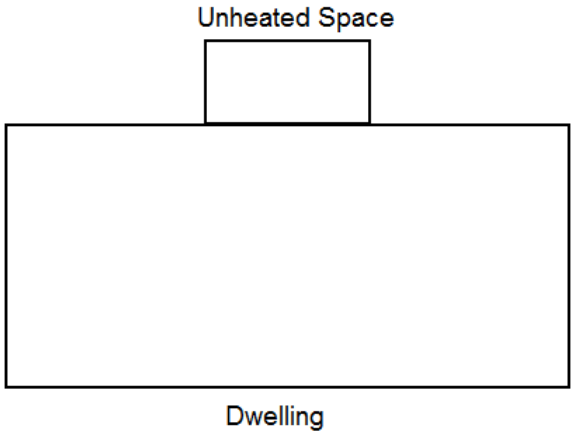
(iv) Where the dedicated solar volume is not known, then, as per DEAP Table S11, the dedicated solar volume can be assumed to be one third of the total cylinder volume.

In the DEAP software the Assessor enters the dedicated solar volume (which in the example below is 100 litres) and the program will carry out the calculation of the effective solar volume as seen in the following screenshot from DEAP:



4 Sheltered Sides: Adjoining Structures

Section 2.5 of the DEAP manual along with the September 2010 Technical Bulletin provide guidance on identification of sheltered sides for the purposes of BER assessments. In some cases an adjoining object can be considered to provide adequate shelter for the purposes of DEAP assessments. The diagram below shows a dwelling with an adjoining unheated space, e.g. a boiler house or draught lobby.



In this situation the unheated space could be considered to shelter the side of the dwelling to which it is attached. However, because it is attached, the method described in the DEAP manual calculating the angle subtended to the midpoint of the wall is ineffective. As a result an alternative set of conditions must be satisfied in this special case.

A side of a dwelling may be considered sheltered by an adjoining unheated space if both of the following conditions are true:
(i) The unheated adjoining space is at least half of the length of the side of the dwelling to which it is attached;

(ii) The unheated space must be at least as high as the ceiling of the uppermost heated storey of the dwelling.

If either condition is not met then that side of the dwelling is not sheltered by the unheated space. It is still possible that an unattached obstacle such as a nearby house will shelter that side of the dwelling.

Sheltered sides should be shown on sketches/ architectural drawings (indicating distance, height and width of sheltering objects and adjacent properties). Defaults may be used as per Appendix S of DEAP Manual for existing dwellings.

5 Solar Panels: multiple panels of different orientation

The Annual Solar Radiation falling on a solar collector is taken from Table H2 of the DEAP manual. The values in this table should not be interpolated; instead, the nearest value should be used;
e.g. for a solar collector on a roof oriented south with a pitch of 25° use the nearest value in the table which is for a south-facing roof with a pitch of 30°, i.e. a value of 1074 kWh/m^2.

The DEAP software assumes that all the solar panels on a particular dwelling have the same orientation but this is not always the case. In this situation the correct value for the annual solar radiation must be calculated by an area-weighted average.

For example, consider a dwelling with,

- 2m^2 of panels on a south-facing roof with a tilt of 30°, and,
- 1m^2 of panels on an east-facing roof with a tilt of 60°.

According to Table H2 the panels on the south-facing roof receive 1074 kWh/m^2 and the panels on the east-facing roof receive 778 kWh/m^2.

$$\text{Average annual solar radiation} = \frac{(1074 \times 2) + (778 \times 1)}{(2+1)} = 975.33 \text{ kWh/m}^2.$$

This value is entered for the "Annual Solar Radiation" in DEAP and the "Aperture Area of Solar Collector" is equal to the total area of the panels which is 3m^2 in this case.

6 Solid Fuel Appliances: Efficiency Adjustment Factor

In DEAP Table 4c, the first section "Gas or oil boiler systems with radiators or underfloor heating", shows the Efficiency Adjustment due to the control system, namely a 5% reduction in efficiency due to the absence of boiler-interlock or thermostatic control. These adjustments only apply to gas or oil boilers. They do not apply to solid fuel boilers.

7 Seasonal Boiler Efficiency from SEDBUK

As detailed in the April 2009 Technical Bulletin, gross seasonal boiler efficiency for gas and oil boilers can be taken from a number of sources, including the SEDBUK database under http://www.sedbuk.com. SEDBUK has recently changed to display 2009 and 2005 seasonal efficiency figures. For the purposes of DEAP assessments, until further notice, the 2005 seasonal efficiency figure is the figure which should be chosen when using SEDBUK as a reference for seasonal efficiency of boilers.

8 Specifying non-default U-values in DEAP assessments

Previous guidance from SEAI provided detail on specification of non-default U-values in DEAP assessments. The DEAP manual (Section 3) and the DEAP Survey Guide both detail how insulation properties can be substantiated and how supporting U-values should be calculated. In addition, the April 2009 Technical Bulletin provides detail on U-value calculation. Non-default U-value calculations must be carried out to the relevant standards and be based on thermal conductivities and thermal resistance values from appropriate sources as detailed in previous guidance from SEAI.

If an insulation installer provides the BER Assessor with a U-value for a building element, the BER Assessor must ensure that any non-default U-value entered in a published BER assessment adheres to the rules set out in the DEAP methodology and associated guidance. It is therefore recommended that the Assessor retains the non-default U-value calculation details with the BER records. A statement of the non-default U-value (without the substantiation required for U-value entry normally required in DEAP) from the installer detailing the non-default U-value is insufficient for the purposes of registered BER assessments.

When calculating the U-value for a building element which has been retrofitted with insulation, the BER Assessor must ensure that the U-value calculation is based on guidance in the DEAP methodology. When calculating retrofitted building element U-values and using the U-value of the original building element as a starting point (such as per the footnote to Table S3 in the DEAP manual), the original building element U-value must be based on substantiated evidence as outlined in the DEAP methodology and DEAP survey guide, or else on DEAP Appendix S defaults.

Example 1
A BER is required for an existing dwelling built in 1983 in which the walls have been retrofitted with dry-lining insulation under the HES scheme. An architect's report is available which provides detail of the original wall makeup:
Cavity wall with,

- 100mm concrete block inner leaf and 100mm concrete block outer leaf;
- 100mm gap between inner and outer leaf partially-filled with 50mm of polystyrene insulation;
- 15mm external render;
- 5mm skim plaster internal finish.

The walls have been dry-lined with insulated plasterboard slabs:

- 50mm Phenolic foam (Certified thermal conductivity, λ = 0.021 W/mK);
- 12.5mm plasterboard.

Layer	**Thickness (mm)**	**Thermal conductivity (W/mK)**	**Thermal Resistance (W/m^2K)**
External Surface	-	-	0.04
Outer Render	15	0.57	0.026
Outer block	100	1.33	0.075
Air Cavity	50	-	0.18
Insulation	50	0.038	1.316
Inner Block	100	1.33	0.075
Plaster	5	0.18	0.028
Internal Surface	-	-	0.13
		Total Thermal Resistance (m^2K/W) =	**1.87**
		Original Wall U-value (W/m^2K) =	**0.53**

Thermal Conductivity values for common building materials and the Thermal Resistance constants for the external & internal surfaces and the air cavity are taken from Table A1 and Table A2 of TGD L.

The Total Thermal Resistance of the original wall is then used to calculate the final U-value of the wall after dry-lining addition:

Layer	**Thickness (mm)**	**Thermal conductivity (W/mK)**	**Thermal Resistance (m^2K/W)**
Original Wall	-	-	1.87
Insulation	50	0.021	2.38
Plasterboard	12.5	0.25	0.05
		Total Thermal Resistance (m^2K/W) =	**4.3**
		Wall U-value (W/m^2K) =	**0.23**

Example 2
A BER is required for an existing dwelling built in 1983 in which the walls have been retrofitted with dry-lining insulation (same dry-lining as the previous example). No information is available about the wall. During the site survey the Assessor establishes that it is a cavity wall.

In order to calculate the U-value of the wall after dry-lining the default U-value of the original wall is taken from Table S3. For a cavity wall built in 1983 (age band G) this is 0.6 W/m^{2}K which is equivalent to a Thermal Resistance of 1.67m^{2}K/W.

Layer	**Thickness (mm)**	**Thermal conductivity (W/mK)**	**Thermal Resistance (m^{2}K/W)**
Original Wall	-	-	1.67
Insulation	50	0.021	2.38
Plasterboard	12.5	0.25	0.05
		Total Thermal Resistance (m^{2}K/W) =	**4.1**
		Wall U-value (W/m^{2}K) =	**0.24**

BER Assessors – Dwellings Technical Bulletin #17

Issue No. 2/11 **March 2011**

Contents:

The archive of previous bulletins is available on the SEAI website.

1. Determining the Living Area of a Dwelling

Recording Survey Details of Living Area
BER Assessors are required to identify and measure the living area of a dwelling for the purposes of domestic BER assessments. The Assessor must clearly indicate the living area and its dimensions on the dwelling sketches or architectural plans and record this data on the Survey Form. As detailed in the January 2011 Technical Bulletin, a dwelling survey is required for "Existing" and "New Final" BERs.

Choosing the Living Area
DEAP defines the living area as "the largest public room (irrespective of usage by particular occupants), together with any rooms not separated from that room". The DEAP Manual also states that "Kitchens (including rooms like kitchen-diners) are not considered to be public rooms on their own. However, if there is no door between the room identified as the largest public room and the kitchen, then the kitchen should be included when calculating the living room area. "

In this guidance, a dining area adjoining a kitchen is assumed to be part of that kitchen. Public rooms would typically be referred to on plans or by the homeowner as sitting rooms, lounges, parlours, family rooms or living rooms.

The following guidance deals with two different cases as illustrated in the diagram below:

- Case (1a): The kitchen is separate from other public rooms
- Case (1b): The kitchen includes a public room

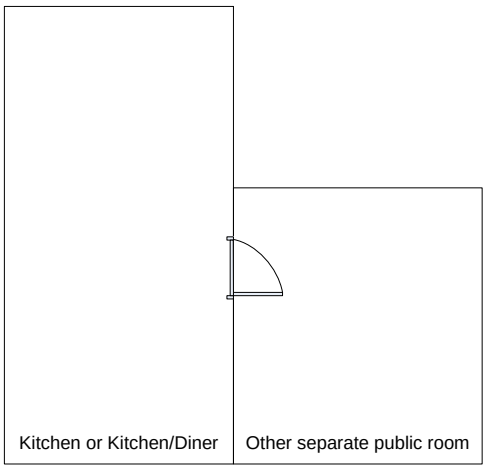


Diagram for case (1a)

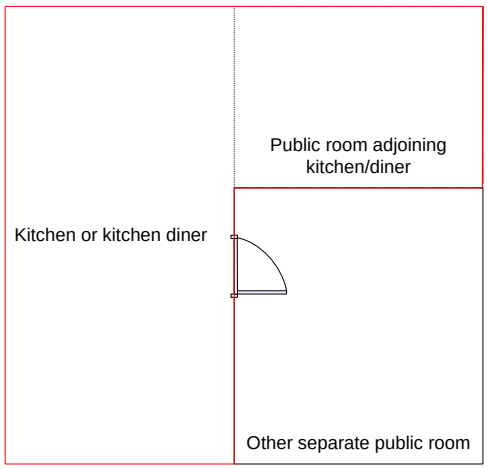


Diagram for case (1b) - combined room outlined in red

As per the following table, the kitchen is only chosen as the living area in case (1a) if there is no other public room in the dwelling.

Dwelling contains a Kitchen (or Kitchen/Diner)	Dwelling contains other Public Room(s)	Living Area specified in DEAP
√	√	Other separate public room with largest floor area
√	X	Kitchen - as there is no public room

Table 1a: Standalone Kitchen/Kitchen-Diner

In some dwellings, the room containing the kitchen and dining area also contains a public room as per case (1b). In this case the combined kitchen/dining/public room may be chosen as the Living Area even when there are other public rooms in the dwelling. The deciding factor is floor area of the public rooms, as summarised in Table 1b:

Situation	Living Area
Area of public room >= Area of largest other separate public room	Combined kitchen/diner/public room
Area of public room < Area of largest other separate public room	Other separate public room

Table 1b: Dwellings with a combined kitchen/diner/public room

In Table 1b, "Area of Public Room" = Area of Combined Room – (Area of Kitchen/diner). This is the public room adjoining the kitchen/diner.

In case (1b), it may not always be obvious where the kitchen/dining area ends and the public room begins. Often the boundary is marked by a change of floor surface from tiles or linoleum in the kitchen/diner to carpet or wooden flooring in the public room. Alternatively, a change in room-width or style may indicate the change in room function.
In any case, when measuring the floor area of the public room section of a combined kitchen/diner/public room, if the boundary between public room and kitchen/diner is unclear or ambiguous, the Assessor should choose the most pessimistic option, in other words, the largest Living Area of the possible options available.

Accuracy of Living Area Measurements
Bay windows, chimney breasts and other small areas within the living room area **must** be included in the living room area measurement. DEAP Appendix S4 states that "Small bay windows, small porches, small door entrances or recesses, small chimney breasts, where they affect the total floor area by less than 10% overall, can all be ignored for the purposes of **total floor area** measurement." However, this text from DEAP Appendix S4 does not apply to measurement of the living room area.

2. Advice to the Client from the BER Assessor

The BER Assessor is expected to provide advice to the homeowner on the main energy saving opportunities identified on foot of the BER assessment. Opportunities (as emphasised in the BER Advisory Report), may include an inefficient heating system, poor insulation or inefficient lighting. This advice is part of good professional conduct required in the BER Assessor's Code of Practice. It is important that the homeowner understands the BER and "typical" rating for their dwelling type and age. The assessor may find further information on typical dwelling ratings in the BER Information Leaflet under the section "How Does My Home Rate?"

3. Flue Gas Heat Recovery Systems in DEAP

A Flue Gas Heat Recovery System (FGHRS) is a mechanism to recover heat from a boiler's exhaust gas, which improves the efficiency of the boiler. The recovered heat can be used to pre-heat water entering the boiler. Sections 1, 2 and 3 of the SAP Appendix Q FGHRS Assessment Methodology provide further useful information on these devices.

FGHRS units must be listed on the SAP Appendix Q website search facility to be accounted for in DEAP. Unlisted FGHRS units are excluded from the BER calculation.

If the FGHRS is on the SAP Appendix Q list, then its contribution to the BER is calculated using an Excel spreadsheet which can be downloaded from the SAP Appendix Q website under "How to use the data". At present this spreadsheet is only valid for condensing boilers fuelled by Gas or LPG. If an Assessor encounters an FGHRS unit on a non-condensing Gas/LPG boiler or on an Oil boiler then the unit must be ignored for the purposes of the BER until such time as it is catered for on SAP Appendix Q.

To calculate the contribution of the FGHRS to the BER the following information is input to the spreadsheet:

Data Required	**Value**
Boiler Brand Name	-
Boiler Model Name	-
Fuel	LPG/Gas/Oil
Boiler Type	Regular/Combi
Condensing or Non-Condensing	Condensing or Non-Condensing
FGHRS Brand Name and Model Name	-
Total Dwelling Floor Area	From DEAP Dimensions tab
Volume of Hot Water store	From DEAP Water Heating tab
Temperature Factor	From DEAP Water Heating tab "Temperature Factor Unadjusted" x "Temperature Factor Multiplier"
Water Storage heat loss	From DEAP Water Heating tab "Storage Loss"
Primary Circuit Heat loss	From DEAP Water Heating tab "Primary Circuit Loss"
Combi Loss	From DEAP Water Heating tab "Additional Loss for Combi Boiler"
Contribution from Solar Water Heating	From DEAP Water Heating tab "Solar Hot Water Input"
Efficiency of Water Heating System	Set to '0'% in this instance.
Energy Saved by WWHRS	Set to '0' in this instance.
Space Heating Requirement	From DEAP Dist. System Losses and Gains tab "Annual Space Heating Requirement"
Fraction of heat from Secondary/Supplementary system	From DEAP Energy Requirements Space Heating tab
Electricity used by Keep-hot facility	From DEAP Water Heating tab

The spreadsheet uses this information to calculate the annual energy saved by the FGHRS in kWh. This number is input into the DEAP software in the Energy Requirements, Fuel Data tab in the "Renewable and energy saving technologies" section.
The example below shows how the data for an FGHRS unit which saves 350kWh per annum is entered into DEAP:

Renewable and energy saving technologies

	Technology/Comment	Type	Part L total contribution [kWh/y]	Delivered energy [kWh/y]	Primary energy conversion factor	CO_2 emission factor [kg/kWh]
Renewable energy 1						
Energy produced or saved	FGHRS	Not Renewable	0	350	1.1	0.203
Energy consumed	None			0.00	0.00	0.000

The Part L contribution is taken to be 0 kWh/yr for FGHRS. The 'Primary Energy Conversion Factor' and 'CO2 Emission Factor' are chosen for the fuel used by the boiler.

If a FGHRS unit is included in the BER calculation in the manner described above then the Efficiency Adjustment Factors from Table 4c for condensing boilers such as load compensation, weather compensation and underfloor heating **must be ignored**, i.e. the Efficiency Adjustment Factors are set to their default value of '1'. This derogation is carried out in the heating system controls lookup function in DEAP under the Dist. System Losses and Gains tab.

4. Thermostatic Radiator Valves on Hot Water Cylinders

In some domestic hot water systems the temperature of the water in the hot water cylinder is controlled by a thermostatic radiator valve (TRV) rather than the usual cylinder thermostat. For the purposes of DEAP a cylinder thermostat is defined as "a sensing device to measure the temperature of the hot water cylinder and switch on and off the water heating. A single target temperature may be set by the user." A TRV does not achieve this level of control so it is not considered to act as a cylinder thermostat in DEAP. Also, a TRV controlling the heat delivered to the cylinder does not provide a boiler interlock to the water heating system.

5. Default Window U-values in Existing Dwellings

Further information on window defaults and use of DEAP Table 6a in May 2011 Technical Bulletin. Summary of all windows defaults technical bulletin articles under the BER FAQ.

The May 2009 Technical Bulletin (Page 4) outlines the use of DEAP Section S8 in determining the U-value of a window in an existing dwelling.

Specifically, a U-value from DEAP Table 6a may only be used if *all* data relating to the window is available to the Assessor. If an Assessor is unable to verify *all* properties of a window, e.g. the type of low-emissivity coating is unavailable, then the appropriate default value from Table S9 must be used, regardless of what other data is available to the Assessor. In examples 1 and 2 below, the Assessor must assume a narrower airgap than the 16mm airgap observed. This is because the Assessor was unable to determine all of the other relevant properties of the window and the Appendix S defaults are then to be used.

Example 1
A BER Assessor encounters a double-glazed, PVC window with a gap of 16mm. There is no firm indication of low-E coating on the window and the window was installed in 2005:

In this example, it is unclear to the Assessor whether there is a low-E coating or not. Therefore, the default value from Table S9 must be used: as it was installed post-2003 a low-E coating (hard coat, en = 0.15) is assumed to be present:

Glazing	Low E coating	Frame	Metal thermal break assumed	U-value (W/m2K) (based on Table 6a)	Solar transmittance (based on Table 6b)	Comment
Double	Yes	Wood/pvc	n/a	2.2	.72	Air filled low E hard coat en = .15 12mm gap

Example 2
A BER Assessor encounters a double-glazed, wood-frame window with a gap of 16mm. There is no firm indication of low-E coating on the window and the window was installed in 2000.

It is unclear whether there is a low-E coating or not so the default value from Table S9 must be used. As it was installed before 2004 it was assumed that there is no low-E coating:

Glazing	Low E coating	Frame	Metal thermal break assumed	U-value (W/m2K) (based on Table 6a)	Solar transmittance (based on Table 6b)	Comment
Double	No	Wood/pvc	n/a	3.1	.76	Air filled 6mm gap

Example 3
A BER Assessor encounters a double-glazed, wood-frame window with a gap of 16mm. The window was installed in 2006. Manufacturer's certified data is available indicating that the gap is filled with Argon and a soft low-E coating has been applied with en = 0.05. As all the required data is available, Table 6a may be used which gives a U-value of 1.7 W/m^{2}K:

	Type of frame					
	Window with wood or PVC-U frame (use adjustment in Note 1)			**Window with metal frame with 4mm thermal break** (use adjustments in Note 2)		
	6 mm gap	**12 mm gap**	**16 or more mm gap**	**6 mm gap**	**12 mm gap**	**16 or more mm gap**
double-glazed, argon filled (low-E, en = 0.05, soft coat)	2.3	1.8	1.7	2.8	2.2	2.1

6. Micro Wind Turbines in DEAP

A number of BER Assessors have recently asked SEAI about inclusion of micro wind turbines in BER assessments. Measured power data from the wind turbine may be used in a BER assessment only if the data covers a minimum of a continuous twelve-month period. This data may be in the form of printouts from (or photographs of) onsite metering equipment. In keeping with the Code of Practice and DEAP Survey Guide, the Assessor must keep a record of all such data.

Measured wind turbine data is entered in the Energy Requirements, Fuel Data page under the "Renewable and energy saving technologies" section in DEAP. In the picture below data for a wind turbine producing 1100kWh of electricity per year is entered in DEAP.

Renewable and energy saving technologies

	Technology/Comment	Type	Part L total contribution [kWh/y]	Delivered energy [kWh/y]	Primary energy conversion factor	CO_2 emission factor [kg/kWh]
Renewable energy 1						
Energy produced or saved	Micro wind turbine	Renewable Electrical	1100	1100	2.7	0.643
Energy consumed	None			0.00	0.00	0.000

7. Translation of Certified Test Data for use in BER Assessments

The April 2009 Technical Bulletin (Page 5) provides information on the requirements of certified product performance data.

Certified test data must be produced to the relevant standards by a body with the relevant accreditation. In addition at least one of the following criteria must be met by that test data:

a) Documentation is in English, or,

b) Documentation is accompanied by an English translation from the accredited test house,

or,

c) Documentation is accompanied by an English translation from a Professional Translator qualified in translation from the specified language to English. Such translators should be sourced via the "Irish Translators and Interpreters Association" (ITIA) search engine.

International bodies such as the Institute of Translating and Interpreting (ITI) in the UK, or the International Federation of Translators, http://www.fit-ift.org are potential sources for suitable translators. Assessors are advised to consult with the BER Helpdesk if uncertain regarding the source of a translation.

8. Semi-exposed Walls in Existing Dwellings

A semi-exposed wall is one that is adjacent to an unheated space. This affects the rate of heat loss through the wall – i.e. the U-value - a fact accounted for by adding an extra thermal resistance, R_U, as described in the Building Regulations 2008 Part L Technical Guidance Document.

The manner in which this adjustment is made depends on the source of the U-value of the wall:

- If the U-value of the semi-exposed wall is based on a default value for an exposed wall taken from DEAP Table S3 then the "Wall is semi-exposed" option in DEAP is selected for existing dwellings;

- If the U-value of the wall is a non-default value, i.e. a value calculated by the Assessor, then the adjustment must be calculated manually by the Assessor and the final value entered manually into DEAP. A record of the supporting calculation must be retained by the Assessor. In this case, the Ru value can be taken from DEAP Appendix S6.1 or from Tables A3/A4/A5 in TGD L 2008.

BER Assessors – Dwellings Technical Bulletin #18

Issue No. 3/11 **May 2011**

Contents:

The archive of previous bulletins is available on the SEAI website.

1 Window defaults in DEAP and use of DEAP Table 6a

The March 2011 Technical Bulletin outlined use of DEAP Table S9 when specifying default window U-values in DEAP for existing dwellings, particularly when not all relevant details of the window can be identified. Since that guidance was published, some Assessors have asked SEAI if it would be reasonable to use DEAP Table 6a as an alternative to Table S9 in this scenario.

SEAI has considered these requests and would like to advise assessors that for existing dwellings, it is acceptable to use DEAP Table S9 as outlined in the March 2011 Technical Bulletin **OR** Table 6a as will be outlined in this article. In all cases, the preferred option is to use accredited data for window U-value and solar transmittance where accredited data is available.

When using Table 6a in DEAP, the following guidance applies. When using Table S9, the guidance in the March 2011 technical bulletin applies.
In using Table 6a to identify appropriate window defaults, several physical properties of the window must be identified, namely:

- glazing type: single, double or triple-glazing;
- frame type: wood, PVC or metal;
- insulating gas: air or argon;
- low-emissivity coating: hard coating, soft coating or no coating;
- insulating gap between glazing panes: 6 mm, 12 mm or 16+ mm;
- thermal break present (in metal-framed windows).

During a site survey of a dwelling, these properties can be determined as follows:
Glazing type & frame type: should be easy to determine so will not be discussed any further.

Insulating gas (for double/triple-glazing): A manufacturer's brochure or product literature stating Argon is used would be sufficient proof for the purposes of DEAP. In the absence of information specifying the type of gas it should be assumed to be Air.

Low-emissivity Coating: A manufacturer's brochure or product literature indicating the presence of a low-e coating is sufficient proof for it to be included in the DEAP assessment. If the glazing is known to have a low-e coating, but no detail is given about the type of low-e coating then the most conservative option should be chosen, namely a hard coat with $\varepsilon n = 0.2$.
In the absence of information specifying whether a low-e coating is present or not, the glazing is to be assumed as being uncoated.

Insulating gap between panes (for double/triple-glazing): the width of the gap can be established using one of the following methods:

1) Manufacturer's data, e.g. a manufacturer's brochure or product literature giving details of the gap.

2) Manufacturer's data on pane thickness & Assessor's measurement: e.g. if the pane thickness is stated on the manufacturer's brochure or product literature, then the gap may be calculated by measuring the thickness from the indoor surface to the outdoor surface of the glazed unit (not including the frame thickness).
Example: Double-glazing with specified 4mm thick glass. Glazing unit measured to be 20 mm thick:
Gap thickness = 20 – (4 + 4) = 12 mm. Any such calculation should be kept on file with the Assessor's records.
In the absence of information relating to glazing pane thickness, the panes can be assumed to be 4mm thick.

Note: for triple-glazing the gap calculated in this manner must be halved to give the value used in Table 6a. The thickness of the three panes must be accounted for if measuring triple glazing gap from the surfaces of the glazed unit.

Example: Triple-glazing with assumed 4mm glass thickness. Glazing unit measured to be 36 mm thick: Gap thickness = [36- (4+4+4)]/2 = 12 mm.

3) Measurement: Laser devices now exist which can measure the thickness of panes and the thickness of the gap(s) in double/triple glazed windows. Data provided by such a device may be used in a BER assessment provided the device meets appropriate European standards or has the CE mark. If there is any doubt the Assessor should contact the device manufacturer for confirmation that the device adheres to relevant standards. The glazing gap specified in DEAP is rounded as per the table below.

4) Where there is no information available on glazing gap thickness and no measurement is possible: Assume a 6mm gap between panes.
When the gap between panes is determined, the options in DEAP (6mm, 12mm, >=16mm) are selected as follows:

Gap between Panes	Option chosen in DEAP Table 6a
<12mm	6mm
>= 12mm ; <16mm	12mm
>=16mm	16mm

Thermal break (for metal-framed windows): in the absence of documentary proof of thermal break (such as manufacturer's literature) or a visible thermal break, the easiest way to establish whether a metal window frame has a thermal break is to feel an internal part of the metal frame. If there is no thermal break the frame will feel noticeably colder than the glass. This technique obviously works best on a cold day when there is a significant temperature difference between inside and outside. If the Assessor determines that there is a thermal break using this technique it should be assumed to be 4mm thick. If in doubt, assume there is no thermal break.

Examples using Table 6a (Assessors may alternatively use Table S9 as previously indicated):

Example 1.1
Double-glazed PVC framed window. Glazing unit thickness measured to be 16 mm.

- Gas: no information so Air is assumed.
- Low-e coating: no information available so assumed to be uncoated.
- Gap: assume panes 4 mm thick so gap thickness = 16 – (4 + 4) = 8mm. Glazing gap therefore assumed to be 6mm when referencing Table 6a as per the table above.

U-value from Table 6a: 3.1 W/m^{2}K.
Solar transmittance for uncoated double glazing (from Table 6b) = 0.76

Example 1.2
Double-glazed wood-framed window. Glazing unit thickness measured to be 22 mm.

- Gas: no information so Air is assumed.
- Low-e coating: No information available. Assumed to be uncoated.
- Gap: assume panes 4 mm thick so gap thickness = 22 – (4 + 4) = 14mm. Glazing gap assumed to be 12mm when referencing Table 6a as per the table above.

U-value from Table 6a: 2.8 W/m^{2}K.
Solar transmittance for uncoated double glazing = 0.76.

Example 1.3
Double-glazed wood-framed window. Manufacturer's brochure stating that window has 18mm Argon-filled gap with a hard low-e coating.

- Gas: Argon.
- Low-e coating: hard low-e coating. As the ε_n value is not stated assume the more conservative value which in this case is the higher value, i.e. $\varepsilon_n = 0.20$.
- Gap: 16+ mm

U-value from Table 6a: 2.0 W/m^{2}K.
Solar transmittance for double glazed with low-e hard coating = 0.72

Example 1.4
Double-glazed metal-framed window. Frame not cold to the touch compared to the glass. Glazing unit thickness measured to be 18 mm.

- Gas: Air.
- Low-e coating: no information available – assume no low-e coating.
- Gap: assume panes 4 mm thick so gap thickness = 18 – (4 + 4) = 10mm. It is appropriate in this case to round down to 6 mm.
- Thermal break: as the frame is not markedly colder than the glass it is reasonable to assume that a thermal break is present. Assume thermal break of 4 mm.

U-value from Table 6a: 3.7 W/m^{2}K.
Solar transmittance for uncoated double glazing = 0.76.

The guidance above and guidance in all technical bulletins relating to determination of default window U-values and solar transmittance has been consolidated under a single FAQ under this link. This FAQ discusses use of defaults for windows under new-final, new-provisional and existing dwelling BERs.

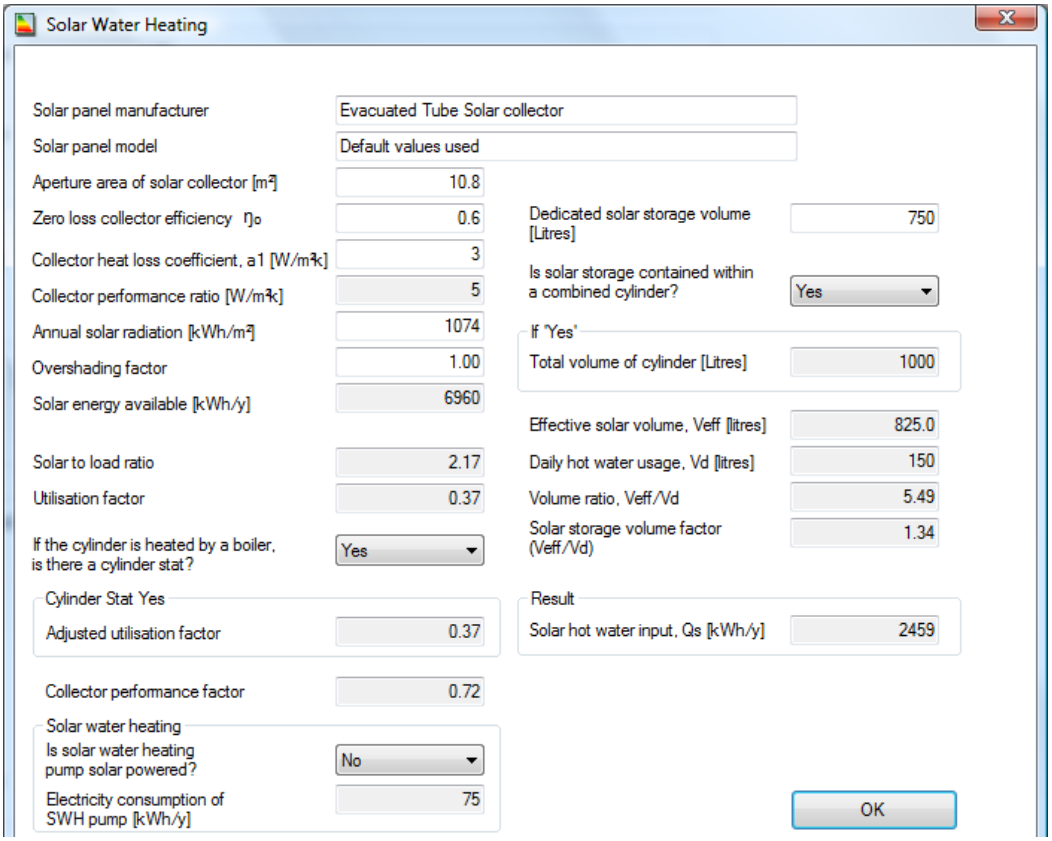
2 Solar Space Heating Systems in DEAP

The following guidance sets out examples in the DEAP methodology of solar space heating systems. Individual solar space heating systems provide space (and usually water) heating to a single dwelling. Group solar space heating systems provide space and water to more than one dwelling. The BER FAQ provides guidance on solar space heating systems.

Example 2.1: An individual solar space heating system
A new dwelling has 15 m^2 of evacuated tube solar collectors providing some of the space and water heating demand. For simplicity, the data for the solar collector is taken from Table H1 of the DEAP manual, although data listed on HARP should be used if available for the collector product in question. The solar panels are south-facing at an angle of 30° with no overshading.
The hot water cylinder is a 1000 litre dual coil cylinder with a Dedicated Solar Storage Volume of 750 litres and 100 mm of factory-applied foam insulation.

In order to do this calculation you will need to download the Solar Space Heating Spreadsheet and the instructions on how to use it.

The first step is to calculate the amount of heat collected by the solar panels that will be used to reduce the *water* heating load. This is done by entering the information on the solar heating system into DEAP in the usual way.



DEAP calculates the Solar Hot Water Input, Qs = 2459 kWh/year.

The next step is to calculate the amount of heat collected by the solar panels that will be used to reduce the *space* heating load. This is the surplus heat from the collectors during the heating season and is calculated by entering the following information into the Solar Space Heating spreadsheet.

Total Hot Water Heating Demand: this value, in kWh/y, is copied from the Water Heating tab of DEAP.

Water Storage Volume: in litres, copied from the Water Heating tab of DEAP. In this case it has a value of 1000 litres, as mentioned above.

Annual Space Heating Requirement: in kWh/y, copied from the Dist. System Losses & Gains tab of DEAP.

Adjusted Efficiency of Main Heating System: taken from the Energy Requirements -> Space Heating tab of DEAP. Note that this is the *adjusted* efficiency taking into account the effect of heating controls.

The next step depends on the type of solar space heating system. The Solar Space Heating spreadsheet covers two types:

(1) Systems with a cylinder or thermal store for storing the solar heat for both water and space heating.

(2) Systems with a cylinder for water heating only and with solar space heat supplied immediately to the heated space in the form of warm air.

In the spreadsheet you select the appropriate system from the dropdown list and follow the final steps set out in (1) or (2) below:

(1) Systems with a cylinder for storing the solar heat for both water and space heating.

For this type of system the details of the solar heating system need to be entered into the spreadsheet. The information is the same as that already entered into DEAP.

The spreadsheet then calculates the Space Heat Contribution – the renewable contribution to part L from the system - and the Delivered Space Heating Energy Saved which must be used to account for the system in DEAP.

Result		
Space heat contribution [kWh/y]	1186	If checking compliance with TGD L Renewables requirement, this is the renewable contribution.
Delivered space heating energy saved [kWh/y]	1251	Enter this to DEAP "Renewable and energy-saving technologies" section as "Energy produced or saved".

This data is entered in DEAP in the Energy requirements – Fuel Data tab as shown below:

Renewable and energy saving technologies	Technology/Comment	Type	Part L total contribution [kWh/y]	Delivered energy [kWh/y]	Primary energy conversion factor	CO_2 emission factor [kg/kWh]
Renewable energy 1						
Energy produced or saved	Solar Space Heating	Renewable Thermal	1186	1251	1.1	0.272
Energy consumed	None			0.00	0.00	0.000

The 'Primary energy conversion factor' and 'CO_2 emission factor' are for the main space heating fuel in the dwelling, in this case Mains Gas.

(2) Systems with a solar store for water heating only and with solar space heat supplied immediately to the heated space in the form of warm air.

In this case the following data must also be entered in the "Immediate" worksheet of the Solar Space Heating spreadsheet:

Total Floor Area: from the Dimensions tab of DEAP.
Total Heat Loss: from Building Elements – Heat Loss Results tab in DEAP.
Thermal Mass Category of Dwelling: from Net Space Heat Demand in DEAP.

As before the spreadsheet calculates the Space Heat Contribution and the Delivered Space Heating Energy Saved,

Result		
Space heat contribution [kWh/y]	496	If checking compliance with TGD L Renewables requirement, this is the renewable contribution.
Delivered space heating energy saved [kWh/y]	523	Enter this to DEAP "Renewable and energy-saving technologies" section as "Energy produced or saved".

which are entered into DEAP as shown in this diagram:

Renewable and energy saving technologies	Technology/Comment	Type	Part L total contribution [kWh/y]	Delivered energy [kWh/y]	Primary energy conversion factor	CO_2 emission factor [kg/kWh]
Renewable energy 1						
Energy produced or saved	Solar Space Heating	Renewable Thermal	496	523	1.1	0.272
Energy consumed	None			0.00	0.00	0.000

Example 2.2: A group solar space heating system
A group solar space heating system is a group heating system (2 or more dwellings heated by the same heating system) in which some of the dwelling heating load is provided by an array of solar collectors, e.g. an apartment block with a boiler providing space heating and hot water to all the apartments and an array of solar collectors on the apartment building roof which also provides space heating and hot water to each apartment.

In order to calculate the group solar space heating contribution to an individual dwelling in the group heating scheme you will need to download the Group Solar Space Heating Spreadsheet and the instructions on how to use it.

It is important to note in this case that the solar space heating system is part of the group scheme and not specific to an individual dwelling. As a result, the Assessor **does not need to enter data on the solar collectors in the Water Heating section of DEAP**. Instead, the spreadsheet is used to calculate the percentage contribution of the solar collectors to the total heat provided by the group heating scheme.
The group solar space heating spreadsheet requires the following data:

Data Required	**Value**
Total Floor Area	From DEAP Dimensions tab
Main Space Heating System: Delivered Energy	From DEAP Results tab
Main Water Heating System: Delivered Energy	From DEAP Results tab
Distribution Loss Factor	From DEAP Energy Requirements: Space Heating tab (taken from DEAP Table 9)
Fraction of heat from CHP unit/recovered from Power Station	From DEAP Energy Requirements: Space Heating tab
Total floor area of all dwellings served by the group heating scheme	Depends on the development in question.
Total aperture area of solar collectors in group heating scheme	From client.
Dedicated solar storage volume of group heating scheme	From client.
Zero loss collector efficiency of solar collectors	From certified test data or HARP database or DEAP Table H1
Collector heat loss coefficient	From certified test data or HARP database or DEAP Table H1
Annual solar radiation	DEAP Table H2
Overshading factor	DEAP Table H3

The following example shows data for one apartment in a block of eight apartments (each apartment has a total floor area of 80 m^2) with a group heating scheme (a gas boiler) and a group solar array on the apartment building roof. The array has a gross area of 100 m^2 which gives an aperture area of 72m^2 according to Table H2 - default values from Table H1 are used – and a dedicated solar storage of 5000 litres. The collectors are south-facing at a 30° tilt.

Take the following inputs from the DEAP calculation software completed as described in the instructions document			
Tab	Item	Value	
Dimensions	Total floor area [m^2]	80	
Results	'Main space heating system', 'Delivered energy [kWh/y]'	5298	
Results	'Main water heating system', 'Delivered energy [kWh/y]'	3849	
Energy requirements	Distribution loss factor [-]	1.05	
Energy requirements	Fraction of heat from CHP unit/recoverd from power station [-]	0	
Other inputs			
Sum of floor areas of all dwellings served by the group heating scheme [m^2]		640	
Proportion of collector area and storage volume allocated to this dwelling		0.125	
Inputs for solar system			
Complete the following inputs as described in Appendix H of the DEAP document i.e. in the same manner as for a solar water heating system serving a single dwelling.			
			Amount allocated to this dwelling
Aperture area of solar collector - of group system [m^2]		72	9.00
Dedicated solar storage volume - of group system [litres]		5000	625
Zero-loss collector efficiency, η_0 [-]		0.6	
Collector heat loss coefficient, a1 [W/m^2 K]		3	
Collector performance ratio, a1/η_0 [W/m^2 K]		5.00	
Annual solar radiation [kWh/m^2] from Table H2		1074	
Overshading factor [-] from Table H3		1	
Result			
Solar contribution as percentage of heat output from heat-only plant (i.e. excluding CHP)			**34%** -

The last line, highlighted in blue, indicates that 34% of the heating provided by the group heating scheme thermal heating comes from the solar collectors. This information must be entered in DEAP in the Energy Requirements -> Space Heating tab:

Heat Source	Fuel type	Efficiency[%]	Percentage of heat [%]	Primary energy conversion factor	CO_2 emission factor [kg/kWh]
Heating System 1	Mains Gas	90.00	66	1.10	0.203
Heating System 2	None	0.00	0	0.00	0.000
Heating System 3	None	0.00	0	0.00	0.000
Solar Space heating system			34		
Factors for heat delivered to dwelling from heating systems 1/2/3			100 of 100 ✔	0	0

In this case, the "Renewable and Energy Saving Technologies" in DEAP is not required as the space and water heating derived from the group solar heating system is accounted for in full by this "34%" figure. In addition, DEAP will use this figure to calculate any applicable Renewable Energy contribution for Part L compliance checking.

The Assessor must follow DEAP Appendix A when identifying the main and secondary heating systems operating in conjunction with the solar space heating system or solar water heating system. A main space and water heating system and associated fuel must be specified for individual heating systems at all times. This reasoning for this is outlined in the BER FAQ. Likewise, for group heating, at least one fuelled thermal heating system should be specified along with the solar space heating system. The solar space heating will reduce the overall primary energy requirement of the dwelling and this is reflected in DEAP.

3 Storage and direct electric heaters in DEAP

This article describes properties of different commonly found types of electric heating and how they are specified in DEAP assessments. Amongst these are storage heaters, direct electric heaters, and heaters which combine storage and direct heating.

Electric Storage Heaters: Old storage heaters consist of a thermally massive material – such as clay bricks or ceramic blocks within the heater – which can be heated by an embedded electrical element.
The principle of operation is as follows: at night electricity is passed through the element thereby heating the thermal mass. This stored heat is slowly released during the course of the following day.

Typically they have two controls:

- an input dial which controls the amount of electricity flowing into the storage heater during the night which in turn determines the amount of heat stored, and,
- an output dial which controls the rate at which the heat is released the following day.

If the following day is likely to be cold then the input dial is set high so that a lot of heat is stored overnight for use the following day. If heat is required throughout the day then the output dial is set low and the stored heat is released slowly. If heat is particularly required in the morning then the output dial is set high and the stored heat is released quickly.
As they run on cheaper night-rate electricity, storage heaters are relatively cost-efficient to run. The main disadvantage is a lack of responsiveness. If the occupant feels cold during the day he/she can't immediately switch the storage heater on. It only ever gives out heat that it has stored during the course of the previous night.
As a result, in DEAP old "large volume" storage heaters such as this have poor responsiveness as seen in the table below. Also, as outlined in DEAP Appendix A, if storage heating is the main heating system then a secondary system must be specified in DEAP.
Note that, in practice old storage heaters were usually sized to provide 90% of a dwelling's heating requirement with direct-acting electric heaters, portable or fixed, providing additional heat when required.

Direct-acting electric heaters: There are different types of direct-acting electric heater – convector heaters, radiant heaters, panel heaters – but they all operate on the same principle: when the occupant feels cold he/she can switch on a direct-acting electric heater and it will immediately generate heat to warm the room. They are often used as a back-up system to storage heating, or may be used as the main heating system in some cases.
Modern direct-acting electric heaters may have sophisticated control systems with timers and thermostats controlling individual heaters giving excellent control and responsiveness in DEAP.

Integrated storage/direct-acting electric heaters: This is a storage heater (relying on stored heat generated during the previous night) and a direct-acting electric heater (which generates heat when it is switched on) contained in the same casing. The system is sized so that most of the heating load is provided by the storage heater at the cheaper night rate electricity. The system may be thermostatically controlled so that any shortfall is automatically provided by the direct-acting electric heater. Also, if the occupant feels cold he/she can manually switch on the direct-acting electric heater to get immediate heat.
If an integrated storage/direct-acting system is the main heating system in a dwelling then a secondary system must be specified in accordance with the guidance in Appendix A of the DEAP manual. However, these integrated storage/direct-acting electric heaters are more responsive than most other types of storage heaters and this is reflected in the DEAP responsiveness category from Table 4a.

Note that a dwelling with any of the systems described above may have a poor BER because of the high primary energy conversion factor of electricity.

System	Control Category	Responsiveness Category	Temperature Adjustment
Storage heaters	3	Ranges from 5 down to 2 depending on type of storage heater as outlined in DEAP Table 4a	0.3 or 0 depending on level of control as outlined in DEAP Table 4e, Group 4
Direct-acting electric Heaters	2 or 3 depending on level of control as outlined in DEAP Table 4e, Group 6	1	0.3 or 0 depending on level of control as outlined in DEAP Table 4e, Group 6
Integrated storage/direct-acting electric heaters	3	2	0.3 or 0 depending on level of control as outlined in DEAP Table 4e, Group 4

This table summarises the relevant DEAP inputs for these electric heaters. All are 100% efficient, with fuel type of "electricity". The efficiency adjustment factor in DEAP is "1". Full detail is available in DEAP Table 4a and Table 4e. The table shown above does not include electric boilers or underfloor electric heating.

BER Assessors – Dwellings Technical Bulletin #19

Issue No. 4/11 July 2011

Contents:

1 Guidance on DEAP data collection and data entry

1.1 Doors in DEAP

Number of Doors
In DEAP the heat loss through the external doors of a dwelling is accounted for in the Building Elements - Doors tab. One of the fields required is the "Number of Doors" in the dwelling.

For ***New Dwellings*** this entry is for informational purposes only but should be entered correctly for clarity. The area and U-value of each door affect the calculation and must be entered correctly.

Example
A new dwelling with 2 identical external doors, one at the front and one at the rear. For each door, area = 1.9 m^2 and U-value = 3 W/m^2K.

In this case the door details can be entered in either of the following ways in DEAP:
(i) Doors entered separately:

Delete	Copy	Number of Doors	Door Description	Area m²	U-Value [W/m²K]	AU Value [W/K]
X		1	Front door - solid wood	1.9	3.0	5.70
X		1	Rear door - solid wood	1.9	3.0	5.70

Total door area m² 3.80

(ii) Doors entered together:

Delete	Copy	Number of Doors	Door Description	Area m²	U-Value [W/m²K]	AU Value [W/K]
X		2	Front & Rear doors - solid wood	3.8	3.0	11.40

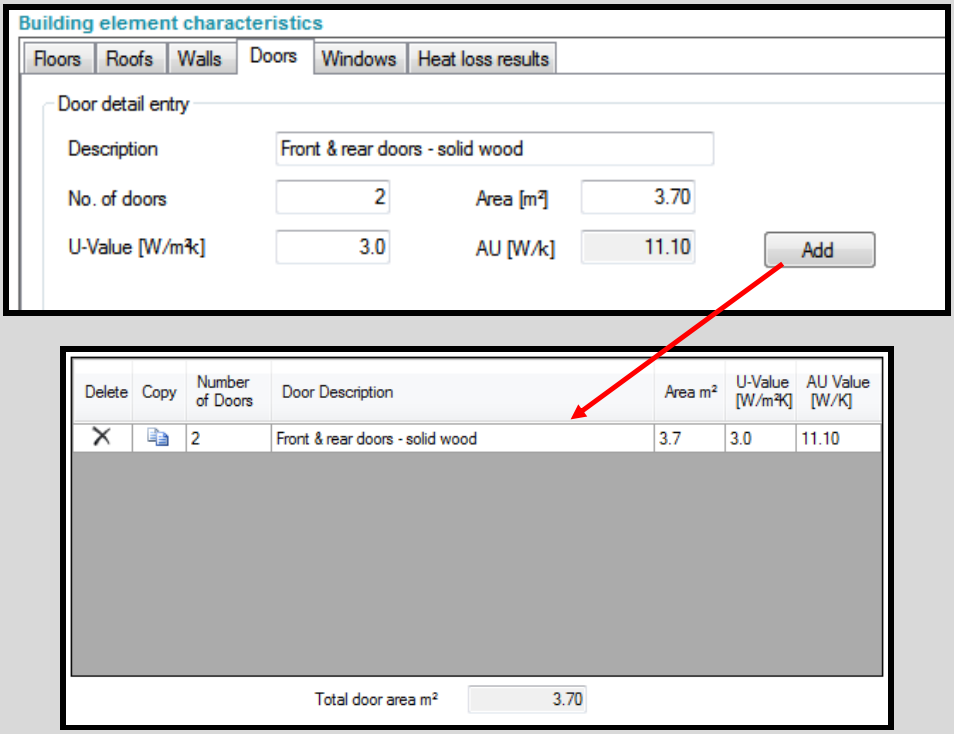
Total door area m² 3.80

Doors with different U-values must always be entered separately.

For ***Existing Dwellings***, if the Assessor is using the default door area, the "Number of Doors" entry is used to calculate the area of all the external doors in the dwelling based on the default value for a single door of 1.85 m^2.

Example
An existing dwelling with 2 external wooden doors:

Once the "No. of doors" is entered, the area is automatically calculated using the default value of 1.85 m^2 per door. This default door area may be used as outlined in DEAP Appendix S. The screenshots below show use of the default area and U-value:



An Assessor may prefer to use the actual door area as calculated from measurements of the door. This is acceptable in DEAP but is not mandatory for existing dwellings.

Solid wooden and PVC doors: U-values
The default U-value for a solid wooden or PVC door is 3 W/m^2K.
A non-default door U-value may also be used as long as it is backed up by the appropriate certification as outlined in Section 3.2 of DEAP and the March 2009 Technical Bulletin. BRE 443 (Conventions for U-value Calculations) also provides information on door U-value calculation.

Glazed Doors – U-value
In DEAP Section 6.2, a glazed door is one having between 30% and 60% glazing. The default U-value for a solid wood or PVC door is 3 W/m^2K. Modern double and triple-glazing has a lower U-value so the presence of glazing may lower the overall U-value of the door. If certified data is not available for the glazed door U-value, it can also be determined using the following formula:

$$U_{door} = \frac{\left(U_{glass} * \%_{glass}\right) + \left(U_{frame} * \%_{frame}\right)}{100}$$

- U_{glass} is the U-value of the glazing, which may be taken from Table 6a or Table S9;
- $\%_{glass}$ is the percentage of glazing in the door;
- U_{frame} is the U-value of the door frame which is taken to be 3 W/m^{2}K;
- $\%_{frame}$ is the percentage of door frame.

Example
A PVC door (area measured to be 1.9 m^2) in an existing dwelling has a 0.8 m^2 of double-glazing, with a manufacturer's date-stamped indicating an installation date of 2005. What is the adjusted U-value of the door?

- U_{glass} = 2.2 W/m^{2}K - taken from Table S9,
- $\%_{glass}$ = 100*0.8/1.9 = 42.1%
- U_{frame} = 3 W/m^{2}K, the default U-value for a PVC (or solid wooden) door,
- $\%_{frame}$ = 100-42.1 = 57.9%

$$U_{door} = \frac{(2.2 * 42.1) + (3 * 57.9)}{100} = \textbf{2.66 W/m}^2\textbf{K},$$

1.2 Uninsulated metal garage doors and metal roofs

Uninsulated metal garage doors are common in existing dwellings. These doors are typically made up of sheets of metal only a few millimetres thick. If the garage is included in the Total Floor Area of a BER assessment then the heat loss through the garage door must be accounted for. The default U-value for wooden doors, 3 W/m^{2}K, is not appropriate for an uninsulated sheet metal door.

If no other information to the relevant standards is available for a metal garage door then a default value of 5.9 W/m^{2}K should be used.

A similar situation applies to single-sheet metal roofs. If the roof is part of a room being included in the BER assessment, then heat loss through the roof must be accounted for. Again, such a thin layer of metal will provide little resistance to the flow of heat so in the absence of any other information to the relevant standards, a default value of 7.0 W/m^{2}K should be used.

1.3 Access Corridors acting as a Draught Lobby

Section 2.4 of DEAP states that "Flats with access via an unheated stairwell or corridor should be classified as having a draught lobby". This rule also applies to flats with access via a ***heated*** stairwell or a ***heated*** corridor. The key point is that the stairwell or corridor is enclosed thereby providing an airlock on the main entrance to the flat.

1.4 Ventilation from Chimneys

In a BER assessment of a dwelling an open fire could be treated as the primary or secondary space heating system, or it may not make any contribution to the space heating in DEAP, depending on what other heating systems are present in the dwelling.

In cases where the open fire is not considered the primary or secondary space heating system in DEAP, the chimney associated with the open fire will still make a contribution of 40 m^3/h to the ventilation of the dwelling in DEAP. For that reason, the chimney associated with an open fire must always be accounted for in the Ventilation section in DEAP unless the chimney is permanently blocked.

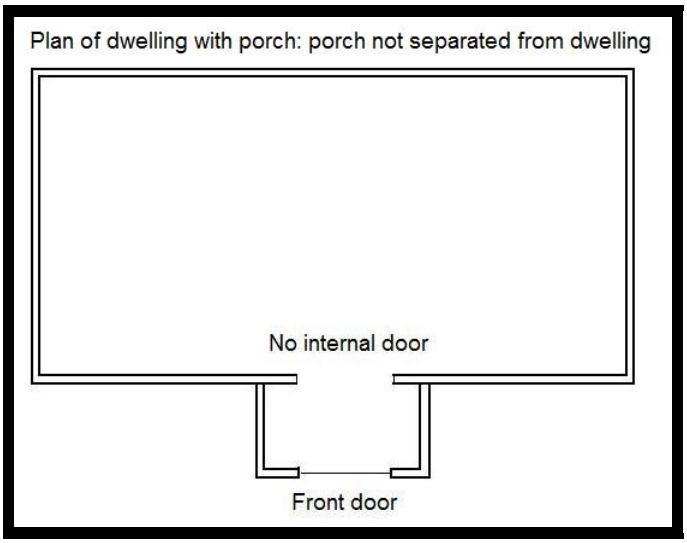
In some instances the chimney may be treated as an open flue as detailed in DEAP Section 2.1 and the April 2009 Technical Bulletin and the November 2009 Technical Bulletin.
Note that permanent air supply vents in the same room as chimneys, open flues or fixed flueless appliances should not be counted in the DEAP ventilation section. The chimney, flue or fixed flueless appliance should be reflected in the room by room count in the survey form. This air supply is accounted for when the chimney, flue or flueless appliance is entered in DEAP.

1.5 Porches

In the context of DEAP, a porch is a dwelling entrance lobby which protrudes from the line of the external wall of the dwelling.

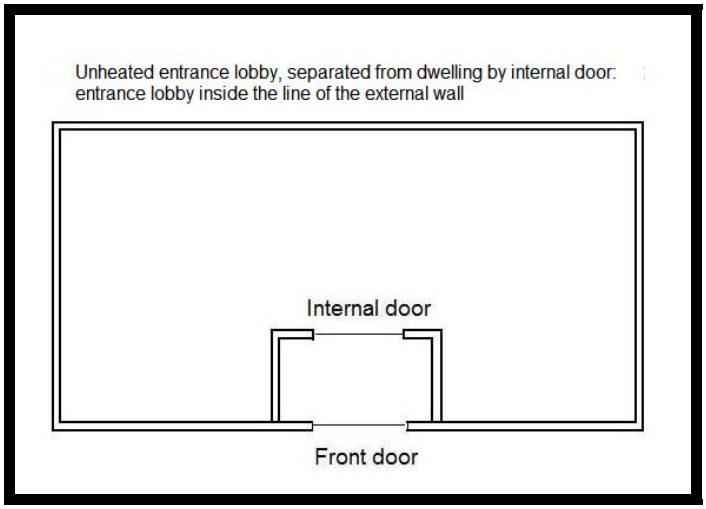
In DEAP, with the above definition in mind, if a porch is heated by a fixed heating device, e.g. a radiator from the dwelling's central heating system or a stand-alone fixed electric heater, then it is **included** in the total floor area of the BER assessment.

If a porch is not separated from the dwelling by an internal door, as shown in the following diagram, it is **included** in the total floor area of the BER assessment even if there are no fixed heating devices in the porch.

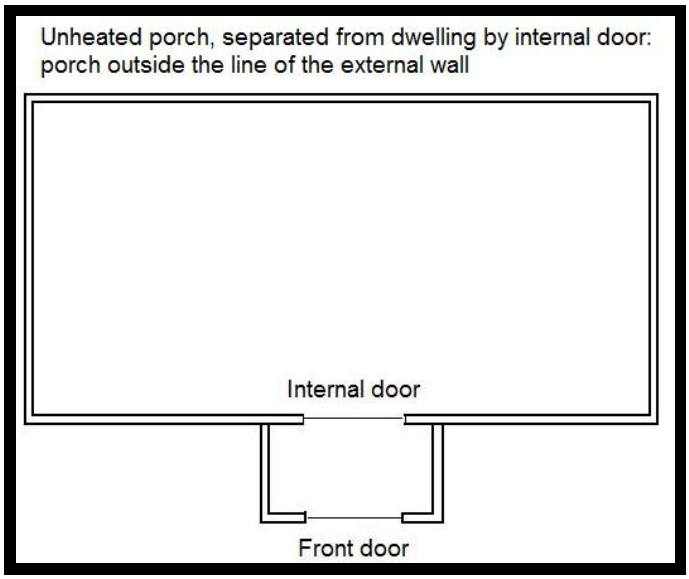


If a porch is unheated and is separated from the interior of the dwelling by a door then it is included in the total floor area if it is within the line of the building envelope and it is excluded from the total floor area if it is fully outside the line of the building envelope. This is detailed in the following examples.

In the example shown in the following diagram, the entrance lobby is unheated and is separated from the rest of the dwelling by an internal door. This entrance lobby is, however, within the line of the building envelope. In DEAP this type of entrance lobby is always **included** in the assessment.



In the next example the porch is again unheated and separated from the dwelling by a door but this time the porch juts out beyond the line of the wall:



In this case the porch is always **excluded** from the assessment.

This rule only applies if the whole of the entrance lobby is outside the line of the wall and is therefore considered a porch in DEAP. If the entrance lobby is not entirely outside the line of the external wall, then the entrance lobby is included in the Total Floor Area of the BER assessment.

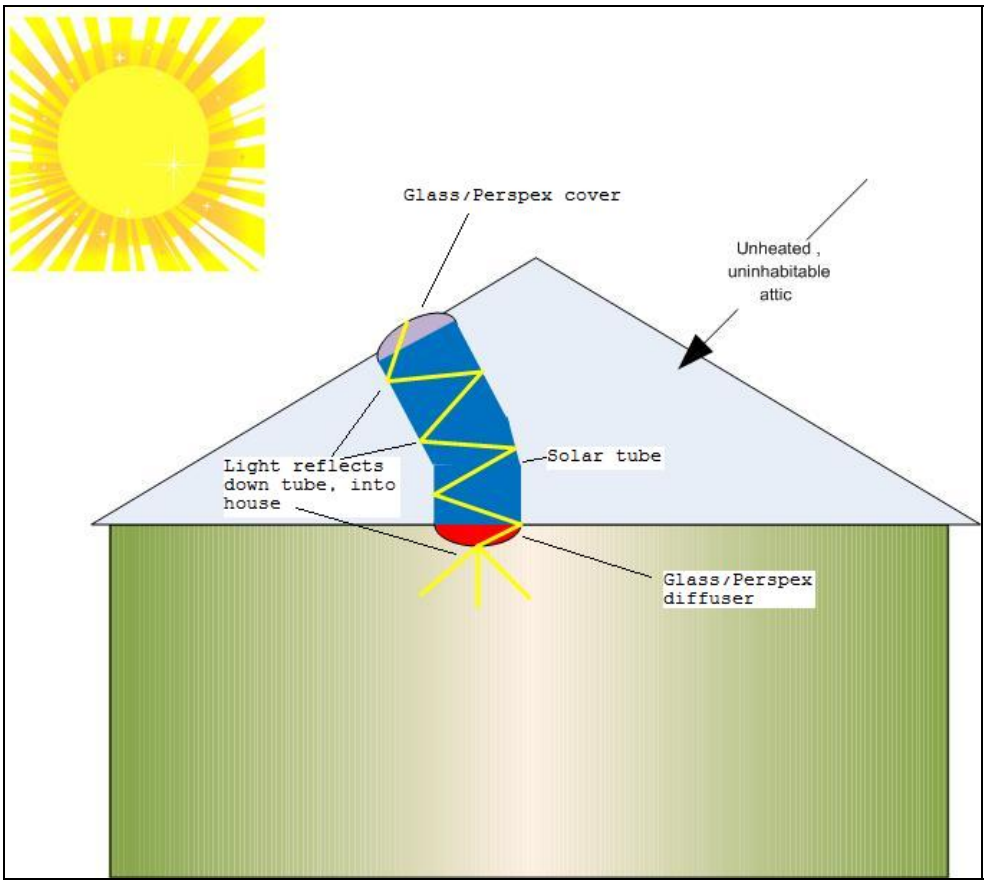
Guidance on inclusion of an entrance lobby in the dwelling floor area is summarised as follows:

Entrance lobby protrudes from the line of external wall of dwelling:	**Entrance lobby heated by a fixed heating device:**	**Entrance lobby separated from the dwelling by a door:**	**Include in dwelling floor area?**
NO	n/a	n/a	**YES**
YES	YES	n/a	**YES**
YES	n/a	NO	**YES**
YES	NO	YES	**NO**

The dwelling entrance may still act as a draught lobby (as specified in the DEAP Ventilation tab) even if it is not included in the dwelling floor area, provided it meets the criteria under DEAP manual section 2.4.

1.6 Skylights and solar tubes

In some types of room - e.g. north-facing rooms with external overshading, internal corridors in detached bungalows - it is difficult to achieve adequate daylight penetration using windows alone. In this case a rooflight extending to the ceiling below may be used to provide adequate natural lighting. In a dwelling with an uninhabited attic space the light must be transmitted from the rooflight to the ceiling of the living space with minimal losses. To do this a solar tube is installed. This is usually a metal cylinder with a highly reflective internal surface so that as much light as possible is conveyed to the interior of the dwelling as seen in the diagram.



The skylight/solar-tube combination admits natural light to the dwelling so is treated as a window in DEAP. There is glazing/Perspex at the top of the tube to admit light and prevent moisture entering. Usually there is also a layer of glazing or Perspex at the bottom of the tube – the area marked in red in the diagram – which acts as a diffuser, spreading the light evenly through the room. In this case the rooflight is treated as being double-glazed, air-filled, with a gap >= 16mm.

If there is no glazing/Perspex at the bottom of the tube then only the upper glazing (which could be single, double or triple glazed) is assumed. In addition, the walls of the solar tube are now considered to be part of the thermal envelope and so must be included in "Building Elements – Walls" section. If the tube is cylindrical, the heat loss area of the tube is estimated from the length and diameter of the tube (for a tube with circular cross-section the opaque heat loss area = π*d*l, where 'd' is the diameter and 'l' the length of the tube).

Default U-values may be assumed unless the Assessor observes evidence to the contrary during the BER survey. In some cases, the tube may also be rectangular with plastered walls.
As always, detailed records of observations and calculations should be made and retained by the Assessor and comments relating to how the solar tube was treated are also recommended.

Example 1
A circular rooflight – diameter 50 cm - is connected to a solar tube – 1.3 m in length - which passes light through a Perspex diffuser into the central corridor of a detached bungalow built in 2002.
How is this accounted for in DEAP?

- Window area = $\pi * r^2 = \pi * d^2 / 4 = \pi * (0.5)^2 / 4 = 0.20\ m^2$.
- U-value: double-glazed, air-filled, gap >=16mm: Table 6a gives a U-value = 2.7 W/m^2K. The "Roof window" option in DEAP should be selected.

Example 2
A rectangular rooflight opening with dimensions 1m * 0.5m - is connected via an elongated plastered rectangular section, 1.3m long, through an unheated attic passing light into the central corridor of a detached bungalow built in 2002. This elongated rooflight is open at the bottom and has a single glazed external surface.
How is this accounted for in DEAP?

- Window area = $0.5m^2$.
- Window U-value: single-glazed – Table 6a gives a U-value = 4.8 W/m^2K. The "Roof window" option in DEAP should be selected.
- Heat loss wall area: i.e. area of plastered section between dwelling and unheated attic = $1.3 * (1+1+0.5+0.5) = 3.9\ m^2$.
- Wall U-value: built in 2002, default U-value from Table S3 = 0.55 W/m^2K. The "Wall is semi-exposed" option should be selected in DEAP as the attic is unheated.

2 Updating published BERs on NAS

Assessors should note that ratings published on the National Administration System (NAS) are generally displayed in descending order of BER Number. In certain circumstances, such as revision of published ratings, the new certificate assumes the same BER Certificate Number and therefore is listed along with the previously uploaded rating. Depending on the dates of the published ratings and the quantity of ratings uploaded by the Assessor the revised rating may appear further down the list or on another page.
To view the latest ratings uploaded, the Assessor can sort the visible ratings on NAS by Date 'Processed/Issued' in descending order simply by clicking on the 'Processed/Issued' column header. To alternate between date descending and date ascending, the Assessor should click on the 'Processed/Issued' column header again. Similarly the Assessor may choose to sort BER Certificates by MPRN, County, Type, etc.

The Assessor should take great care in uploading revised ratings as refunds cannot be issued after accepting the "Publish Rating Confirmation" screen. Each time an Assessor publishes a BER the €25 publication fee will be charged to that Assessor's account. The NAS Publishing Ratings - Confirmation screen advises the Assessor that:

If you click on the "Publish" option you are accepting responsibility for the accuracy of the assessment. If you opt to proceed with publication you will be advised that you are about to incur a fee. If you click "OK" to this message your assessment will be published and it will:

- *be available for viewing on the Public Register*
- *allow the Assessor to download BER certificates and xmls, and*
- *charge publication fee against the account of the BER Assessor/employer per published rating.*

3 Publishing a BER under the Better Energy Homes scheme

BER Assessors should ensure that the BER assessment for a Better Energy Homes scheme grant application is published immediately after the assessment has been completed. A delay may result in the withdrawal of the homeowner's grant offer **for all measures** if the BER is not published within 6 months of the initial offer. If a BER Assessor feels that the completed works relating to the scheme at the property do not conform to the standards in the Better Energy Homes Code of Practice and Technical Specifications they are still obliged to carry out the BER but should notify SEAI of their concerns via the Better Energy Homes Helpdesk at 1850 927000 or admin@betterenergyhomes.ie.

BER Assessors – Dwellings Technical Bulletin #20

Issue No. 5/11 **Oct '11**

Contents:

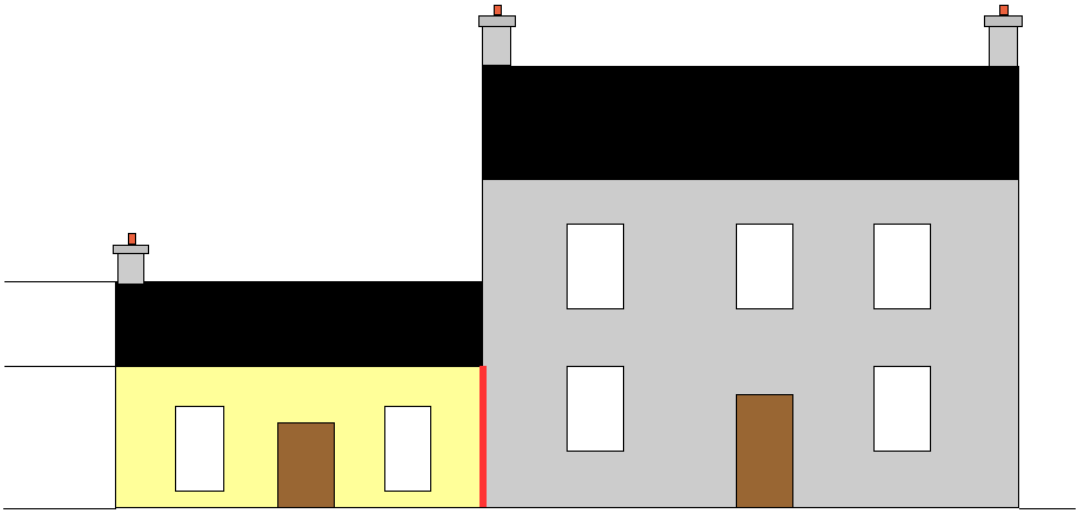
This technical bulletin addresses a number of issues recently encountered by the BER audit team and the BER Helpdesk:

- Dwelling type classification ;
- Partially sheltered sides: obstacles lower than the required height;
- U-values of filled cavity walls;
- Draught-stripping calculation;
- Selecting the correct efficiency for solid fuel appliances.
- Warm air heating systems and mechanical ventilation.

1 Dwelling type classification

The classification of a house as detached, semi-detached or terraced depends on how it adjoins the neighbouring buildings. A side is considered attached if more than half of its area adjoins a heated space. Otherwise it is not attached for the purposes of identifying dwelling type.

As an example, consider the BER assessment of the grey two-storey house below:

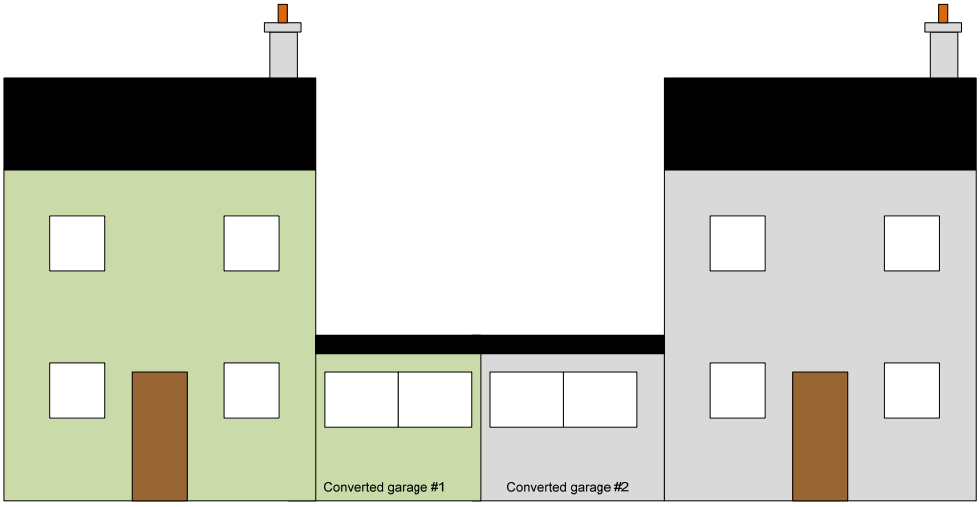


The grey two-storey house adjoins a single-storey house. The attic in the yellow single storey house is unheated. Less than half of that side of the grey two-storey house adjoins the heated space (yellow) so that side is considered to be unattached for the purposes of identifying the dwelling type. The other side of the grey two-storey house is unattached in this case so the dwelling type is 'Detached'.

Even though the grey house is specified as 'Detached', it can still be assumed that there is no heat loss through the area of the party wall between the grey house and heated yellow house (marked in red in the diagram).

For the yellow single-storey house, both sides are fully adjoining heated spaces so the dwelling type is 'Mid-terrace'.

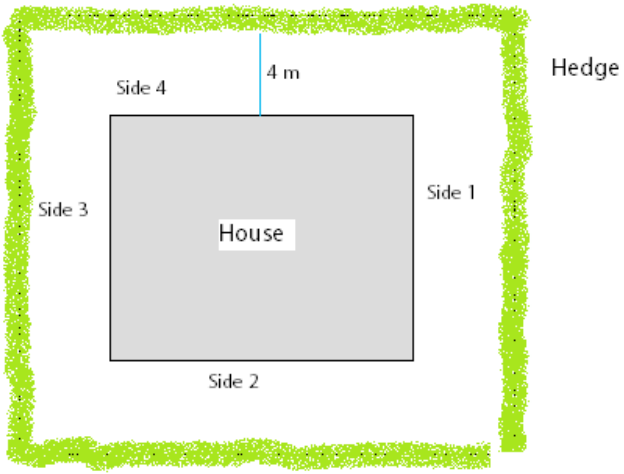
In the following example, both houses were originally constructed with adjoining garages. Both garages were converted to habitable heated spaces and are less than half the height of the original dwellings. In addition, both houses were constructed as detached houses and should be entered as detached houses in DEAP.



2 Partially sheltered sides in DEAP

The September 2010 technical bulletin details the combination of two partially sheltered sides to count as one sheltered side. In those examples the obstacles were tall enough and close enough to the dwelling to meet the criteria in the DEAP Manual Section 2.5, but not wide enough to fully shelter a side of the dwelling. The *combined* width of the two obstacles was sufficient to count the two partially sheltered sides as one sheltered side.

This approach can also be applied to the combination of obstacles which are close enough and wide enough but not tall enough. For example consider a two storey detached house with the upstairs ceiling at a height of 5.5 metres. The house is surrounded on all sides by a 3-metre tall hedge that is 4 metres from the house.



If two sides are taken together, the *combined* hedge height is 6 metres which is tall enough as it is greater than the dwelling height. So, sides 1 and 2 count as a single sheltered side, as do sides 3 and 4. In total the house has 2 sheltered sides in DEAP.

3 U-value of filled cavity walls

In cases where an existing cavity wall has been filled with insulation, the U-value may be calculated based on the default U-value for the original wall as detailed under DEAP Manual Table S3. This requires the following:

- the original default U-value of the wall – taken from Table S3;
- the thickness of the newly added insulation – as measured and documented by the BER Assessor or as documented by the Contractor who installed the cavity-fill insulation;
- the thermal conductivity of the new insulation material used to fill the cavity – taken from a certified data source as explained in the April 2009 Technical Bulletin.

Alternatively the U-value may be calculated in full using the thermal conductivities and thicknesses of the different layers in the wall.

If the information above is unavailable, then the wall U-value should be taken from the appropriate default for a filled cavity wall in Table S3 in the DEAP manual.

4 Draught-stripping calculation

In calculating the ventilation heat loss of a dwelling it is necessary to estimate the level of infiltration of air through the dwelling structure. The most accurate way to do this is using an air pressurisation test. Data about the dwelling structure gathered during the BER survey is used where the air pressurisation test has not been carried out.

This dwelling structure information includes the "Percentage of windows and doors draughtstripped" which is used to estimate air infiltration through gaps between the openable part of a window and the surrounding window frame.

In practice, it is unnecessary to measure the perimeter or area of each openable section when determining the percentage draught stripping. The Assessor may identify the number of openings with draught stripping and divide this by the total number of openings in the dwelling. Openings include openable windows, doors and attic hatches between the dwelling and unheated spaces or open air.

For windows it is likely that double-glazed windows, triple-glazed windows and single glazed windows with secondary glazing have draught-stripping.

The percentage of windows and doors draughtstripped may then be calculated based on the number of openings in the dwelling.

5 Efficiency data for solid fuel appliances

The BER auditors have encountered assessments where the fuel used by a heating appliance is not the same as the fuel specified in test data or the HARP listing for the appliance. For example, the appliance was tested with smokeless fuel but in DEAP is to be specified as using solid multi-fuel. Using a different fuel can affect the efficiency.

The following guidance outlines the steps that should be taken:

1) If the appliance fuel type as per DEAP 10.3.3 matches the test data fuel type then the gross efficiency is used if it is shown on the test certificate or on HARP.

Example
HARP listing for wood fuel stove: gross efficiency 73%.
If the stove uses wood fuel in DEAP, then the efficiency is entered as 73% in DEAP.

2) If the appliance fuel type as per DEAP 10.3.3 matches the test certificate fuel type but the test certificate only shows the net efficiency then the net/gross conversion described in Appendix E must be applied (see Table E4).

Example
Test certificate for wood fuel stove: net efficiency 77.2%.
If the stove uses wood fuel in practice then the efficiency used in DEAP is given by,
Gross efficiency = 77.2 x 0.91 = 70.25%.

3) If the appliance fuel type as per DEAP 10.3.3 is solid multifuel then the Assessor should consider the average efficiency from available solid fuel test data. This may be a single efficiency for a single fuel type or multiple efficiencies for multiple fuel types. The data could be from HARP or from other accredited sources. If the test data specifies gross efficiencies, such as on HARP, then the average of these can be used in DEAP. If the test data efficiencies are net, then these are averaged and the solid fuel net/gross conversion of 0.94 described in Appendix E must be applied.

Example
The fuel type of the stove in DEAP is solid multifuel.
Test data for coal, anthracite and manufactured smokeless fuel are available specifying gross efficiencies of 75%, 76% and 72% respectively.
The efficiency used in DEAP = (75 + 76 + 72)/3 = 74.33%.

6 Warm Air Heating System with MVHR

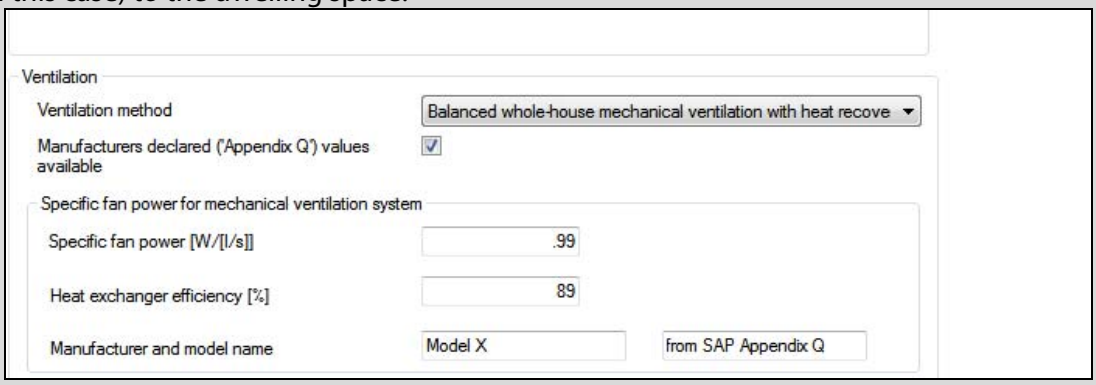
Older warm air heating systems have their own distribution system but in more recent installations warm air systems are frequently combined with a Mechanical Ventilation system with Heat Recovery. For example, a boiler system may feed a heat exchanger at the mechanical ventilation inlet rather than feeding radiators.

The heat recovery system data is entered in the ventilation tab in DEAP in the usual way. This caters for the ventilation aspect and the power consumption of the heat recovery system fans. It is possible to use non defaults for the MVHR parameters by following the guidance outlined here.

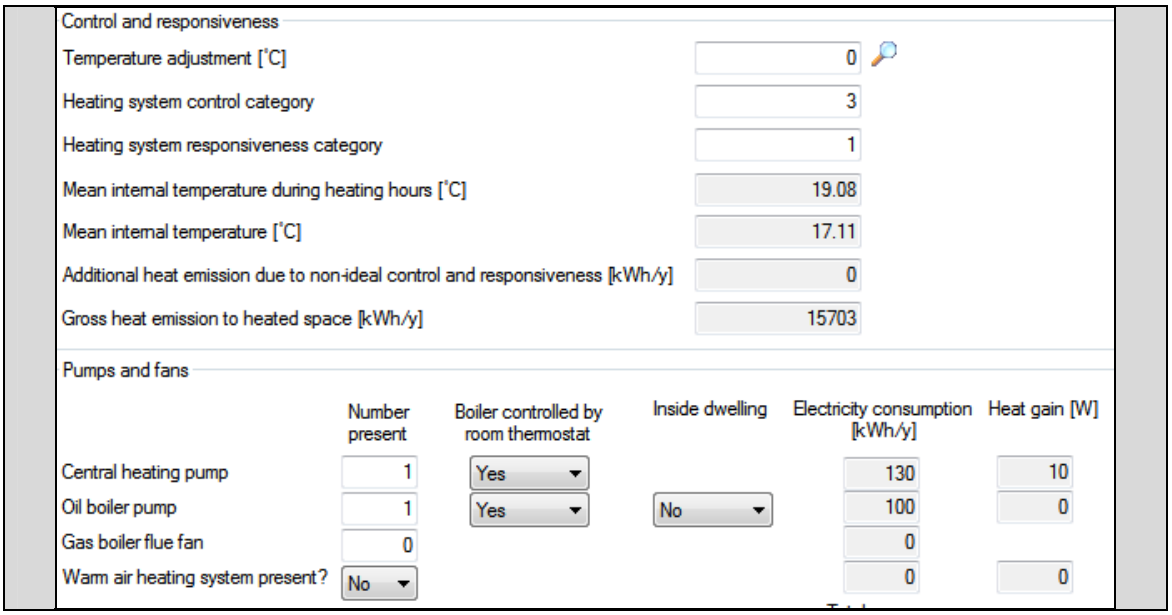
The boiler data is entered as normal, using the efficiency from HARP for example. In the Distribution System Losses & Gains tab, "Warm air heating system present" is not specified as the warm air heating fan power is entered through the heat recovery system in the DEAP ventilation tab. As per DEAP table 4f note (d) the warm air heating fan power usage is actually that of the MVHR in this case. The responsiveness category is 1 in this system type. It should be assumed that a central heating pump is required to pump water from the boiler to the MVHR heat exchanger unless you can demonstrate otherwise.

The following example shows the relevant DEAP data entries. The sample dwelling shown has an oil boiler with a central heating pump providing hot water to a heat exchanger in a heat recovery unit inlet. The heat recovery unit test data is taken from SAP Appendix Q in this case.

DEAP Ventilation Tab: MVHR entry. The specific fan power accounts for the electricity required to distribute the warm air from the heat recovery unit (and boiler heat exchanger in this case) to the dwelling space:



Distribution system losses and gains tab: Responsiveness category set to '1' and warm air heating system not specified:



Control and responsiveness

Temperature adjustment [°C]	0
Heating system control category	3
Heating system responsiveness category	1
Mean internal temperature during heating hours [°C]	19.08
Mean internal temperature [°C]	17.11
Additional heat emission due to non-ideal control and responsiveness [kWh/y]	0
Gross heat emission to heated space [kWh/y]	15703

Pumps and fans

	Number present	Boiler controlled by room thermostat	Inside dwelling	Electricity consumption [kWh/y]	Heat gain [W]
Central heating pump	1	Yes		130	10
Oil boiler pump	1	Yes	No	100	0
Gas boiler flue fan	0			0	
Warm air heating system present?	No			0	0

BER Assessors – Dwellings Technical Bulletin #21

Issue No. 1/12 **January 2012**

Contents:

The bulletin also outlines recent minor updates to the DEAP Survey Guide.

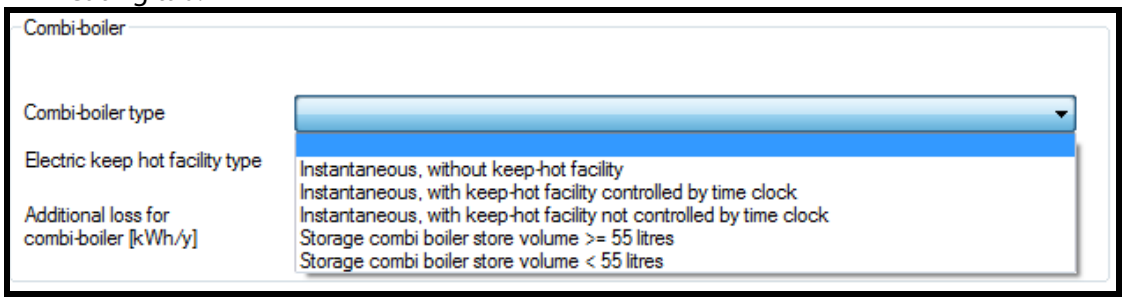
1. Combi Boilers: Additional Losses

The Helpdesk have received a number of queries relating to identification of combi boilers and their inclusion in BER assessments. A Combination Boiler, commonly known as a combi boiler, has the capability to provide domestic hot water directly and also to provide space heating in the usual manner. In some cases the combi boiler has an internal hot water store. In DEAP a combi boiler with an internal store capacity of less than 15 litres is classed as an instantaneous combi. A combi boiler with an internal store capacity of 15 to 70 litres is classed as a storage combi boiler.[1] Dwellings with combi boilers are unlikely to have hot water storage installed other than storage which may be in the boiler. In addition, the combi boiler has separate connections for water and space heating. The HARP database categorises boilers as being combi or regular boilers. In addition, HARP provides information on any storage facility or keep-hot facility in the boiler. This information may also be available from product literature or websites.

When providing hot water, combi boilers operate in response to a demand from a tap or shower. By contrast, a regular boiler heats water stored in a hot water cylinder or thermal store for use at a later time.

It takes a short amount of time for the water leaving the combi boiler to reach an adequate temperature. The energy required to meet the dwelling's hot water demand in DEAP does not take account of the energy used as the combi boiler output reaches an adequate temperature. In DEAP this extra energy input is called the additional loss for the combi boiler and is specified in DEAP Table 3a and the associated footnotes.

The Assessor selects the combi boiler type from the list provided in the DEAP Water Heating tab:



Additional Loss for Storage Combi Boilers

The additional loss for a storage combi boiler depends on the volume, V, of the internal hot water store. An additional loss of zero applies if the volume is 55 litres or more (DEAP Table 3a).

[1] See DEAP Manual Appendix D for definitions of the combi boiler, instantaneous combi, storage combi and keep-hot facility. Storage > 70litres is a CPSU.

If the volume is less than 55 litres (but greater than 15 litres) the additional loss is calculated by the Assessor for entry in DEAP as follows:

Additional Loss = 600 – [(V-15) * 15]

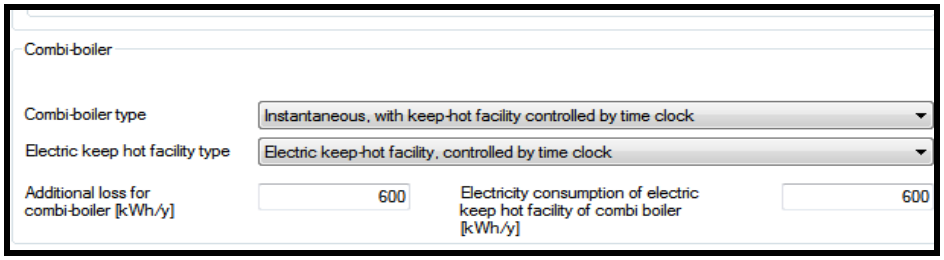
Example
What is the Additional Loss of a combi with an internal hot water store having a capacity of 45 litres?
V = 45 litres. Substituting into the equation above gives additional loss as follows:
= 600 – [(45-15) * 15]
= 150 kWh/y.

Table 3a, Note (a) applies to this category of storage combi boiler. Note (a) states that if the daily hot water usage is less than 100 litres/day, then the additional loss calculated above must be multiplied by **(Daily Hot Water Usage)/100**.

In this example if the daily hot water usage is 79 litres/day, the additional loss is:
= 150 * (79/100)
= 118.5 kWh/y.

The daily hot water usage is displayed on the Water Heating tab in DEAP. If Note (a) applies the Assessor must make the adjustment to the additional loss. This adjustment is not made if the daily hot water usage >= 100 litres.

Instantaneous Combi Boilers - Keep-hot Facility
Some instantaneous combi boilers maintain the water in the internal store above a set temperature even when there is no hot water demand and the boiler is not in use. This is called a keep-hot facility. It may operate by burning fuel or by heating an electrical element in the internal store. When an instantaneous combi boiler is selected from the list of combi boiler types it is also necessary to specify whether there is a keep-hot facility powered by electricity, using the second drop-down list:



If there is no keep hot facility present then the "Electric keep hot facility type" entry is set to "None".
An instantaneous combi with no keep-hot facility has an additional loss of 600 kWh/y but Note (a) applies in this case so the daily hot water usage is taken into account. DEAP does this automatically. The associated electricity consumption is zero as there is no keep-hot facility.

If there is a keep hot facility present that operates by burning boiler fuel the "Electric keep hot facility type" entry is set to "None".
In this case the additional loss is 600 kWh/y if the keep hot facility is controlled by a time-clock but 900 kWh/y if it is not controlled by a time-clock. The associated electricity consumption is zero. DEAP then attributes the keep-hot facility energy usage to the main water heating fuel type.

If there is an *electric* keep hot facility present, then one of the following options is chosen:

- **Electric keep-hot facility, controlled by time clock**

For an instantaneous combi boiler with an electric keep-hot facility controlled by a time-clock, the additional loss is 600 kWh/y and the electricity consumption is also 600 kWh/y (as defined in Table 4f).

- **Electric keep-hot facility, not controlled by time clock**

For an instantaneous combi boiler with an electric keep-hot facility controlled by a time-clock, the additional loss is 900 kWh/y and the electricity consumption is also 900 kWh/y (as defined in Table 4f).
As per the footnotes in DEAP Table 3a, if the power rating of the keep-hot facility without time clock is available from the HARP database, the additional loss is calculated by the user as:

Loss =8.76 x P (kWh/year)

where P is the power rating of the heater in Watts. The electricity consumption will have the same value as detailed in DEAP Table 4f (note f).

Specification of keep-hot facilities is summarised as follows:

Keep hot Facility	Type	Time-Clock	Additional Loss (kWh/y)	Electricity Consumption (kWh/y)
No	NA	NA	600*	0
Yes	Boiler Fuel	No	900	0
Yes	Boiler Fuel	Yes	600	0
Yes	Electric	No	900 *or* (8.76 x P)	900 *or* (8.76 x P)
Yes	Electric	Yes	600	600

* Table 3, Note (a) applies in this case if daily hot water usage < 100 litres.

2. Roof Windows

A window is treated as a *roof window* if it is inclined at an angle of less than 70° from horizontal. Otherwise, treat it as a standard vertical window. This is defined in DEAP Table 1b. Roof windows are treated differently from vertical windows in 2 ways: orientation and U-value.

Orientation
For roof windows there are only two possible orientations in DEAP:

- North: when the roof window is oriented within 30° of North;

- Horizontal: for all other orientations.

Example
During an attic conversion a window is built into the line of a roof having a pitch of 30°. The roof is oriented 15° West of North. What is the orientation of the window?

Answer: The pitch of the window is less than 70° so it is a roof window and the window is oriented within 30° of North so the orientation must be "North".

Example
A vertical dormer window faces 25° East of North. The pitch of the roof is 45°.
How is the window treated in DEAP?

Answer: This dormer window is a vertical window in a pitched roof. It is treated as a vertical window, not a roof window. It is 25° from North, 20° from North-East so the appropriate orientation is "North-east".

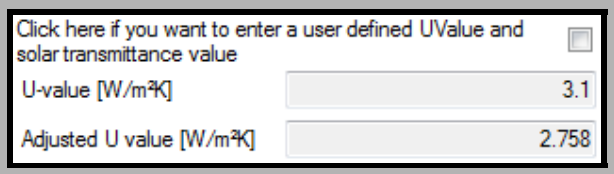
Example
An existing dwelling has three roof windows in a south-facing roof with a pitch of 30°. How are the windows treated in DEAP?

Answer: The pitch of the windows is less than 70° so they are roof windows and the roof is *not* oriented within 30° of North so the orientation must be "Horizontal".

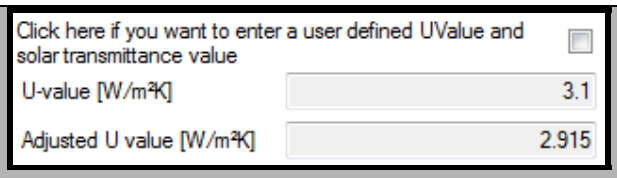
U-value
DEAP adjusts the U-value of a roof window to account for the different direction of heat flow compared to a vertical window. Details of the adjustment are given in Notes (1) and (2) of DEAP Manual Table 6a.
When adding a roof window in DEAP the Assessor should select the "Roof Window" option. DEAP will automatically adjust the U-value. The adjustment applies to default or non-default U-values alike.

Example
An Assessor observes the following window during a BER assessment:
Roof window (roof pitch 30°), wood frame, double-glazing, air filled, 6mm gap. Roof orientation: East. Overshading: None.
What is the U-value and Adjusted U-value of the window?

Answer: The U-value is 3.1 W/m^{2}K based on the window parameter lookups in DEAP as shown below:



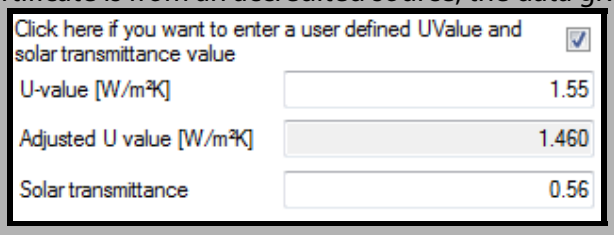
To apply the roof window adjustment the "Roof Window" option is selected giving the following:



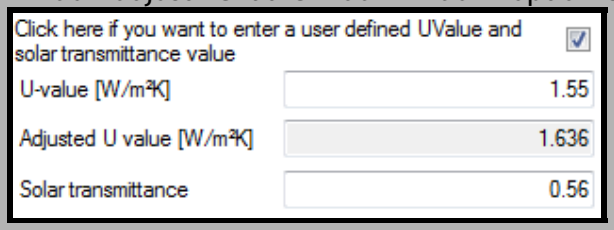
The U-value remains unchanged (3.1 W/m^{2}K) but the Adjusted U-value has increased to 2.915 W/m^{2}K to account for the different direction of heat flow.
The U-value adjustment for assumed use of curtains (Section 3.2) is also applied by DEAP.

Example
An Assessor notes the following details during a survey of a New Dwelling:
Roof window (pitch 45°), wood frame, triple-glazing, 18mm gap. Orientation: Southeast. Overshading: None.
There is also an IAB certificate stating U-value for the window of 1.55 W/m^{2}K and solar transmittance for the glazing of 0.56.
What is the U-value and Adjusted U-value of the window?

Answer: As the certificate is from an accredited source, the data given is used.



To apply the roof window adjustment the "Roof Window" option is selected giving:



The U-value remains unchanged (1.55 W/m^{2}K) but the Adjusted U-value has increased to 1.636 W/m^{2}K to account for the different direction of heat flow.
The U-value adjustment for assumed use of curtains (Section 3.2) is also applied by DEAP.

3. Suspended Wooden Ground Floor

In the Ventilation tab of DEAP, if data from an air permeability test is not available an estimate of the level of air infiltration to the dwelling is made based on the dwelling structure. In this case, one of the items which the BER Assessor must specify is whether there is a suspended wooden ground floor in the dwelling or not.

This entry refers specifically to the ground floor of dwellings which have a floor at ground level. It does not apply to dwellings such as mid floor or top floor apartments.

4. Fuel Cost Comparison using DEAP

The main and secondary space heating systems are identified based on DEAP Appendix A. In some cases, it may be necessary to make a cost-comparison between two or more heating systems to see which is the cheapest to run, as outlined in DEAP Manual Appendix A, Section A2. A number of BER Assessors have asked the BER helpdesk how to carry out this calculation.
This is done by calculating the BER for each heating system in turn and noting the Delivered Energy in the DEAP Results tab. The Delivered Energy (in kWh) is multiplied by the fuel cost (in €/kWh) to give the annual cost of running the dwelling for each of the heating systems.
The fuel cost data can be taken from the Domestic Fuel Cost Comparison file here.

As an example, consider a dwelling in a smokeless fuel area with three habitable rooms and two heat sources present: an open fire and a direct-acting electric heater. Each heater heats only one habitable room. Therefore the cheapest to run is chosen as the main space heater.
The BER was first calculated with the open fire (efficiency = 30%) as the main heating system and the electric heater (efficiency = 100%) as secondary. Fuel costs in the example below are based on prices published in October 2011.

Main: Open Fire;
Delivered Energy: 50301 @ 0.0463 €/kWh = €2328.94
Secondary: Direct-acting Electric Heater;
Delivered Energy: 1677 @ 0.1777 €/kWh = €298.00
Total: **= €2626.94**

The BER was then calculated with the electric heater as the main heating system and the open fire as secondary:

Main: Direct-acting Electric Heater
Delivered Energy: 11264 @ 0.1777 €/kWh = €2001.61
Secondary: Open Fire
Delivered Energy: 4172 @ 0.0463 €/kWh = €193.16
Total: **= €2194.77**

When changing the main heating system above, it may also be necessary to make changes on the Distribution System Losses & Gains tab to reflect a different level of control and responsiveness in the main heating system.
Each value was multiplied by the respective Unit Fuel Cost taken from the Domestic Fuel Cost Comparison file to give the annual running cost. In this case as the second option is cheaper to run so the electric heater is chosen as the main heating system and the open fire as the secondary system.

5. BER Survey Photograph Quality

As described in the DEAP Survey Guide, "BER Assessors should endeavour to gather as much data, photographs, sketches/plans and supporting evidence as possible (and indeed practicable) to increase the likelihood of an accurate survey and assessment which will stand up to auditing by SEAI".
Issues have arisen during BER Audits regarding the quality of photographs taken by Assessors. Recurring problems include:

- blurred photographs – due to camera movement;
- underexposed photographs – particularly photos taken in attics & boiler houses when the flash has been used incorrectly;
- poorly focused photographs – caused by not giving the camera time to focus, not having sufficient distance between camera and object, or, misuse of the camera's macro function. This applies particularly to pictures of nameplates on boilers, heating appliances, etc.

If an Auditor cannot make a clear appraisal of a photograph for reasons such as the issues mentioned above, or for any other reason, then the Assessor may be liable to disciplinary sanction under the BER QA scheme. In some cases, BER Assessors may wish to compress photographs to a smaller file size as smaller documents are easier to transmit by email. This is acceptable provided the photograph remains clear.

In order to minimise the likelihood of any problems occurring the Assessor is encouraged to read the camera's manual to gain a full understanding of how the camera works, paying particular attention to the use of flash, macro and focus.
The following simple tips should also be adhered to:

- hold the camera steady;
- give the camera time to focus;
- for close-up shots, the camera's macro function may take several seconds to gain correct focus;
- use the flash in poorly lit spaces (the camera's auto-flash setting will do this automatically, generally with good results);
- when using the flash on a object several metres away try to ensure there are no objects in the foreground as this can affect the focus and/or over-expose the photograph;
- check the photograph and if it is not of sufficient quality **re-take the photograph**.

6. Data Integrity for Provisional BER

As per Section 5 of the BER Assessor's Code of Practice, "a New Provisional BER assessment can be carried out by BER Assessors based on design drawings and specifications of an uncompleted building provided that, on completion of the building in question, a New Final BER assessment is carried out on the completed building".

The provisional BER must be representative of the specification and drawings of the building. The BER assessor must verify each item entered in the provisional BER and in a similar manner to the final or existing BER must have documentary evidence to support all entries such as signed off specifications, U-value calculations and so on.

The specification and drawings must be provided by the client or their representatives, however where as part of their role within a project a BER Assessor has developed the specification or drawing, they must be signed off by the client confirming that the uncompleted building shall be built to the specifications and drawings produced by the Assessor.

The specification and drawings must provide adequate information to support an entry, please refer to examples below.

In exceptional cases, there may be insufficient documentary evidence to support an entry. The assessor may then use the default values. The default should be based on the relevant guidance documents and the assessor should keep a record with the assessment detailing the reason for the default chosen.

Here are a few examples of acceptable and unacceptable documentation:

Data Entry	Acceptable Supporting Documentation	Unacceptable Supporting Documentation
U-Value of Opaque Elements	- Specification/ Drawing detailing materials used in element construction and - U-Value Calculation and - Appropriate References to Thermal Conductivities used in U value calculation	- Specification/ Drawing stating U value of element is X.XX value
Pressure Test Results	- Refer to Technical Bulletin September 2009 "Pressure testing in DEAP and for TGD L compliance"	- Specification/ Drawing stating Pressure Test shall achieve X m3/h/m2 with no other supporting data.
Thermal Bridging Factor	Refer to DEAP manual Appendix K For a provisional BER for a building that proposes to conform with "Limiting Thermal Bridging and Air Infiltration - Acceptable Construction Details" Assessor must provide the relevant drawings	- Specification/ Drawing stating the building will conform with "Limiting Thermal Bridging and Air Infiltration - Acceptable Construction Details" with no details provided.

	clearly showing the relevant details. These drawings should be signed off by the developer/builder, site engineer or architect confirming that the uncompleted building shall be built to these details.	
Heating System Efficiency	- Specification/ Drawing detailing proposed heating system - Efficiency of Heating System based on HARP Database/ Certified Test Data/ Table 4a and 4b of the DEAP manual.	Specification/ Drawing stating that the boiler efficiency shall be X%.

7. DEAP Survey Guide Update

The DEAP Survey Guide and Survey Form have been updated and are available www.seai.ie/deap. These changes are primarily to align to the DEAP v3.2.0 software and manual. The changes are summarised as follows:

- References to DEAP Table 12 instead of TGD L Table A1/A2 for thermal conductivity defaults;
- Reference to DEAP Table 2a on calculation of hot water storage volume added;
- Reference added to DEAP Section 3.2 for window default derivation;
- Hot water storage location now to be detailed by the Assessor;
- Detail on location and number of oil boiler fuel pumps and central heating pumps;
- Added detail on fan coil radiators;
- Added reference to DEAP 10.3.3 for solid fuel type identification;
- Added reference to individual heating system CHP plant;
- Reference to DEAP Appendix C for group heating system distribution loss factor calculation;
- Sheltered sides entry does not have a default;
- Updated references to new wall types from DEAP Appendix S;
- Survey form requires client name and property address and purpose of rating;
- Survey form references basement apartment dwelling type;
- Survey form now lists biodiesel and bioethanol fuel types;
- Survey form caters for unglazed solar collectors and specification of area type (gross or aperture);
- Further emphasis on mandatory requirement for survey evidence and BER records.

8. DEAP v3.2.0: Troubleshooting

SEAI launched DEAP v3.2.0 on 1st December 2011. There are a number of new functions in the software as detailed in the DEAP v3.2.0 Release Notes.

SEAI have been contacted by BER Assessors on minor issues found in the software relating to the following:

- Downloading DEAP using Firefox and Chrome browsers;
- Importing the MPRN address to the property address;
- Outdoor central heating pumps;
- Upgrading from previous versions of DEAP;
- Dwelling county issues;
- Specifying heated basements in DEAP.

The release notes (Appendix A) now details these issues along with simple workarounds to ensure they do not impact on ratings. Assessors are advised to familiarise themselves with the release notes to avoid these issues arising.

SEAI intends to perform a minor DEAP release in the coming months to rectify these issues.

BER Assessors – Dwellings Technical Bulletin #22

Issue No. 2/12 **April 2012**

Contents:

1. Supplementary Electric Water Heating in Summer

The BER audit team have seen a number of issues relating to the specification of supplementary electric water heating in summer which can have significant impact on the rating – this article explains these issues. In DEAP the main water heating system heats the bulk of the water during the year. Entry of supplementary electric water heating in DEAP depends on the main water heating system type and the level of control on the heating system. If the main water heating system cannot heat water without also heating the space, then it is assumed that this system isn't used to heat water when there is no space heat demand in summer. Instead, DEAP assumes that in summer, hot water is provided by an alternative electric system that only heats water and not the space. This is called "supplementary electric water heating in summer". There may be other secondary water heaters present in the dwelling but these are ignored in DEAP.

The BER Assessor must check whether the main water heating system can provide water heating without also heating the dwelling space. DEAP Manual Section 4.6 gives examples of systems in which the space heating and water heating are independent, in which case supplementary electric water heating is **not** required in summer.

The physical presence of an immersion heater is not a sufficient reason to specify supplementary electric water heating in summer. It is quite common to have an immersion heater in a dwelling which has a boiler that can produce hot water separate from space heating. Note that the presence of a solar water heating system has no bearing on the question of supplementary water heating in summer. If a solar water heating system is present then the solar heating system details should be entered as described in DEAP Manual Appendix H.

The Assessor must make a clear record in the DEAP Survey Form of all the heating controls relevant to the decision to specify (or not) supplementary electric water heating in summer. For example, if the dwelling has a boiler system with a programmer and a manual pipe valve to turn off the heating to the space, the Assessor should record the presence of the programmer and make a note of the manual pipe valve in the "Comments on Water Heating System" section of the DEAP Survey Form. The Assessor is also advised to retain photographs of these controls and any other relevant features as detailed in the DEAP Survey Guide.

Two data inputs are required to specify supplementary electric water heating in DEAP. On the Water Heating tab set "Is supplementary electric water heating used in summer?" to 'Yes' and in the "Fuel" section of Energy Requirements: Fuel Data tab, set the "Supplementary Water Heating System" to "Electricity". DEAP then assumes that one third of the annual water heating requirement is met by electricity.

If supplementary electric water heating doesn't apply, then both fields can be left at their default values, "No" and "None", respectively.

The following pages include a number of examples reflecting typical heating system configurations encountered and how they should be recorded in DEAP.

Example 1

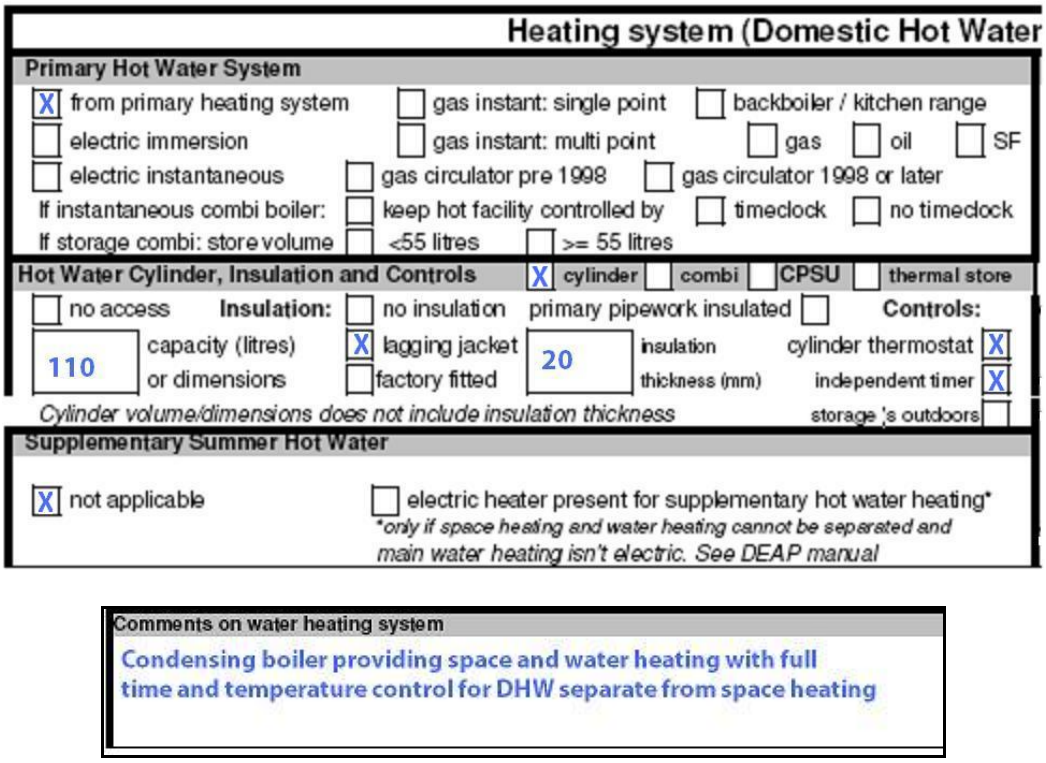
Heating system description: A condensing boiler with full time and temperature control of DHW separate from space heating. There is also an immersion installed.

Can hot water be provided independent of space heating? Yes.

Is supplementary water heating used in summer? No.

Photographic Evidence: Primary water heating system and full zone controls.

The relevant sections from the survey form are as follows:



Heating system (Domestic Hot Water

Primary Hot Water System

[X] from primary heating system [ ] gas instant: single point [ ] backboiler / kitchen range
[ ] electric immersion [ ] gas instant: multi point [ ] gas [ ] oil [ ] SF
[ ] electric instantaneous [ ] gas circulator pre 1998 [ ] gas circulator 1998 or later
If instantaneous combi boiler: [ ] keep hot facility controlled by [ ] timeclock [ ] no timeclock
If storage combi: store volume [ ] <55 litres [ ] >= 55 litres

Hot Water Cylinder, Insulation and Controls [X] cylinder [ ] combi [ ] CPSU [ ] thermal store

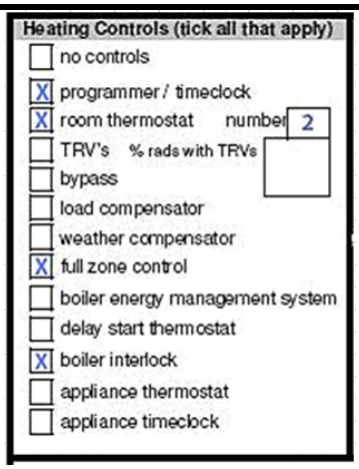
[ ] no access **Insulation:** [ ] no insulation primary pipework insulated [ ] **Controls:**
110 capacity (litres) or dimensions [X] lagging jacket [ ] factory fitted 20 insulation thickness (mm) cylinder thermostat [X] independent timer [X] storage 's outdoors [ ]
Cylinder volume/dimensions does not include insulation thickness

Supplementary Summer Hot Water

[X] not applicable [ ] electric heater present for supplementary hot water heating*
**only if space heating and water heating cannot be separated and main water heating isn't electric. See DEAP manual*

Comments on water heating system

Condensing boiler providing space and water heating with full time and temperature control for DHW separate from space heating

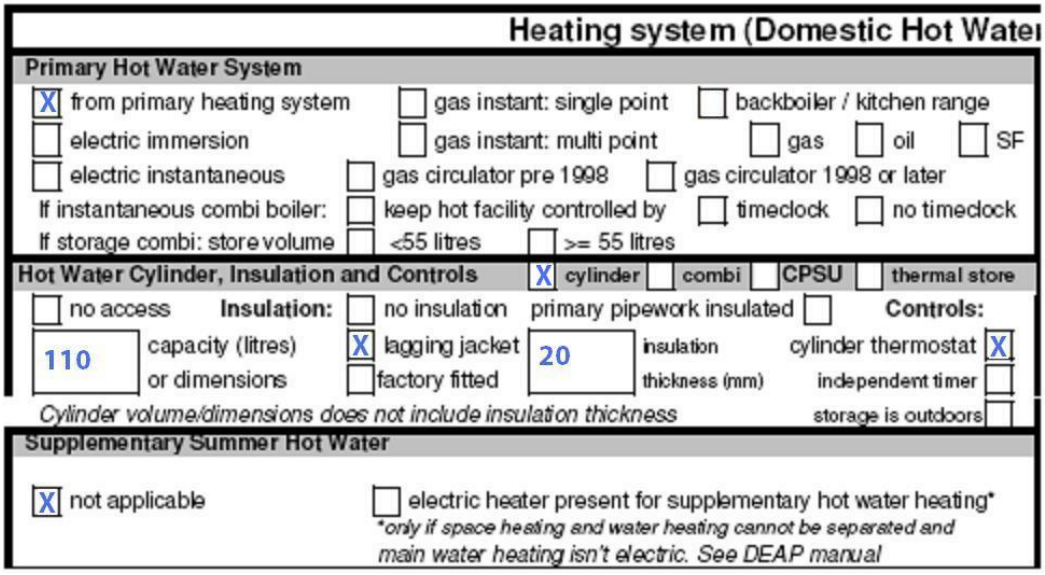


Example 2

Heating system description: A boiler system with a "summer/winter switch" that either controls a motorized valve or a separate pump allowing the water heating to be separate from the space heating.

Can hot water be provided independent of space heating? Yes.
Is supplementary water heating used in summer? No.
Photographic Evidence: The boiler, the "summer/winter switch" and the controls present.

The relevant sections from the survey form are as follows:



Comments on water heating system

Boiler providing space & water heating. A summer/winter switch controls a motorized valve for the hot water only so that the water can be heated independently in summer

Heating Controls (tick all that apply)

- [ ] no controls
- [X] programmer / timeclock
- [ ] room thermostat number
- [ ] TRV's % rads with TRVs
- [ ] bypass
- [ ] load compensator
- [ ] weather compensator
- [ ] full zone control
- [ ] boiler energy management system
- [ ] delay start thermostat
- [ ] boiler interlock
- [ ] appliance thermostat
- [ ] appliance timeclock

Example 3

Heating system description: A boiler system with TRVs as the only means of switching off space heating. DEAP 4.6 does not specify that TRVs provide water heating independent of space heating.

Can hot water be provided independent of space heating? No.
Is supplementary water heating used in summer? Yes.
Photographic Evidence: The boiler and controls present.

The relevant sections from the survey form are as follows:

Heating system (Domestic Hot Water

Primary Hot Water System

- [X] from primary heating system
- [ ] electric immersion
- [ ] electric instantaneous
- If instantaneous combi boiler:
- If storage combi: store volume
- [ ] gas instant: single point
- [ ] gas instant: multi point
- [ ] gas circulator pre 1998
- [ ] keep hot facility controlled by
- [ ] <55 litres
- [ ] backboiler / kitchen range
- [ ] gas [ ] oil [ ] SF
- [ ] gas circulator 1998 or later
- [ ] timeclock [ ] no timeclock
- [ ] >= 55 litres

Hot Water Cylinder, Insulation and Controls [X] cylinder [ ] combi [ ] CPSU [ ] thermal store

- [ ] no access
- **Insulation:**
- [ ] no insulation
- [X] lagging jacket
- [ ] factory fitted
- primary pipework insulated [ ]
- 110 capacity (litres) or dimensions
- 25 insulation thickness (mm)
- **Controls:**
- cylinder thermostat [X]
- independent timer [ ]
- storage is outdoors [ ]

Cylinder volume/dimensions does not include insulation thickness

Supplementary Summer Hot Water

- [ ] not applicable
- [X] electric heater present for supplementary hot water heating*

**only if space heating and water heating cannot be separated and main water heating isn't electric. See DEAP manual*

Comments on water heating system

Boiler providing space and water heating. TRVs are the only means of shutting off space heating.

Heating Controls (tick all that apply)

- [ ] no controls
- [ ] programmer / timeclock
- [ ] room thermostat number
- [X] TRV's % rads with TRVs 75
- [ ] bypass
- [ ] load compensator
- [ ] weather compensator
- [ ] full zone control
- [ ] boiler energy management system
- [ ] delay start thermostat
- [ ] boiler interlock
- [ ] appliance thermostat
- [ ] appliance timeclock

Example 4 .

Heating system description: A solid fuel back boiler (not connected to radiators).

Can hot water be provided independent of space heating? No (the solid fuel fire will emit heat to the space regardless of controls).

Is supplementary water heating used in summer? Yes (even though there is no immersion present).

Photographic Evidence: Solid fuel back boiler system.

The relevant sections from the survey form are as follows:

Heating system (Domestic Hot Water

Primary Hot Water System

- [ ] from primary heating system
- [ ] gas instant: single point
- [X] backboiler / kitchen range
- [ ] electric immersion
- [ ] gas instant: multi point
- [ ] gas [ ] oil [X] SF
- [ ] electric instantaneous
- [ ] gas circulator pre 1998
- [ ] gas circulator 1998 or later

If instantaneous combi boiler: [ ] keep hot facility controlled by [ ] timeclock [ ] no timeclock

If storage combi: store volume [ ] <55 litres [ ] >= 55 litres

Hot Water Cylinder, Insulation and Controls [X] cylinder [ ] combi [ ] CPSU [ ] thermal store

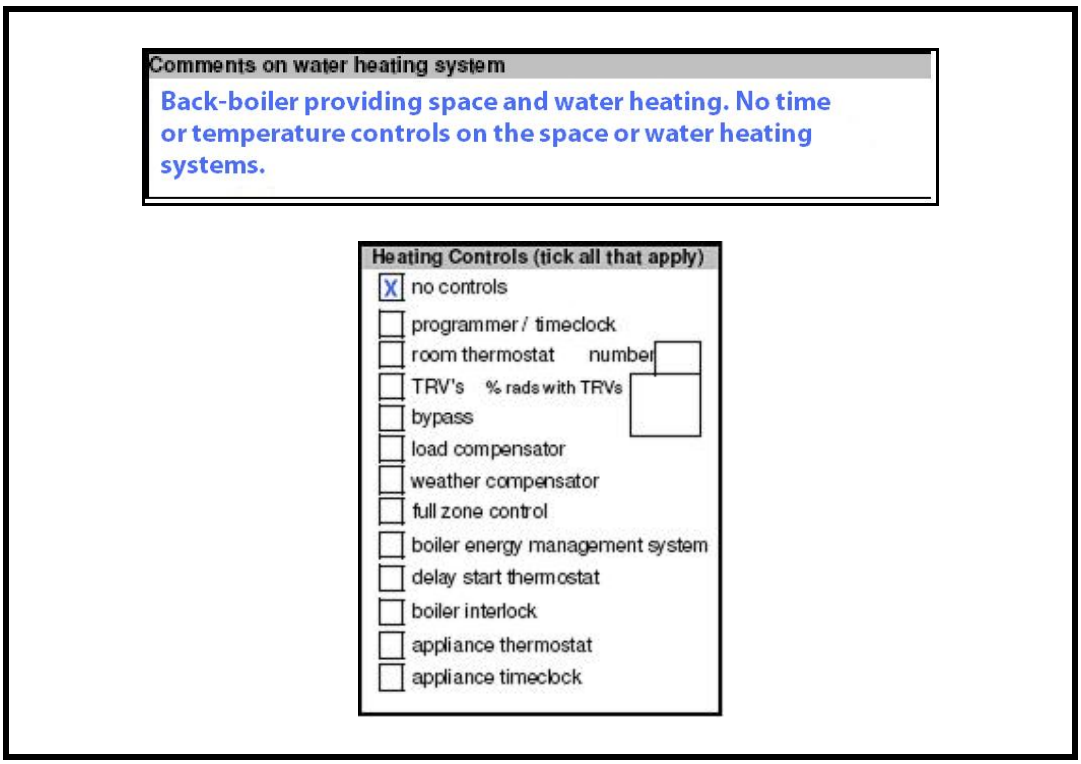
- [ ] no access
- **Insulation:** [ ] no insulation
- primary pipework insulated [ ]
- **Controls:**
- 110 capacity (litres) or dimensions
- [X] lagging jacket
- [ ] factory fitted
- 20 insulation thickness (mm)
- cylinder thermostat [ ]
- independent timer [ ]
- storage is outdoors [ ]

Cylinder volume/dimensions does not include insulation thickness

Supplementary Summer Hot Water

- [ ] not applicable
- [X] electric heater present for supplementary hot water heating*

**only if space heating and water heating cannot be separated and main water heating isn't electric. See DEAP manual*

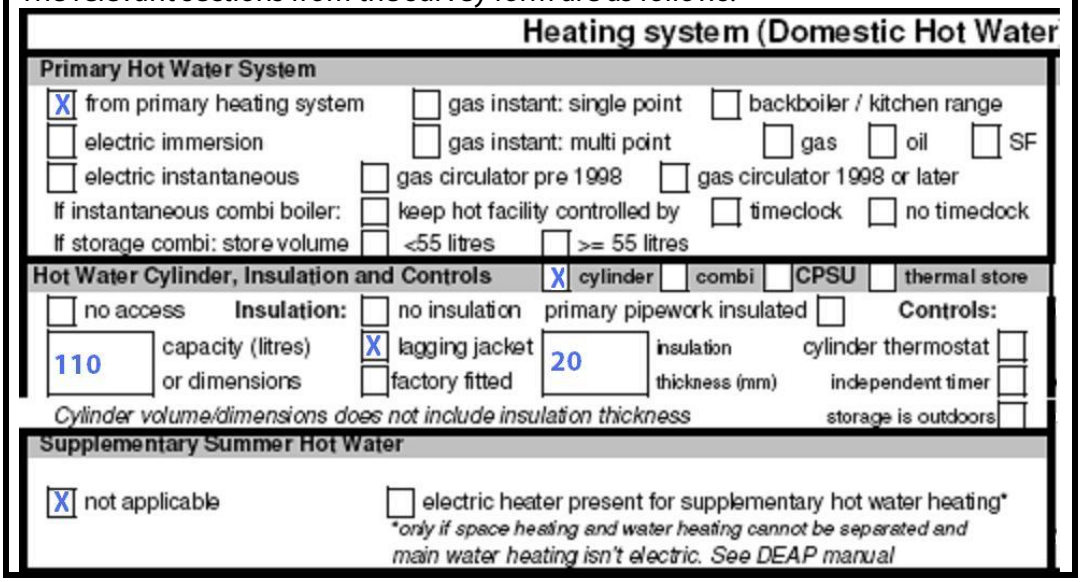


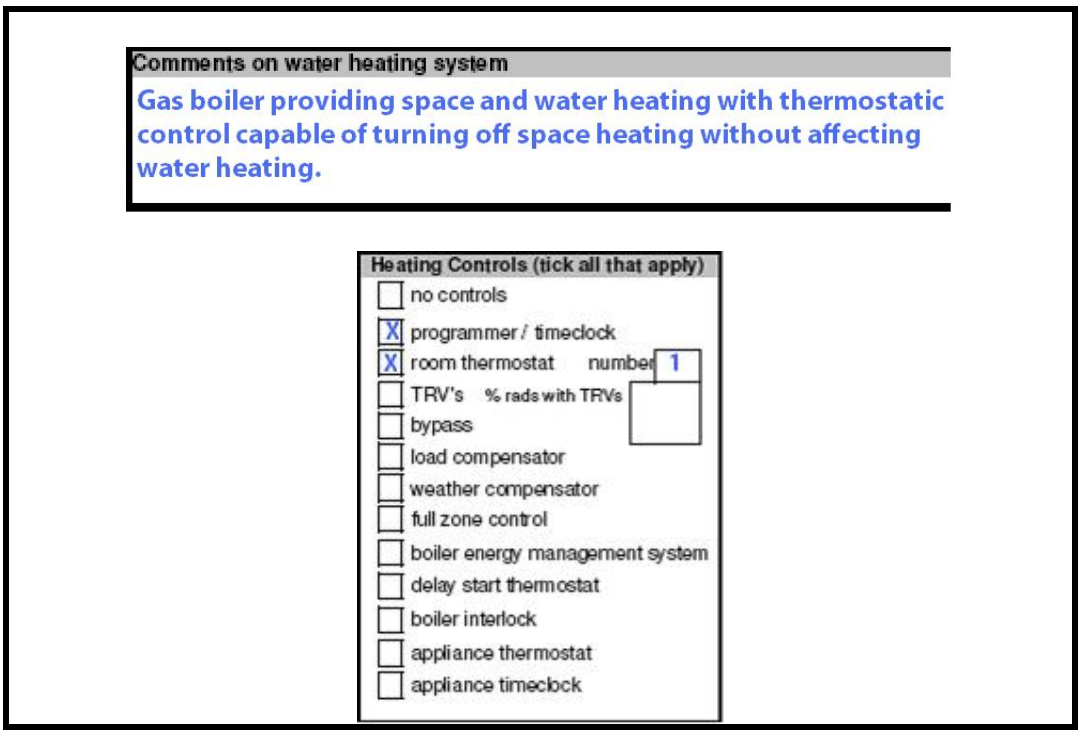
Example 5

Heating system description: A gas boiler with room thermostat capable of turning off space heating without affecting water heating. There is no cylinder thermostat.

Can hot water be provided independent of space heating? Yes.
Is supplementary water heating used in summer? No.
Photographic Evidence: Photographic evidence of primary water heating system and controls present.

The relevant sections from the survey form are as follows:



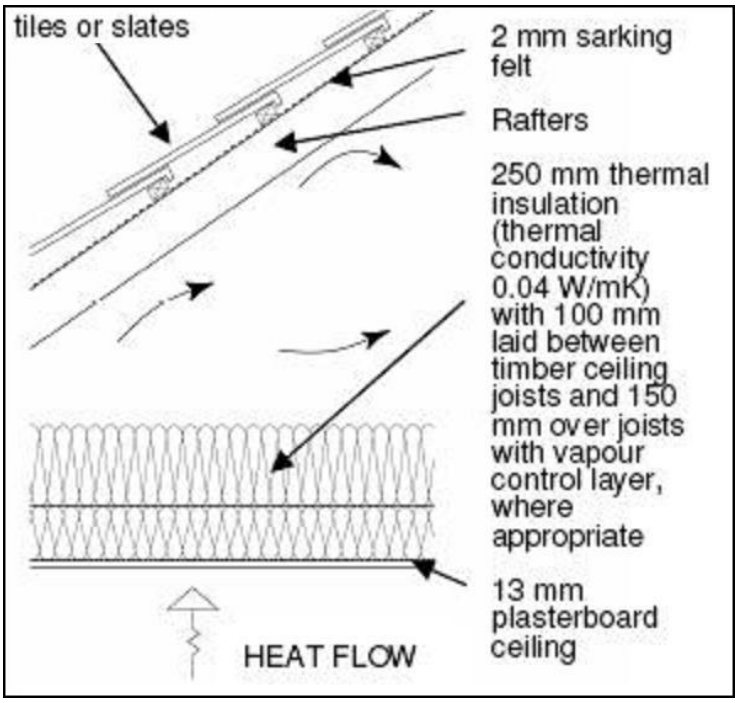


2. Pitched Roof U-value Calculations

A number of Assessors have asked the helpdesk for help with the calculation of roof U-values in DEAP. Extensive detail on U-value calculations is provided in EN6946, Appendix A of the Technical Guidance Document to Building Regulations, Part L, the FAQs section of the BER website and BRE 443, *Conventions for U-value Calculations* (2006 edition) published by the UK Building Research Establishment. BRE 443 Section 8 (U-values for Roofs) has a useful summary of the methods to be applied. This technical bulletin article is comprised of example calculations based on the guidance provided in these documents. The more common pitched roof scenarios are detailed below. Commercially available U-value calculators can be used to carry out these calculations provided they adhere to the relevant standards.

2.1. Pitched roof, insulated at ceiling level, ventilated attic space

An example of this roof type is shown in the following diagram from TGD L:



Insulation is first laid between the joists so as to completely fill the space between the joists. Another (continuous) layer of insulation is then laid over the joists. The joists act as a repeating thermal bridge through the first layer of insulation. Heat flows through the timber joists more easily than it flows through the insulation. In numerical terms, timber has a higher thermal conductivity than the insulation. A thermal bridge increases the rate of heat loss but in this case, it is an unavoidable consequence of the roof structure. The second layer of insulation is laid over the joists, so does not have thermal bridges.

To calculate the U-value of this type of roof – or any structure with one or more thermally-bridged layers - it is necessary to account for the different heat-paths through the structure. This is done using the *Upper and Lower Resistance Method* as described in detail in Example A3 of TGD L. In this method the upper and lower thermal resistances of the structure are calculated and averaged to obtain the U-value of the roof.

The following notes are relevant to this calculation:

- The internal and external surface thermal resistances are shown in Section 4.1 of BRE 443 and EN6946.
- The ventilated roof space thermal resistance, 0.20m^{2}K/W, is taken from TGD L and is based on EN6946.
- The thermal conductivity values of construction materials can be taken from Table 12a of the DEAP manual where certified data isn't available. For insulation materials, the values in Table 12b can be used for Existing and New-Provisional BER Assessments when certified data is not available. For New-Final BER

Assessments, accredited test data must be used for insulation materials as described in DEAP manual section 3.1.

- The fractional area of thermal bridging can be calculated if the size and frequency of the timber joists are known. Otherwise default values from Table A2 of TGD L can be used. The default value for a flat ceiling, i.e. timber joists and insulation between the joists is 9 % thermal bridging which is equivalent to a fractional area of 0.09.
- Sections 4.9 and 8 of BRE 443 discuss minor corrections due to air gaps and outlines when those corrections are required.

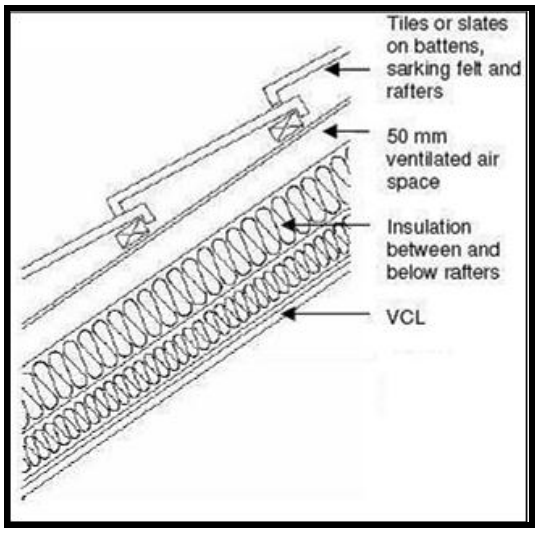
The U-value calculated by this method (U = 0.16 W/m^{2}K in Example A3) is entered into DEAP along with the corresponding heat loss area, namely the area of the flat ceiling.

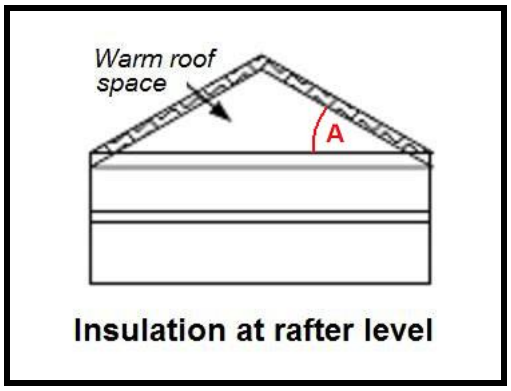
As an aside, the U-value of a flat roof structure with thermal bridging – insulation between timber joists – is calculated with the same method though without accounting for the ventilated roof space of the pitched roof.

2.2. Pitched roof, insulated at rafter level, unventilated attic space with a flat ceiling

This example shows the calculation of the U-value of a pitched roof when the insulation is installed at rafter level. The attic is not accessible by a fixed staircase so is not included in the Total Floor Area in DEAP.

In this example, adapted from Appendix B of TGD L, the roof has 120 mm rafters with 120 mm phenolic foam insulation between the rafters and 50 mm of the same insulation below the rafters as shown in the close-up of the sloping section. The pitch of the roof is 30°. This is the angle 'A' in the diagram below.





The structure is similar to the previous example with several uniform layers and one thermally-bridged layer (rafters + insulation between rafters) so the Upper and Lower Resistance method is used. The Thermal Resistances are tabulated below.

Layer	Thickness (m)	Thermal Conductivity (W/mK)	Thermal Resistance (m^2K/W)	Corrected Thermal Resistance (m^2K/W)
*External Surface**	-	-	0.04	0.035
*Insulation (between rafters)**	0.12	0.025	4.8	4.157
*Timber Rafters**	0.12	0.13	0.92	0.799
*Sloping Insulation (below rafters)**	0.05	0.025	2	1.732
Roof Space	-	-	0.16	0.16
Plasterboard	0.0125	0.25	0.05	0.05
Internal Surface	-	-	0.10	0.10

Although the form of the calculation is the same as the previous calculation there are important differences:

- Even though the insulation is located on the slope of the roof, **the area of the flat ceiling is used for heat loss calculations in DEAP**;
- The thermal resistance of each layer in the sloped section of the roof must be multiplied by the **cosine** of the pitch of the roof as detailed in BRE 443 Section 8 (Insulation at rafter level – flat ceiling). In the table above these layers are marked with an asterisk (*). In this example the thermal resistance of these layers is multiplied by the Cos(30°) = 0.866 to give the Corrected Thermal Resistance in the last column of the table;
- Following guidance in BRE 443 the thermal resistance of the roof void between slope and ceiling is taken as 0.16 m^2K/W;
- The default percentage of thermal bridging is again taken from Table A2 of TGD and has a value of 8%.

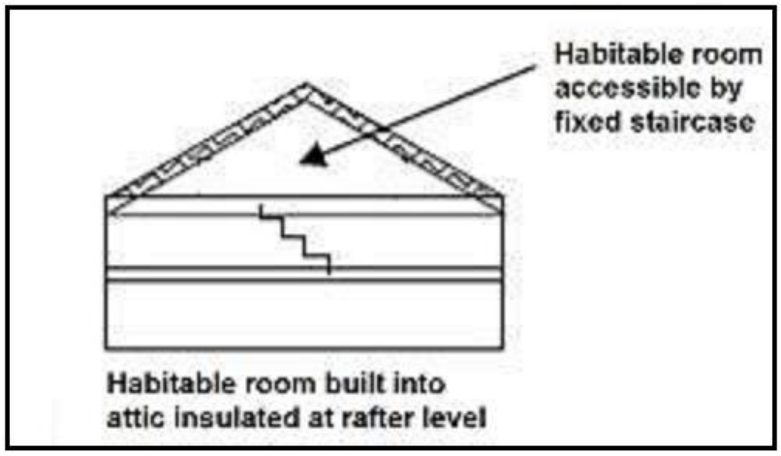
The remainder of the calculation follows the method of upper and lower resistances to derive the total U-value.

The resulting U-value and the corresponding area, i.e. the area of the flat ceiling, are entered into DEAP to account for heat loss through the roof.

2.3. Pitched roof, insulated at rafter level, habitable attic space accessible by fixed staircase

This differs from the example in Section 2.2 as the attic space is included in the assessment floor area. In this case the heat loss area to be entered in DEAP is the area of the sloping roof and the U-value calculation is for the sloping section.

In this example, a roof structure similar to Example 2.2 above is used, namely, 120 mm rafters with 120 mm phenolic foam insulation between the rafters and 50 mm of phenolic foam insulation below the rafters. There is a plasterboard finish.



The slope is a thermally bridged structure, so the U-value is calculated with the Upper and Lower Resistance method as in Section 2.1.

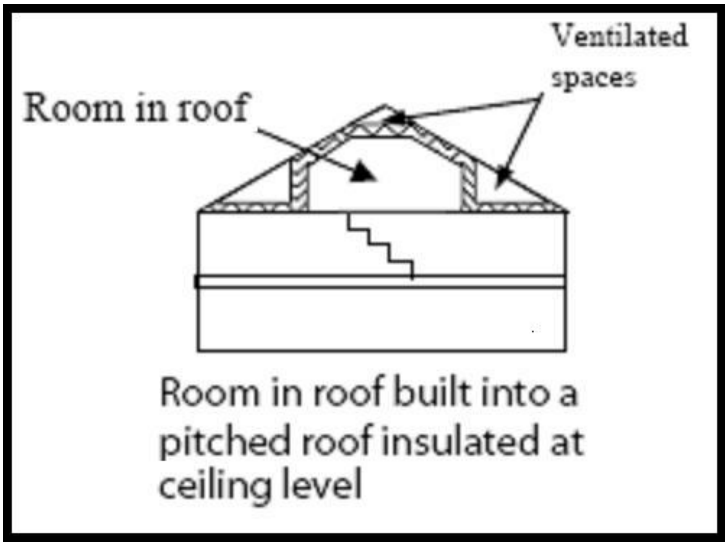
Layer	Thickness (m)	Thermal Conductivity (W/mK)	Thermal Resistance (m^2K/W)
External Surface	-	-	0.04
Insulation (between rafters)	0.12	0.025	4.8
Timber Rafters	0.12	0.13	0.92
Sloping Insulation (below rafters)	0.05	0.025	2
Plasterboard	0.0125	0.25	0.05
Internal Surface	-	-	0.10

The remainder of the calculation follows the method of the previous example with the Upper Resistance = 6.36 m^2K/W and Lower Resistance = 5.78 m^2K/W leading to a U-value of 0.16 W/m^2K. The U-value is entered in DEAP along with the area of the sloping roof. There is no Cosine multiplier applied to the thermal resistances as the sloping area is the heat loss area in DEAP.

As before, the default percentage of thermal bridging is taken from Table A2 of TGD L and has a value for a sloped ceiling of 8%. BRE 443 section 4.8 provides further detail on accounting for ventilated air gaps where present in the sloping roof structure.

2.4. Room in roof, insulation follows the shape of the room

There are two ways to calculate heat loss for a room in roof construction as depicted in the diagram below:



(i) *Room in roof approximation*

For Existing Dwellings, DEAP gives the option to automatically calculate the total exposed area and default U-value of the room in roof's heat loss surfaces. The area is an approximation of the total area of the heat loss roof and wall sections of the room in roof as described in Appendix S6.2 of the DEAP manual. The Assessor must account for the heat loss area of the ceiling of the storey below separately (ceiling below exposed to the ventilated crawl-spaces).

(ii) *Manual calculation*

In cases where the Assessor can identify the levels of insulation on the room in roof and there are varying levels of insulation, the Assessor must manually calculate the heat loss for each section of the room-in-roof. The area approximation referenced above is not used in this case.

- *Flat Ceiling Section of Room in Roof:* U-value calculated as per a standard pitched roof insulated at ceiling level, as described in Section 2.1 above and entered in DEAP along with the area of flat ceiling.
- *Sloped Ceiling Section of Room in Roof*: U-value calculated as per a standard sloped ceiling, as described in Section 2.3 and entered in DEAP along with the area of sloped ceiling.
- *Knee Wall Section of Room in Roof*: U-value calculated as per a standard wall (e.g., use the Upper and Lower Resistance method for an insulated timber stud knee-wall). A thermal resistance of Ru = 0.5 is added to the knee-wall U-value as shown in Diagram A5 of TGD L 2011. The U-value and the area of the knee-walls are entered in DEAP (walls section).
- *Semi-exposed Ceiling of Room Below*: U-value calculated as per a standard roof (Upper and Lower Resistance method). A thermal resistance of Ru = 0.5 is

added to the ceiling U-value as shown in Diagram A5 of TGD L 2011. The U-value and the area of the semi-exposed ceiling are entered in DEAP.

3. Solar Collector Defaults, Suppliers' Guidance and Thermal Bridging

3.1. Solar Hot Water Collector Defaults

The BER Audit team have found instances where incorrect data is used for solar hot water collectors when certified collector data is not available. In particular, in the absence of any certified data, the total collector area is detailed in DEAP Table S11 as $3m^2$, regardless of how many collectors are present. So, if the Assessor sees two collectors of unknown area, the aperture area entered in DEAP is $3m^2$.

The Assessor may use data from DEAP Table S11 or Appendix H where certified data is not available for collector heat loss and/or efficiency parameters.

3.2. Guidance from Suppliers

The BER Audit team has noted times where Assessors have followed incorrect guidance from heating system and insulation suppliers and other third parties.

Assessors must ensure that they follow the DEAP methodology as published in the DEAP manual, survey guide, technical bulletins and FAQs. In any case where an Assessor is unsure of guidance received from a third party, the Assessor should contact the BER helpdesk with details of the guidance they are considering and specific queries they may have on this.

Each Assessor is entirely responsible for the content of each BER Assessment they upload to the NAS, so it is in the Assessor's best interests to ensure that any information used in assessments is in compliance with the DEAP methodology.

3.3. Thermal Bridging Factor Calculation

In DEAP a default value of 0.15 is used for the thermal bridging factor (y-factor) of a dwelling when no other information on thermal bridging is available.

DEAP Appendix K details that a y-factor other than 0.15 may be used as follows:

1) *y = 0.08 W/m2K: for new dwellings whose details conform with "Limiting Thermal Bridging and Air Infiltration --- Acceptable Construction Details" (www.environ.ie) as referenced in Building Regulations 2008 and 2011 TGD L. This requires that the relevant drawings be signed off by the developer/builder, site engineer or architect.*

A signed document without the relevant drawings is not enough to use the 0.08 value. Drawing details (signed or accompanied by a signed document) must be

held on file by the Assessor. These drawings are provided here in the Acceptable Construction Details (ACDs).

2) *y = 0.11 W/m2K: Only applies to new dwellings where Building Regulations 2005 TGD L applies.*

DEAP Appendix K outlines the documentation requirement in this case. This case only applies to new TGD L 2005 dwellings.

3) *Values of Ψ can be determined from the results of numerical modelling, or they can be derived from measurement. If the junction detail is as recommended in Acceptable Construction Details, the Ψ-value associated with that junction can be taken from TGD L 2011 Appendix D or from Introduction Document for Acceptable Construction Details or other certified Ψ values.*

Thermal transmittance Ψ values can be calculated by numerical modelling or else based on the ACDs mentioned above. Again, the drawing details used must be signed by the relevant personnel and kept on file by the assessor. Once these Ψ values adhere to these requirements, then junction lengths with valid Ψ values are used to determine the dwelling's DEAP y-factor. SEAI have developed a tool to carry out this calculation .

Ψ values must be based on the tables in TGD L Appendix D (from the ACDs) or must be certified as per TGD L section 1.3.3.2(iii):

> *use certified details which have been assessed in accordance, and comply, with Appendix D, e.g. certified by a third party certification body such as Agrément or equivalent or certified by a member of an approved thermal modelers scheme (to be developed) or equivalent for all key junctions.*

The thermal modellers' certification scheme has now been launched by NSAI here as a means of meeting the requirements in TGD L and DEAP for calculation of Ψ values.

BER Assessors – Dwellings Technical Bulletin #23

Issue No. 3/12 **October 2012**

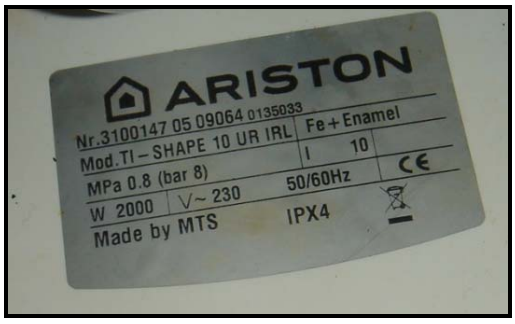
Contents:

The archive of previous bulletins is available on the SEAI website.

1 Heating and Ventilation Guidance

1.1 Instantaneous Electric Water Heaters

A number of Assessors have asked the BER Helpdesk for information on instantaneous electric water heaters. An instantaneous electric water heater is a unit containing an electric heating element used to provide on-demand hot water, i.e. when the hot water tap is opened the electric element is switched on, thereby heating the cold water passing through it. These units are frequently located at the point of use, e.g. under the sink. They may contain a small insulated hot water store to be included in the water storage volume in the Water Heating section in DEAP. If a unit has a water store its volume may be detailed on a product data plate as shown in this picture.



In this case the volume is 10 litres. The data plate must have a CE-marking or reference to a national standard or equivalent to use the volume shown in DEAP.

Where insulation thickness isn't detailed and can't be measured, the default thicknesses based on dwelling age band from DEAP Table S11 are used.

The examples below show how these systems are treated in DEAP.

Example 1
Consider a one bedroom apartment with hot water provided by three identical instantaneous electric water heaters: one for the bath, one for the bathroom sink, one for the kitchen sink. A CE-marked data plate on the instantaneous heaters states that each unit has a 10 litre hot water store insulated by 15mm of high density polyurethane foam. How is this treated in DEAP?

The hot water storage of each instantaneous heater must be accounted for in DEAP. The DEAP inputs are as follows:

Water heating tab:

- *Are there Storage Losses:* "Yes".
- *Water Storage Volume (for the three water heaters)*: 10*3 = 30 litres.
- *Temperature Factor Unadjusted*: 0.6 - equivalent to a cylinder heated by an electric immersion *as per DEAP Table 2*.
- *Temperature Factor Multiplier*: 1.
- *Insulation Type on Water Store*: Factory Insulated.
- *Insulation Thickness [mm]*: 15.

- *Are there Distribution Losses:* "No" – If the heater is at the point of use, there are no distribution losses. If the heater is not at the point of use, e.g. a multi-point electric water heater providing hot water to taps in several different rooms, then there will be distribution losses.
- *Is supplementary electric water heating used in summer?: "*No".
- *Primary Circuit Loss Type:* "Electric Immersion heater" – this is chosen when instantaneous electric heaters are the main water heating system.

Energy Requirements tab:

- *Efficiency of main water heating system*: 100%.
- *Efficiency adjustment factor:* 1 (none of the values in DEAP Table 4c apply)
- *Main water heating system fuel*: Electricity.

In a dwelling where there is no hot water storage, when the BER is uploaded to NAS, error notice no. 027 will be raised: "No water storage losses declared". This notice is ignored in this case because there are no water storage losses. As stated in DEAP Appendix U, "If the unexpected data reflects the actual dwelling being assessed, the Assessor can choose to ignore the validation notices and publish the assessment on the BER register."

Example 2

A detached house has a regular oil boiler and a 110 litre hot water cylinder with a 25mm thick lagging jacket. The house has an extension with a WC with hot water provided by an instantaneous electric heater. A data sheet indicates that the instantaneous heater has an internal 15 litre hot water store with 10 mm of factory-fitted foam insulation. How do you deal with this in DEAP?

The cylinder and the instantaneous heater both store domestic hot water, so both will contribute to the storage loss. However, the main water heater is the oil boiler (provides more hot water and is cheaper to run). DEAP entries are as follows:

Storage Volume: 110 + 15 = 125 litres.
Insulation Type & Thickness: only one entry is permitted in DEAP so the weighted average of the two systems must be calculated taking into account the different storage capacity of each system; so,
Insulation Type: Factory Insulated.

$$\textit{Insulation Thickness} = \frac{\left(\left(25\times 0.5\times 110\right)+\left(10\times 15\right)\right)}{\left(110+15\right)} = 12.2 \text{ = 12 mm.}$$

Lagging jacket insulation is considered to be half as effective as factory foam insulation. Therefore the 25mm thickness of the cylinder lagging jacket is multiplied by 0.5 in the equation above. The equation shown provides an average factory insulation thickness weighted by volume.

Temperature Factor & Temperature Factor Multiplier: these are calculated as normal for the main water heating system, i.e. the boiler & cylinder system.

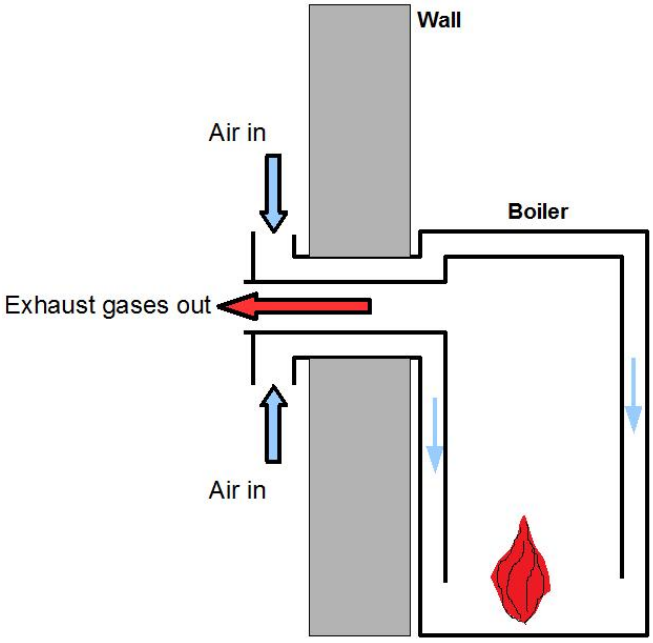
1.2 Common Flue Types on Domestic Heating Appliances

The Audit team have encountered a number of issues in BER assessments related to specification of the different types of flue in common use for heating appliances. An *open flue* is (usually) a vertical duct up to 200mm in diameter. It is considered to be open because it takes the air required for combustion from the room in which the appliance is situated. Independent oil/gas boilers typically no longer use open flues although they can be seen on an old boiler (20+ years) in an existing dwelling.

Many modern stoves use an open flue. In the stove pictured below, combustion air is drawn into the stove from the room through a controllable vent. The combustion products – carbon dioxide, water vapour, smoke particles and other gases – are removed through the vertical duct – the open flue - rising from the top of the stove. If the stove is located in a fireplace the flue will continue upwards through the chimney but an open-flued stove can be located elsewhere in a dwelling with the flue passing up through the roof to expel the combustion products to the outside.
An open fire would normally have an associated chimney in DEAP. A chimney is specified if the open diameter of the flue is 200mm or more.

Modern boilers tend to have *room-sealed flues*. This means that the combustion air is taken from outside the dwelling (and the combustion products are expelled to outside the dwelling) so that the boiler is, in effect, sealed off from the air in the room in which it is located. This reduces the ventilation heat loss in the dwelling.

A *balanced flue* is an example of a room-sealed flue. In a balanced flue the intake and exhaust ducts are concentric as per the schematic diagram below.



In order to ensure that there was a plentiful supply of air for combustion early balanced flues (from ca. 1980) tended to be quite large (up to 30 cm in diameter) with a rectangular cross-section.

Modern balanced flues use a fan to ensure a continuous supply of combustion air. As a result the diameter of the balanced flue in a modern boiler has reduced: it is usually less than 150 mm in diameter and the flue has a concentric circular cross-section as shown in this picture of a fan-assisted flue on a gas boiler.

Balanced flues are increasingly common on stoves as they are necessary in houses with good air tightness levels and/or balanced whole house mechanical ventilation systems. In either situation, drawing air from the dwelling for combustion would impact on airtightness, so a balanced flue is used.

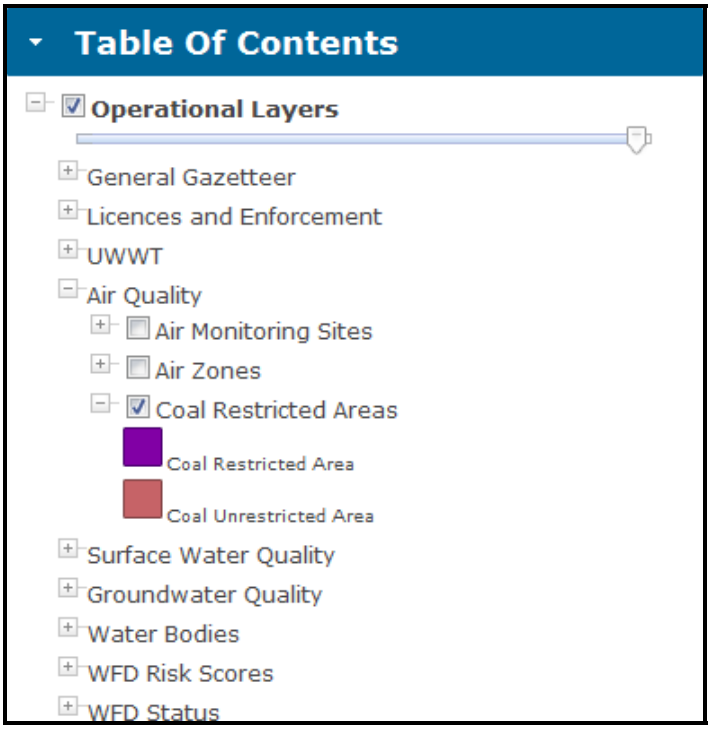
1.3 Fuel Selection in Coal-Restricted Areas

A review of audit findings has shown a high incidence of errors related to the choice of fuels for solid fuel heating appliances in Coal-Restricted Areas. In a Coal-Restricted Area (also known as a Smoke-Control Area) the sale of solid fuels is restricted in order to minimise airborne pollution.
In a Coal-Restricted Area, a solid multi fuel heating appliance (open fire, stove, solid fuel boiler, etc.) is assumed to use Manufactured Smokeless Fuel unless otherwise specified.

Further details can be found in DEAP manual Section 10.3.3.

The restriction on the use of solid fuels applies in specific densely-populated urban areas throughout the country. These can be identified using the map-facility available at http://maps.epa.ie/ under the link "Envision Map Viewer". Follow this link to display a map of Ireland.

On the left-hand side of the page is an interactive Table of Contents:



The option of interest to us is "Air Quality". Click on the '+' to reveal 3 options: we are interested in "Coal Restricted Areas" selected as shown above. The map of Ireland now shows Coal Restricted Areas highlighted in purple.

The map has a zoom-facility so the user can zoom in on the dwelling location to identify whether it is in a coal restricted area. The operational layer slider should be set to the midpoint to see both the coal restriction boundaries and actual map locations.

1.4 Secondary Space Heating

We have seen a number of recurring issues with specification of secondary heating systems in BER assessments.

Incorrect Choice of Secondary Heating System

DEAP Appendix A specifies when and how to select a secondary heating system. A secondary heating system is specified where the main heating system is inadequate or fixed secondary heaters are present. Fixed electric bathroom heaters and towel rails are not counted as secondary heaters in DEAP.

The June 2009 Technical Bulletin provides examples of primary and secondary heating system selection in an adequately heated house.
The May 2009 Technical Bulletin and DEAP manual Appendix A, Section A.3.2 provide examples of primary and secondary heating selection in inadequately heated houses.
Choosing between two or more heating systems may require a comparison of fuel costs as discussed in the January 2012 Technical Bulletin.

Incorrect Efficiency from Table 4a

Some Assessors have made errors in selecting the default efficiency of secondary heating systems from Table 4a. The following examples provide clarification on this issue:

Example 1
An existing dwelling has a stove capable of burning multiple solid fuels. No efficiency information is available. What efficiency should be entered into DEAP for this stove?

In the absence of certified efficiency information, the appropriate default efficiency from Table 4a is used. In that table there is a section headed "Solid fuel room heaters", shown below:

Solid fuel room heaters		
Open fire in grate	30	3
Open fire with back boiler (no radiators)	50	3
Closed room heater	60	3
Closed room heater with boiler (no radiators)	65	3
Stove (pellet fired) – with or without back boiler	65	2

There is a pellet fired stove in this section – the stove in question is not a pellet stove. A stove is not an open fire so the first two in the list are also ruled out. A stove is a closed room heater but does not have a boiler in this case so the closest fit is "Closed room heater" with a default efficiency of 60%. This is the value entered in DEAP. Fuel type is based on DEAP 10.3.3.

Example 2
What is the efficiency of the gas fired heating appliance pictured?

Again, in the absence of certified efficiency, the appropriate default efficiency from Table 4a is used. This is a gas-fire fuelled by mains gas. Table 4a lists the different types of gas room heater:

Gas (including LPG) room heaters:		
Gas fire, open flue, pre-1980 (open front)	50	1
Gas fire, open flue, 1980 or later (open fronted), sitting proud of, and sealed to, fireplace opening	63	1
Gas fire or wall heater, balanced flue	58	1
Gas fire, open flue (open fronted), sitting proud of, and sealed to, fireplace opening, with back boiler unit	63	1
Flush fitting Live Fuel Effect gas fire (open fronted), sealed to fireplace opening, with back boiler unit	40	1
Gas fire, closed front, fan assisted	72	1
Condensing gas fire	85	1
Flush fitting Live Fuel Effect gas fire (open fronted), sealed to fireplace opening	40	1
Flush fitting Live Fuel Effect gas fire (open fronted), fan assisted, sealed to fireplace opening	45	1
Decorative Fuel Effect gas fire, open to chimney	20	1
Gas fire, flueless	90	1

The appliance shown above is open to the chimney rather than having a flue outlet as part of the heater. This rules out all of the "flueless", "open flue" and "balanced flue" options above. It does not have a back boiler and does not have a condensate drain, ruling out the back boiler and condensing appliances in the above list. It is not sealed to the fireplace opening - it sits in the existing fireplace.

This is therefore a decorative fuel effect gas fire open to the chimney, with a default efficiency of 20%.

The July 2009 Technical Bulletin contains guidance to help identify the type of gas heater directly or by a process of elimination.

Insufficient Proof of System Efficiency

A number of Assessors have specified a heating system efficiency in DEAP for which they did not have sufficient proof.

While Assessors are encouraged to use non-default data, it is only correct to do so if there is sufficient acceptable evidence that the non-default data is from HARP or has been measured according to the appropriate standards by an accredited body.

The requirements for non-default data are given in the "General Principles" section of the DEAP manual under "Accredited or certified data".

If Assessors intend to use a non-default efficiency (or any other non-default data) we would urge that you examine the DEAP requirements for non-default data to ensure that all conditions are met.

In cases where there is any doubt about the acceptability of a test certificate, a copy of the test certificate should be emailed to the BER helpdesk for review.

2 DEAP Version 3.2.1 Release

DEAP v3.2.1 was launched by SEAI in July. The software and manual changes are detailed in the DEAP v3.2.1 Release Notes. BER assessors are now permitted to publish BERs using DEAP versions 3.1.0, 3.2.0 and 3.2.1. However, SEAI will only allow NAS upload of domestic BER assessments from DEAPv3.2.1 in the near future. The planned cut-off date for assessments from DEAPv3.2.0 and v3.1.0 is **20th November 2012**. This will ensure that BER Assessors use the latest primary energy factor and CO_2 factors for electricity and take advantage of latest software updates. Assessors should therefore download and install DEAP v3.2.1 in advance of this date.
DEAP v3.2.1 addresses the minor issues present in DEAP v3.2.0 but otherwise is functionally identical. The main changes are as follows:

- DEAP Manual Version 3.2.1 incorporates relevant data from latest technical bulletins. In addition, the derivation of solar transmittance from certified data has been clarified under Table 6b. Full details of the DEAP Manual changes are in the release notes. Guidance in DEAP Manual Version 3.2.1 should be referenced for published ratings. Previous DEAP Manual versions are now considered obsolete.
- Known issues relating to data import and export have been resolved.
- Issues with the upgrade of the internal records database during install have been resolved.
- Other minor usability issues have been fixed.

Assessors are advised to read the release notes in full before installing DEAP v3.2.1. The release notes and DEAP manual are available here: www.seai.ie/deap.

3 Quality Assurance System and Disciplinary Procedure (QADP)

SEAI have undertaken a review of the Quality Assurance System and Disciplinary Procedure (QADP) reflecting some operational changes and also feedback from BER assessors. A revised QADP has now been published at the following link.

Your attention is particularly drawn to the following sections, which have been significantly amended:

2.3.3.2 Documentation and Practice Audit (With Site Inspection)

3.3.1 Audit findings and penalty points

3.3.3 Summary suspension of registration

We suggest that you take this opportunity to review the QADP and to have a clear understanding of the obligations and implications therein. As always, we welcome any feedback you make have.

4 Audit Request Compliance

BER Assessors are required to respond to audits within 28 days from the issuing of notification of an audit request in showing compliance with the Code of Practice.

It is important to ensure that all relevant information is provided and clearly labelled when responding to an audit request. The required information should already be on file prior to the BER publication.

Assessor Name & Assessor ID
In addition, many Assessors have submitted survey forms which did not clearly state the Assessor's name or ID in response to audit requests.

Every survey form used in a BER assessment must clearly state the Assessor's name or registration number.

5 Insulation Upgrades in the Better Energy Homes Grant Scheme

A BER certificate is required for dwellings retrofitted under the Better Energy Homes (BEH) scheme. This article deals with insulation upgrades under the BEH scheme and how they should be handled in a BER assessment. The article focuses on wall insulation but the comments below apply equally to roof insulation upgrades, particularly where the added insulation may not be directly identifiable, e.g. insulated rafter sections. Assessors must ensure that all efforts are made to obtain relevant information leading to calculated U-values rather than relying on defaults.

The U-value of walls with upgraded insulation must be calculated. There are two approaches available to the Assessor:

- The U-value may be calculated in full using the thickness and thermal conductivity of each layer in the wall by the methods used in EN ISO 6946. Appendix A of TGD L 2011 provides useful sample calculations.
- If this information is not available then the default U-value of the original wall – taken from DEAP Table S3 – may be used as the starting point. An example of such a calculation is given in Table S3 (footnote).

Examples of both calculations are given in Section 8 of the January 2011 Technical Bulletin. Section 3 of the October 2011 Technical Bulletin provides further information on cavity wall U-value calculations. The Assessor needs to know the thickness and thermal conductivity of the added insulation to calculate U-values.

Thermal Conductivity
If the Assessor is unable to identify the type of insulation by visual inspection, invoices and/or receipts from the Contractor should be used. The Assessor should check if the insulation product has an Irish Agrement Board (IAB) Certificate or other accredited test data detailing the thermal conductivity. If certified thermal conductivity is not available, the most conservative appropriate default thermal conductivity value from DEAP Table 12b should be used following guidance in DEAP Manual section 3.1.

Insulation Thickness

In the simplest case of insulation upgrade, the same thickness of insulation is added to all external heat-loss walls, e.g. 50 mm of cavity wall insulation added to the 4 external walls of a dwelling with no extensions. In this case the thickness of added insulation can be established using the Contractor's Declaration of Works. The Contractor is required to detail the average thickness of insulation before and after the grant works, enabling the Assessor to calculate the thickness of insulation added:

(b) Measure Specification

*(Please **COMPLETE ALL** of the following).*	**Before Works**	**After Works**
% Total Wall Area of Home Insulated	%	%*
(Average) Depth / Thickness of Insulation	mm	mm
(Average) Calculated U-Value for Wall	W/m²K^	W/m²K
Area of CAVITY WALL insulated by you		m²

As an example, if the DOW states that there was 0mm of insulation before and 50mm of insulation after, then 50mm of insulation was added to the cavity.

More complex situations will arise. Take a dwelling with cavity walls built in 1940 with an extension (also with cavity walls) built in 2001. If the cavity width or insulation thickness of the original wall is different from that of the extension walls then the "average thickness" specified in the DOW cannot be used in a BER assessment. In this case the Assessor should seek written clarification from the contractor or further detail from invoices/receipts for any section where wall insulation is not visible / accessible. Failing that, the filled cavity wall default in DEAP Table S3 provides a conservative value which may be used instead.

It is worth emphasising that the BEH Declaration of Works is not sufficient proof of insulation type or thermal conductivity. The Assessor must also retain a copy of all relevant invoice / receipts and any other documentation used to specify the type and thermal characteristics of the insulation.

If the Assessor has good reason to believe that the information provided by a Contractor is incorrect, he/she should contact SEAI. In cases where a BER assessor is being encouraged to misrepresent a BER, SEAI should be informed immediately in line with the Whistleblower policy. A BER may still be published and must be in accordance with both the Code of Practice and DEAP methodology. The BER must represent identifiable information gathered on site where there is any conflict with Contractor information. Please see Section 4 of the DEAP Survey Guide: "The actual data observed on site takes precedence".

Following completion of Better Energy Homes grant aided works, BER Assessors are currently required to complete portions of the BER Declaration of Works (DOW) including specific assertions by them. The wording of these declarations has been revised recently, and now reads:

- The BER was completed and published in full compliance with the BER Code of Practice
- The BER assessor completed a BER survey and is satisfied that the grant aided works specified are in accordance with the contractor's declaration on the relevant Declarations of Works forms
- The BER assessor calculated the Pre Grant Evaluation in line with SEAI guidance
- The BER assessor has been paid in full by, or a payment schedule contract is in place with, the homeowner for the works described

Further, all BER assessors are directed to notify SEAI immediately, in instances where they are invited to complete a BER Declaration of Works, and where the works surveyed are not in accordance with contractor's declarations. Assessors should note that, in signing a BER DOW from this date forward, the above content applies to all DOWs, irrespective of when the upgrade works were completed or the BER published.

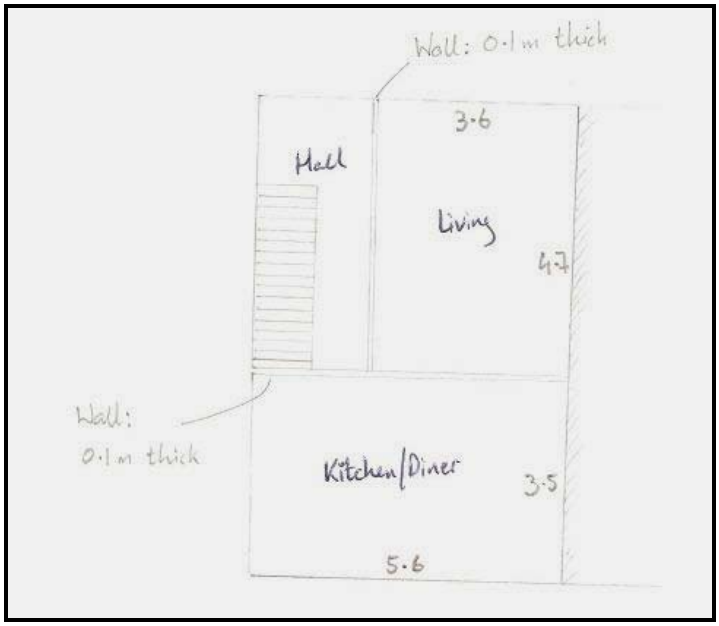
As an extension to the whistle-blower requirement set-out on the BER DOW, henceforth SEAI requires all assessors to identify to SEAI any instances where they are being encouraged by others to act outside the scheme rules, or indeed where they have information regarding others who are acting improperly. All BER assessors are thus directed to notify SEAI immediately, via BER Helpdesk, in instances where they are:

- Requested to publish a BER where it has not been possible to complete the BER assessment fully in accordance with SEAI requirements and guidance
- Aware of published BERs which were not completed in full accordance with SEAI requirements and guidance
- Invited to complete a BER Declaration of Works and works surveyed are not in accordance with contractor's declarations
- Aware of completed BER Declaration of Works Forms which were not completed in accordance with SEAI guidance
- Any other instances where they have evidence that a BER Assessor has not acted fully in compliance with the scheme requirements

All BER Assessors should be assured that any such instances identified to SEAI will be treated in the utmost confidence and that their assistance will ultimately contribute to the improved professionalism and integrity of the scheme.

6 Floor Area Calculations in DEAP

A review of BER QA audits has shown a high incidence of errors in the calculation of floor area. Floor area impacts both the dwelling total energy usage and the per m^2 energy usage calculations in DEAP. The first step in the accurate calculation of floor area is the dwelling survey. The sketch below shows the ground floor plan of a semi-detached dwelling as extracted from BER survey notes. For simplicity, windows and doors have not been drawn, as they do not affect this calculation.



The **internal** width of the house is the width of the kitchen/dining room: 5.6 m. The **internal** length of the house is:

4.7 + 0.1 + 3.5 = 8.3 m

so the ground floor area entered in the DEAP dimensions tab is:

5.6 x 8.3 = 46.48 m^2.

Note that in calculating the length of the house, the thickness of the wall between the living room and the kitchen-dining room, 0.1 m, is included.

In this house the first floor area is the same as the ground floor area: 46.48 m^2.

As the ground floor is a heat loss floor, its dimensions will be required in the Building Elements section of DEAP. In order to determine the U-value (default or non-default) we must calculate the exposed perimeter of the ground floor. The ground floor is exposed on three sides (front, back and gable-end) but not on the side shared with the neighbouring house. Therefore, the exposed perimeter is:

P = (2 x 5.6) + 8.3 = 19.5 m.

The storey height and area of each storey in the dwelling should be recorded on the DEAP Survey Form:

Total Floor Areas, Heat Loss Floor Areas, Gross Heat Loss Wall Areas, Gross Heat Loss Roof Area

	Storey height (m)	Total floor area (m^2)	Heatloss Floor 1 Area (m^2)	Heatloss Floor 2 Area (m^2)	Heatloss Floor 3 Area (m^2)	Heatloss Floor 4 Area (m^2)	Heatloss Perimeter (m)	Heatloss Wall 1 Area (m^2)	
Ground / Lowest Floor									
First / Next Floor									
Second / Next Floor									

The calculations shown above and all other calculations related to the published BER should be kept on file by the Assessor as outlined in the Code of Practice.

BER Assessor – Dwellings Technical Bulletin #24

01/13 **May 2013**

Contents:

1 Water Heating Controls

The Audit team have encountered a number of issues related to the level of control specified in the water heating system in DEAP assessments. Under the 'Water Heating' tab, the 'temperature factor unadjusted' and associated multiplier figures are taken from DEAP Table 2. Alternatively the lookup function can be used in the DEAP software. Information required during the site survey for correct selection of the factors is as follows where a hot water cylinder is heated by a boiler or heat pump:

- Presence of a cylinder thermostat
- Separate time control of the water heating

Other factors are considered for other storage types (e.g. thermal stores, combi boilers, CPSUs) as detailed in Table 2.

The following examples show the effect of varying time and temperature control and the effect on the temperature factor and multiplier in DEAP:

Example 1: No separate time control and no temperature control

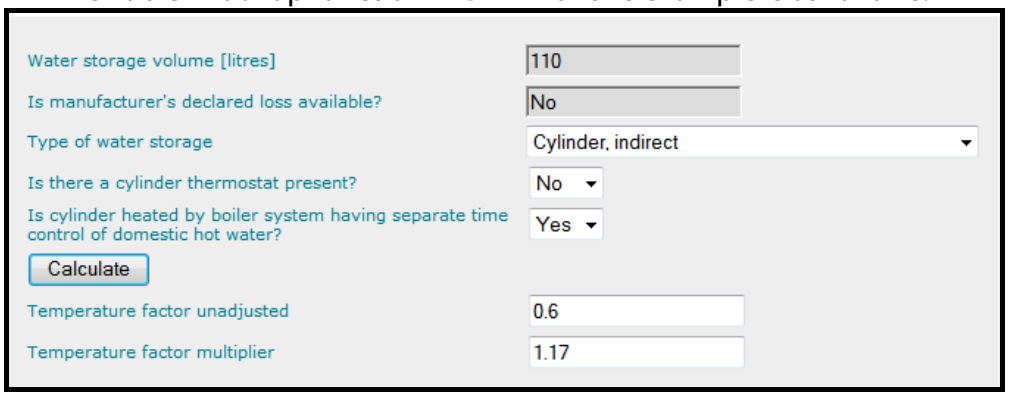
- **Main space and water heating:** Open fire with back boiler to radiators and cylinder
- **Controls**: none
- **Temperature factor**: **0.6** for cylinder (indirect) as per table 2.
- **Temperature factor multiplier**: **1.3** (no timer or cylinder thermostat)

Note, if an immersion is installed as the main water heater, the multiplier is always 1 as detailed in Table 2 of the DEAP manual.

Example 2: Separate time control only

- **Main water and space heating**: Oil boiler heating radiators and cylinder
- **Controls**: full programmer allowing the user to set separate times for space and for water heating. No thermostatic controls. See DEAP 9.3.3.
- **Temperature factor**: **0.6** for cylinder (indirect) as per table 2.
- **Temperature factor multiplier**: As there is no cylinder thermostat the multiplier 1.3 applies. As there is separate time control of water heating, the multiplier of 0.9 also applies. The multiplier entered into DEAP is therefore 1.3*0.9=**1.17**.

The Table 2 lookup function in DEAP for this example is as follows:



Example 3: Temperature control only

- **Main space and water heating:** Gas boiler
- **Controls**: No time control. Has cylinder thermostat.
- **Temperature factor: 0.6** for cylinder (indirect) as per Table 2
- **Temperature factor multiplier: 1.** Table 2 multipliers from notes a) and b) do not apply as there is no time control and there is separate temperature control.

Example 4: Separate time and temperature control

- **Main space and water heating:** Oil boiler
- **Controls**: Programmer allowing the user to set different times for space and for water heating. Cylinder thermostat present.
- **Temperature factor: 0.6** for cylinder (indirect) as per Table 2.
- **Temperature factor multiplier:** As there is cylinder thermostat the multiplier 1.3 does not apply. As there is separate control of water heating, the multiplier of 0.9 applies. The multiplier entered into DEAP is therefore **0.9**.

Note that for such systems in existing dwellings, as per Table S11 of the DEAP Manual, Boiler Interlock is assumed present if there is a room thermostat and (for stored hot water systems) a cylinder thermostat. DEAP Section 9.3.9 provides further detail on boiler interlock.

DEAP Section 9.3.7 describes how to identify a cylinder thermostat.

The following examples show systems with and without cylinder thermostats:

A cylinder thermostat attached to the side of the cylinder:

The cylinder thermostat is accounted for in DEAP if it provides the level of control outlined in DEAP 9.3.7. The following must be borne in mind:

I. Does it measure the temperature of the cylinder?
II. Does it switch on and off the water heating?
III. Can a single target temperature be set by the user?

Both the BER Helpdesk and Audit team have received a number of queries regarding **TRVs with a sensing loom** attached to the side of the cylinder such as the following:

This device:

I. Does measure the temperature of the cylinder.
II. Does not switch on and off the water heating. The device is not wired back to a motorized valve, programmer or boiler. It merely closes of the flow through the cylinder coil.
III. A single target temperature cannot be set by the homeowner. The TRV does not show temperatures and does not allow the user to set a temperature (e.g. 60 degrees). Therefore it is not a cylinder thermostat and should not be accounted for in DEAP.

In other instances the water temperature of the pipework rather than cylinder is being measured. Again, this does not count as a cylinder thermostat in DEAP as the cylinder temperature is not being measured.

Please refer to the following SEAI video for guidance on domestic hot water:
http://www.seai.ie/Your_Building/BER/BER_FAQ/FAQ_BER/Assessors/Building_Energy_Rating_-_Domestic_hot_water.html

2 Roof U-values

The following article provides detail on determining roof insulation thickness and relevant supporting evidence.

2.1 Measuring Roof Insulation Thickness

When measuring the depth of attic roof insulation, for example glass fibre/mineral wool quilt or blown insulation, take care not to compress the insulation during measurement. As stated in the DEAP Survey Guide "Ensure insulation depth is

established by taking the average of a number of measurements (including insulation levels on attic hatches). "

In certain cases it will be necessary to enter the roof sections separately in DEAP as per the DEAP Survey Guide: "Different U-values (e.g. significantly different depths or materials) must be treated as separate roofs in DEAP."
For example, the attic space may be insulated in a piecemeal fashion with different thicknesses in different sections and areas:

Roof Type	Roof Description	Age Band	Insulation Thickness	Area m²	U-Value [W/m²K]
Pitched Roof - Insulated on Ceiling	Insulated Sections of Main Roof	2005 onwards	100 mm	95	0.40
Pitched Roof - Insulated on Ceiling	Uninsulated Sections of Main Roof	2005 onwards	0 mm	10.2	2.30

For inaccessible sections of roof area (e.g. flat roofs) the applicable default from Appendix S is applied if there is no other supporting evidence on the insulation type/thickness used. Where a default is applied to some sections and non-defaults to others, this is split into multiple roof sections under Building Elements -> Roofs in DEAP.

Roof Type	Roof Description	Age Band	Insulation Thickness	Area m²	U-Value [W/m²K]
Pitched Roof - Insulated on Ceiling	Insulated Sections of Main Roof	1978 - 1982	100 mm	95	0.40
Pitched Roof - Insulated on Ceiling	Uninsulated Sections of Main Roof	1978 - 1982	0 mm	10.2	2.30
Flat Roof	New Extension	2005 onwards	Unknown	9.3	0.25
Flat Roof	Previous Extension	1983 - 1993	Unknown	6.5	0.49

The April 2012 Technical Bulletin provides further guidance on U-value calculations for different roof types. Always retain supporting evidence and calculations on file.

2.2 Roof Insulation and the Better Energy Homes Grant Scheme

Further to the guidance issued in Section 5 of the October 2012 Technical Bulletin on retrofitted wall insulation, a similar approach can be taken for retrofitted roof insulation:

- A non-default U-value is calculated using the relevant thickness and thermal conductivity for each layer where possible. Section 2 of the April 2012 Technical Bulletin provides guidance on roof U-value calculation.
- If this information is not available (for example the retrofitted roof space is inaccessible) then the default U-value of the original roof – taken from DEAP Appendix S – may be used as the starting point. An example of such a calculation is given in Table S3 (footnote). For example, an existing flat roof extension with an original age band 'E', retrofitted with additional insulation but not visible upon inspection. In this instance the U-value of 2.3W/m^{2}K taken from Table S5 is used as a starting point.

Use of grant Declaration of Works (DOW) form to determine retrofitted insulation thickness:

The Better Energy Homes roof contractor's DOW form can be used as proof of additional insulation where a single insulation type and thickness is added to all roof sections in the dwelling. The contractor details the average insulation thickness on all roofs before and after the grant aided works are completed:

	Type of Roof found in Home (please tick)	Before Works	After Works
% Flat Roof Area of Home Insulated	☐	%	%*
% Sloping Rafters Area of Home Insulated	☐	%	%*
% Ceiling Area of Home Insulated	☐	%	%*
(Average) Depth / Thickness of Insulation		mm	mm
(Average) Calculated U-Value for Roof		W/m^{2}K^	W/m^{2}K
Area of roof / ceiling insulated by you			m^2

As an example, the DOW may state that there was 0mm of insulation before and 100mm of insulation after on a dwelling with a flat ceiling.

More complex situations may also arise. Take a dwelling availing of the Better Energy Homes roof insulation grant with an inaccessible attic built in 1960 and with a flat roof extension built in 2001. As there is no access, the insulation thickness of the original attic and extension are assumed to differ. Therefore the "average thickness" specified in the DOW cannot be used in a BER assessment. In this case the Assessor should seek written clarification from the contractor or further detail from invoices/receipts on the thickness and type of retrofitted insulation for any section where roof insulation is not visible / accessible. Failing that, the DEAP defaults provide conservative values which may be used instead.

Thermal Conductivity

If the Assessor is unable to identify the type of insulation by visual inspection, invoices and/or receipts from the contractor should be used. Check if the insulation product has an NSAI Agrément Certificate or other accredited test data detailing the thermal conductivity. If certified thermal conductivity is not available, the most conservative appropriate default thermal conductivity value from DEAP Table 12b should be used following guidance in DEAP Manual section 3.1.

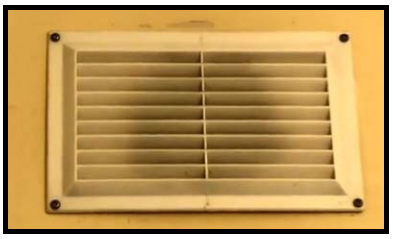
Similar to the October 2012 Technical Bulletin, the roof DOW form does not detail insulation type or thermal conductivity. The Assessor must retain a copy of all relevant invoice / receipts and any other documentation used to specify the type and thermal characteristics of the insulation.

3 Intermittent Fans and Background Vents

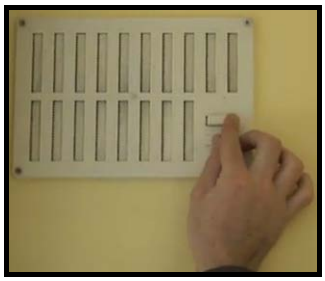
The Audit team have encountered a number of issues related to the incorrect entry of intermittent fans and passive or background vents. Controllable/closable ventilators should not be included in DEAP as detailed in Section 2.2 of the DEAP Manual.

Examples:

Non controllable wall vent (counted in DEAP subject to DEAP 2.2):



Controllable/closable wall vent (ignored in DEAP subject to DEAP 2.2):



Controllable/closable window vent (ignored in DEAP subject to DEAP 2.2):

Window vent closed:

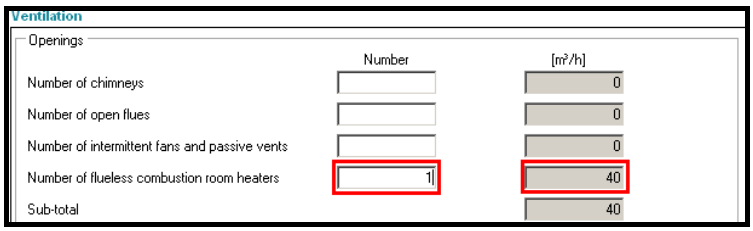
Window vent open:

Some rooflight windows give the option of background ventilation through use of the opening handle. As this is closable it should not be counted as a background vent in DEAP:

Roof window vent closed:

Roof window vent open:

Permanent wall vents should also be ignored when located in a room containing chimneys, flues and fixed flueless gas fires. For example, in a dwelling with a flueless gas fire and associated permanent wall vents in the same room, the applicable ventilation rate is already calculated by DEAP under *'Number of flueless combustion room heaters'*:



Mechanical extractor fan (cooker hood) counted as an intermittent fan in DEAP:

Bathroom mechanical extractor exhaust counted as an intermittent fan in DEAP:

Please refer to the following SEAI video for guidance on ventilation and room by room surveys:
http://www.seai.ie/Your_Building/BER/BER_FAQ/FAQ_BER/Assessors/Building_Energy_Rating_-_Room_by_room_survey.html

The video "Inside the Property" also provides detail on ventilation:
http://www.seai.ie/Your_Building/BER/BER_FAQ/FAQ_BER/Assessors/Inside_the_property.html

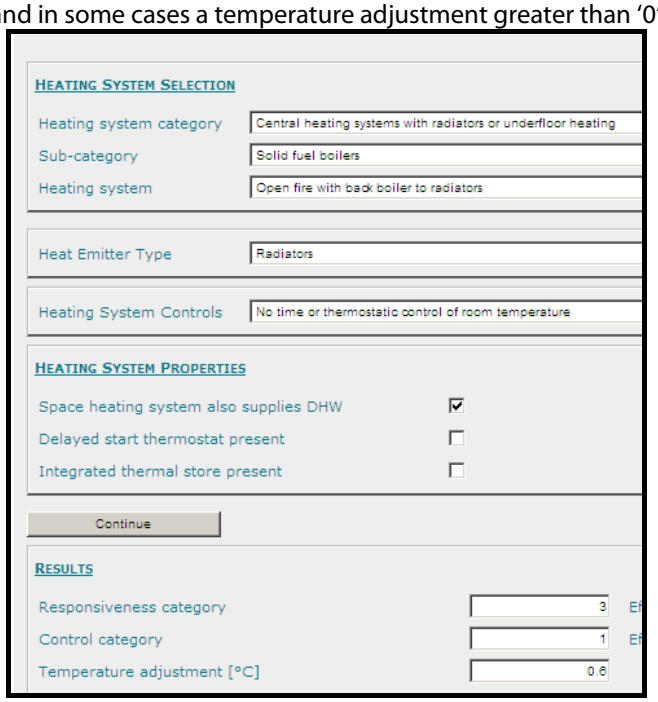
4 Space Heating Controls

The Audit team have encountered a number of assessment errors in identification of the level of space heating control. DEAP provides a controls lookup function under the 'distribution system losses and gains' tab based on DEAP Table 4. The relevant fields in DEAP are the temperature adjustment, heating system control responsiveness categories along with efficiency adjustment factors under the 'energy requirements' tab. Alternatively, the user can manually derive the figures from DEAP Table 4. SEAI recommends use of the lookup function for correct selection of control entries in DEAP. Information required during the site survey for correct selection of the factors is detailed in The DEAP Survey Guide and Manual. Information is required from site survey for correct selection of these factors such as:

- System/boiler type and emitter type.
- Type of control of space heating.
- Number of zones.
- Number of room thermostats.
- Number TRV's.

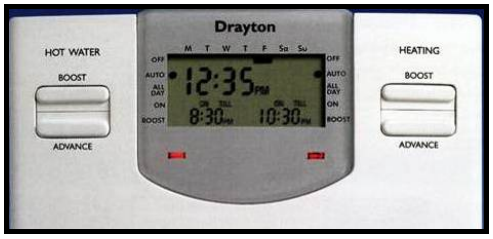
The following examples show the effect of varying time and temperature control on the DEAP entries. Full details are available in DEAP Table 4c and 4e in particular.

No time control of main space heating – A typical scenario would be when the main space heater is an open fire with back boiler to radiators. It can also be found in boiler systems controlled only by means of an on/off switch or by systems having a room thermostat only. This poor level of control is reflected in the control category of '1' and in some cases a temperature adjustment greater than '0'.



Programmer + at least two room thermostats – Assessors must determine the number of zones and the method of control in each zone. For a control category of '2' in a gas/oil boiler system, a programmer is always required along with other measures as detailed in Table 4e (Group 1). As part of the survey process the assessor should record the details of the programmer and room thermostats in the Survey Form. A TRV is not considered a 'room thermostat' and does not provide boiler interlock. Towel radiators are ignored in DEAP assessments and do not influence the TRV assessment.

The following programmer provides time control of a space heating zone and water heating. This has **separate time control of hot water**. In a conventional gas/oil boiler system, depending on the presence of room thermostats and/or TRV's, this will have a control category of either '1' or '2':

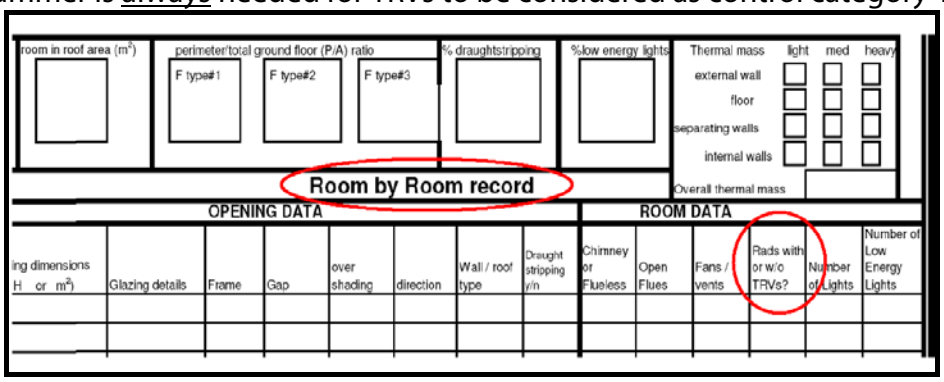


Full time and temperature zone control – For a boiler system to have a control category of '3' it needs to have full time and temperature zone control as defined in DEAP Section 9.3.12. For this, independent time and temperature control of least two space heating zones is required. The following photo shows a programmer having two space heating zones and one water heating zone. If this type of programmer was seen in a boiler system with two room thermostats a control category of '3' is applied:

Wall or room thermostats are available in various types and styles, analogue and digital, examples of these are shown as follows:

If there are multiple space heating thermostats, then there are multiple space heating zones and each of these will need independent temperature and time control to apply a control category of '3' in a boiler system.

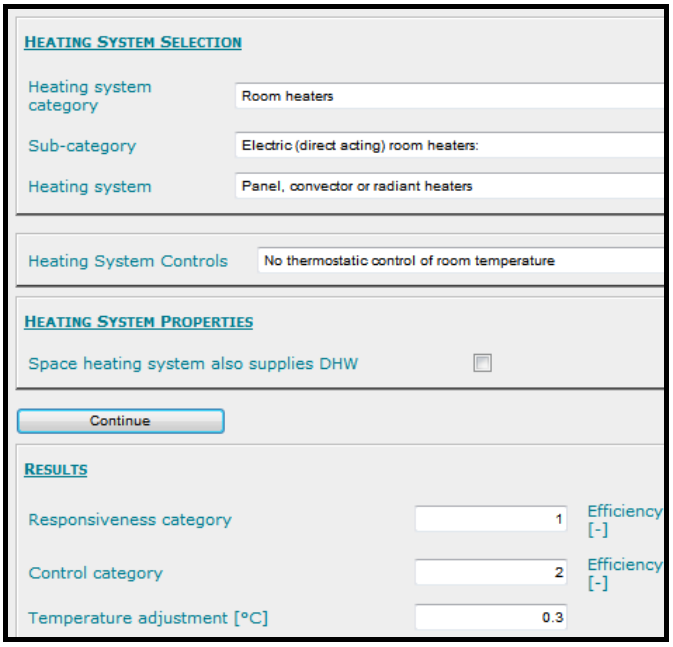
TRV's – further to guidance previously given in the DEAP Manual and April 2010 Technical Bulletin all TRV's are counted in the Survey Form – Room by Room record. This determines whether or not they are accounted for in DEAP. A programmer is always needed for TRVs to be considered as control category '2'.



Group Heating Controls – for selection of the appropriate control category, observe and record the presence of the programmer, thermostats and TRVs. The programmer can be in the dwelling (e.g. apartment) or central to the group heating scheme (e.g. boiler room, corridor). As stated in Table 4e DEAP Group 3; under heating controls: *"(Programmer in group heating scheme may be inside dwelling or part of the group heating system)"*

Electric Heater Controls – Similarly, Table 4 details the level of controls and corresponding DEAP entries for electric heaters. The controls for the main heating system are applied in DEAP. As an example, consider a small apartment with a storage heater and Automatic Charge Control in the living room and direct electric heating (with on/off control only) in each of the two bedrooms. There are no other

habitable rooms. As per DEAP appendix A, the direct electric heaters heat most of the habitable rooms and are therefore the main heating system. The controls in DEAP are as follows:



If an appliance or system of appliances can provide the level of time control outlined in section 9.3.3 of the DEAP manual it should be considered as a programmer.

DEAP Section 9.3.1 states: *'Room thermostat - A room thermostat senses the indoor air temperature and switches on or off the space heating. A single target temperature may be set by the user.'*

The following photo shows an appliance dial graduated by '*' to 'Max' on a direct electric heater:

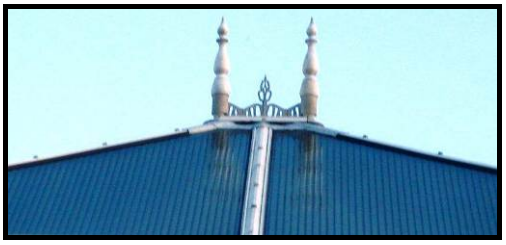
This cannot be used to set the target temperature by the user and therefore should not be regarded as a thermostat.
Alternatively, there may be product instructions or literature available for this particular appliance equating the graduations to temperatures measured in the room. We would advise Assessors to contact the relevant supplier/manufacturer for further details and to contact the Helpdesk if further assistance is needed.

Please refer to the following SEAI video for guidance on heating system controls;

http://www.seai.ie/Your_Building/BER/BER_FAQ/FAQ_BER/Assessors/Building_Energy_Rating_-_Heating_system_controls_video.html

5 Perspex or Plastic Roofs

Perspex or plastic roofing is treated as glass when relying on defaults for solar transmittance and U-values. If there is more than a single layer (e.g. double or triple layers of Perspex) assume it is double or triple glazing air filled. Use the associated default U-values and solar transmittance for entry in to DEAP as a roof window:



6 Missing or Broken Heating Systems

A number of Assessors have asked the BER Helpdesk about dwellings containing incomplete or partially removed heating systems. As stated in Section A3.4 of the DEAP Manual: *'DEAP assumes that the installed heating systems are operational and takes no account of whether they are working or not. However, in the case where the main heating unit (e.g. boiler) is missing and thus the dwelling has no installed primary heating system, the rules in A3.2 should be followed.'*

In the case of a missing or removed cylinder, if the heating system requires the use of a cylinder (i.e. not a combi boiler) to provide hot water, effectively there is no facility to heat water in the dwelling. In such a case, direct acting electric heating should be assigned as the main water heater (without a water heating cylinder). Similarly, if there are no space heat emitters, the boiler cannot heat the dwelling and direct acting electric heaters are assumed to provide space heating.

In the case of missing controls (thermostat, programmer etc.), then the system is deemed not to have the missing controls. If the controls are present but broken, it is assumed that they are operational and they are accounted for.

7 SEAI Substitute MPRN Facility

SEAI have noted that some BER Assessors are not aware of the revised RO11 form and are submitting saved copies of the previous RO11 version resulting in delays in the issue of the SEAI Substitute MPRN.

The latest version RO11 form can be downloaded here: http://www.seai.ie/Your_Building/BER/BER_Assessors/RO11.pdf

The BER Assessor should, from the outset, exhaust all avenues to obtain the relevant MPRN. The Assessor will need to confirm to the BER Helpdesk if the property has electric power and what lengths they've gone to obtain the MPRN.

Please note the SEAI Property Reference Number is not to be used in instances where a builder/developer wants a BER certificate without registering the property with the ESB and seeking a MPRN. If the owner/vendor is a builder, or an agent acting on their behalf, they should be instructed to arrange for registration of the property for MPRN, at which stage the Assessor will be able to publish a BER rating.

To prevent delays in generating the SEAI MPRN, the BER Assessor should make sure that all parts of the form have been completed in full and enclose a copy of all the relevant attachments and information.

8 Homeowner Complaints

We have received a number of queries through the BER Helpdesk where BER Assessors have failed to follow up with homeowners and provide feedback in relation to the outcome of the BER assessment. A BER assessor has a responsibility to explain the rating achieved to the homeowner and, particularly in the case of poorer ratings, explain how this was arrived at. Further to the guidance given in Section 2 of the March 2011 Technical Bulletin, the BER Assessor should explain to the client why their dwelling has achieved a particular BER grade. The following links are useful for homeowners:

1) http://vimeo.com/40214470 (BER for homeowners explained)
2) http://www.seai.ie/Your_Building/BER/Householders/Householders.html (Homeowners section of BER website)

In some cases, particularly where the rating is based on extensive use of defaults, the Assessor may need to explain to the client why certain default values were used. The Assessor should make it clear to the homeowner what documentation is required to support non defaults (and most likely result in a rating with a lower energy value). As stated in the Survey Guide: "Use of substantiated non defaults is encouraged as it will result in a more accurate BER grade for the dwelling."

BER Assessors need to pay particular attention generating the Advisory Report, ensuring that all irrelevant items are suppressed and excluded from the report.

A homeowner complaint to the BER Helpdesk could trigger the requirement for further investigation under the SEAI Quality Assurance and Disciplinary Procedure. As stated in the BER Assessors Code of Practice: "A BER Assessor must take full responsibility for each BER assessment that he or she carries out and take full responsibility for the accurate submission of a BER assessment to SEAI for publication on the BER Register."

9 Introduction to DEAP for Professionals

SEAI have recently published the "Introduction to DEAP for Professionals". This document provides an introduction to the principles of DEAP for anyone involved in building research or the design, construction or retrofit of dwellings. It is also useful for anyone wishing to understand the technical basis for BER certificates.

The document is available to view or download here: http://www.seai.ie/Your_Building/BER/BER_Assessors/Technical/DEAP/

BER Assessors – Dwellings Technical Bulletin #25

Issue No. 1/14 **February 2014**

Contents:

1 BERs for New Dwellings

The May 2009 technical bulletin article "When do I specify the dwelling as being an "existing" dwelling in DEAP?" has been updated to reflect the requirements in S.I 243 on all new dwellings requiring a BER. Specifically, all new dwellings regardless of completion and planning application dates require a BER. A new dwelling is a dwelling that has not previously been sold or occupied.

2 Energy Requirements

2.1 Electricity Fuel Factors Update

The electricity primary energy and CO_2 factors in DEAP were updated on 11th December 2013 to reflect the latest Energy Balance figures from the SEAI Energy Policy Statistical Support Unit (EPSSU). BER assessors will notice the factors assigned to the electricity fuel type in DEAP automatically update provided their PC is connected to the internet. No action is required by BER assessors to obtain these new figures.

The background on derivation of the figures is published on the BER FAQ here.

The electricity primary energy factor was updated to 2.45 and the electricity CO_2 factor was updated to 0.555kgCO_2/kWh. Factors for other fuels (e.g. oil, gas, wood fuels) remain unchanged. See DEAP manual Section 10.2 and Table 8.

2.2 Heating System Fuel Types

The Audit team have encountered a number of issues in BER assessments related to the selection of heating system fuel types.

Secondary heating system efficiencies are taken from the HARP database, certified data or defaulted based on DEAP Table 4. Selection of fuel types for solid fuel appliances is detailed in DEAP Manual Section 10.3.3. This method applies to both secondary and primary solid fuel heating systems.

Notes: Smokeless coal areas are detailed on the Department of Environment, Community and Local Government (DECLG) website here. These areas are also referred to as areas in which the sale of bituminous coal is banned. Individual Local Authorities may have further details. Section 1.3 of the October 2012 Technical Bulletin details how the EPA website can be used to identify smokeless coal areas.

The examples below show how to identify the fuel type in DEAP.

Example 1
A detached house located in Tallow, Co. Waterford has an oil boiler installed outside. There is a two channel programmer controlling both water and space heating. The boiler provides space heating to all habitable rooms and water heating. A solid fuel stove is installed in the living room. There are no details visible to identify the type of stove.

The following approach applies for DEAP:

Heating System	**Fuel Type**
Main Space Heating System	Heating Oil
Secondary Space Heating System	Solid Multi Fuel
Main Water Heating System	Heating Oil
Supplementary Water Heating System	None

The DECLG website above shows that the house is not in a smoke control zone. By reference to section 10.3.3 of the DEAP manual, as no details are available on the stove and the fuel type in the area is unknown, solid multi fuel is selected. There is separate zoned time control (DHW separate from space heating). Therefore "None" is selected for Supplementary Electric Water Heating. See Section 4.6 of the DEAP manual for further guidance on Supplementary Water Heating.

Example 2
A two bedroom apartment in Dublin has electric panel heaters in the two bedrooms and a solid multi fuel stove in the living room. There are no more habitable rooms. As per DEAP Appendix A, the direct electric heaters heat most of the habitable rooms and are therefore the main heating system. The solid fuel stove is the secondary heating system. As Dublin is a smoke free zone, Manufactured Smokeless Fuel is selected as the Secondary Space Heating Fuel Type. An immersion heats all of the DHW in a cylinder.

The following data entry applies for DEAP:

Heating System	**Fuel Type**
Main Space Heating System	Electricity
Secondary Space Heating System	Manufactured Smokeless Fuel
Main Water Heating System	Electricity
Supplementary Water Heating System	None

2.3 Primary and Secondary Heating System with Electric Heating

The BER Helpdesk has received a number of queries relating to Appendix A: "Primary and secondary heating systems". The primary or main space heating system heats the largest proportion of the dwelling. As per Appendix A of the DEAP manual, this proportion is calculated using a count of the habitable rooms heated by each system.

Example:
An apartment has three habitable rooms heated as follows:

- 1 integrated storage + 1 slimline storage in living area
- 1 slimline storage heater in hallway (note the hallway is not a habitable room)
- 1 panel heater in each of 2 bedrooms

The panel heater is the main heating system as it heats more habitable rooms than the other systems. The technical bulletins in June 2009 and May 2013 discuss this and base the choice of main heater, first and foremost, on habitable room count for each heating system. If two systems heat the same number of habitable rooms, then the system that is cheapest to run is the main space heating system (as per Section 4 of the January 2012 Technical Bulletin).

Note: In accordance with DEAP manual Section 10.3.2 and Appendix A, a secondary heating system is always specified when the main system is electric storage heaters or off-peak electric underfloor heating. In addition, Assessors are advised to review the example on page 2 of the June 2009 technical bulletin. This details correct selection of main and secondary heating when there are several heating systems installed.

3 Building Elements

3.1 Window Solar Transmittance and U-values

BER auditors and the Helpdesk have encountered a number of issues and queries relating to window performance data. This article reiterates a number of the points made in relevant guidance. The approach to selection of the correct window default is detailed in the BER FAQ here.

DEAP Manual Section 3.2 details the standards to be followed when obtaining non-default window U-values. The U-value for the entire window (including glazing and frame) is input directly into DEAP. U-values for glazing only are not acceptable for DEAP without use of further calculations to the relevant standards. **When specifying a non-default window U-value in DEAP, it must be accompanied by a non-default solar transmittance value calculated according to EN 410. If the non-default solar transmittance or U-value are not available, then default U-value and solar transmittance must be used.**

Solar Transmittance

When a non default window U-value is entered in DEAP, the solar transmittance must also be obtained from certified data to the standard EN410. Ensure that the solar transmittance value entered in DEAP is the $\mathbf{g_{\perp}}$ value. In some cases, where the solar factor for the entire window is given (including frame) as g_{window} and the solar transmittance, $g_{\perp}$, is unavailable, then solar transmittance to be entered in DEAP =

$$g_{\perp} = g_{window} \ / \ [\text{Frame Factor} * 0.9]$$

The British Fenestration Rating Council (BFRC) and the NSAI Window Energy Performance (WEP) scheme are acceptable sources of Window solar transmittance and U-value. See DEAP Table 6b footnotes for further detail.

Glazed door U value defaults:
As per DEAP Section 6.2, a glazed door is one having between 30% and 60% glazing. Glazed doors are entered under the "Doors" section in DEAP. Doors with more than 60% glazing are entered as windows. For glazed doors the adjusted default U-value must be calculated by the Assessor as a weighted average between the glazing and opaque U-values. The DEAP entry for solid and glazed doors is described in the July 2011 Technical Bulletin Section 1.1.
There is further detail on identification of window properties on site in the following video.

3.2 Case study: Data entry for wall areas and floor areas

The case study below details wall and floor survey, associated calculations and DEAP data entry. It covers a number of queries raised at the BER Helpdesk and also issues identified during audits using sample data in the Survey Form, sketches, calculations and the relevant DEAP entries.
The floor area for each level of the dwelling is needed to calculate both the **total floor area** and the **dwelling volume** under 'dimensions' regardless of whether a dwelling's floor (or floors) loses heat.
The assessment of a constructed dwelling also identifies and measures the **heat loss building elements**. Non-heat loss areas (e.g. party walls, a floor or a ceiling wholly above or below another dwelling, or walls backing onto a heated circulation space) are ignored as heat loss elements in the DEAP Building Elements tab.
The calculations shown below, as well as sketches, photos, survey forms and all other calculations as related to a published BER must be kept on file by the Assessor as outlined in the Code of Practice.

There is further guidance on the DEAP survey and sketches in the following video.

Case Study:
The house being surveyed is a two storey semi-detached house built in 1990. The main dwelling has an unheated garage. A cavity wall with partial fill insulation as built, extends around the main dwelling and the outside of the garage. The walls between the main dwelling and the garage are uninsulated solid walls. The floors of the main dwelling are suspended. The garage floor is solid. The external walls, internal walls on ground and first floor and the party wall are masonry walls with dense plaster. The dwelling has a flat ceiling insulated between the joists below a pitched roof.

The extension to the rear was built in 2002. The extension age was determined from homeowner knowledge and the date stamp on the glazing in the extension. The extension is a sunroom and has a vaulted ceiling insulated at rafter level, timber frame walls and a solid floor. There is a radiator with a TRV in the sunroom and it is heated from the main heating system. See survey form and sketch below.

Dwelling Type	Age: Dwelling	Age: Extension 1	Age:Extension 2	number of stories
[ ] detached house	[ ] pre 1900	[ ] pre 1900	[ ] pre 1900	2
[x] semi detached house	[ ] 1900 - 1929	[ ] 1900 - 1929	[ ] 1900 - 1929	
[ ] end of terrace	[ ] 1930 - 1949	[ ] 1930 - 1949	[ ] 1930 - 1949	
[ ] mid terrace	[ ] 1950 - 1966	[ ] 1950 - 1966	[ ] 1950 - 1966	
[ ] ground floor apartment	[ ] 1967 - 1977	[ ] 1967 - 1977	[ ] 1967 - 1977	
[ ] mid floor apartment	[ ] 1978 - 1982	[ ] 1978 - 1982	[ ] 1978 - 1982	
[ ] top-floor apartment	[x] 1983 - 1993	[ ] 1983 - 1993	[ ] 1983 - 1993	
[ ] basement apartment	[ ] 1994 - 1999	[ ] 1994 - 1999	[ ] 1994 - 1999	
[ ] maisonette	[ ] 2000 - 2004	[x] 2000 - 2004	[ ] 2000 - 2004	
Pick dwelling type that is	[ ] 2005 onwards	[ ] 2005 onwards	[ ] 2005 onwards	
closest to actual dwelling type		[ ] no extension 1	[ ] no extension 2	

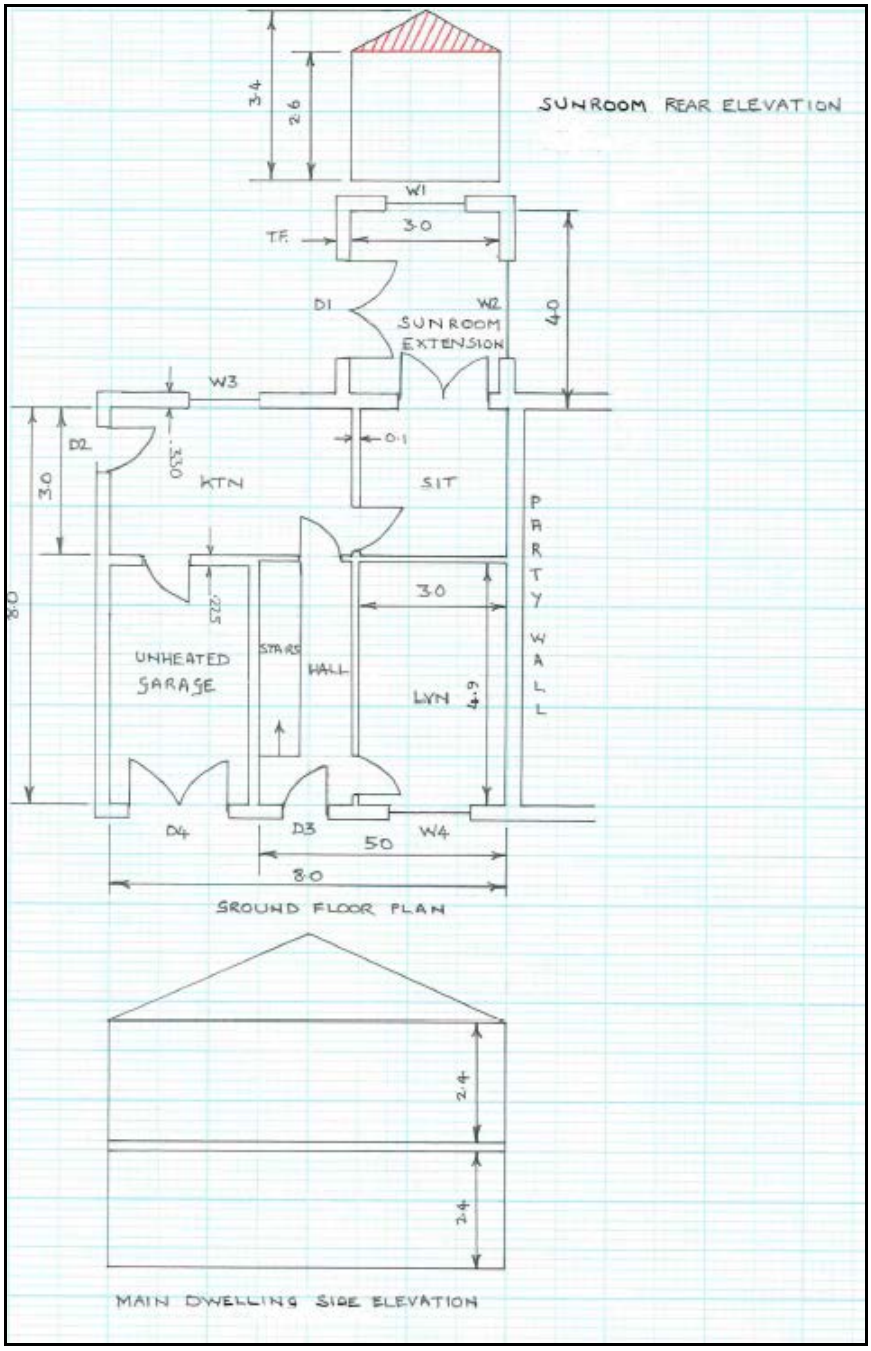
Type of Rating
[ ] new-final dwelling
[x] existing dwelling

Purpose of Rating
[ ] new: owner occupation
[x] sale
[ ] private letting
[ ] social housing letting
[ ] grant support
[ ] other

Wall construction Main Wall*		Roof Construction: Main Dwelling*		Ground Floor Construction: Main Dwelling*	
[ ] stone	wall thickness (mm)	[x] pitched - insulation btw joists	Roof insulation	[ ] solid	[ ] no heat loss ground floor
[ ] solid brick	is wall semi exposed?	[ ] pitched - insulation in rafters	thickness (mm) fibre [x]	[x] suspended: sealed [ ]	unsealed [ ]
[x] cavity	Wall Insulation	[ ] flat - insulation integral	warmcell [ ]	[ ] above unheated basement	
[ ] solid concrete	[x] as built bead [ ]	[ ] room in roof	150 EPS [ ]	[ ] heated basement	
[ ] hollow block	[ ] cavity fill EPS [ ]	[ ] no heat loss roof	[ ] unknown dense [ ]	[ ] other	
[ ] timber frame	[ ] external min fibre [ ]	[ ] other		Floor Insulation	Type of insulation (if any)
[ ] other/unknown	[ ] internal dense [ ]				thickness (mm) EPS [ ]
insulation thickness if observable(mm)					(only if any observed) min fibre [ ]
				[ ] none	unknown [x] dense [ ]

Wall construction Wall Type 2*		Roof Construction: Roof Type 2*		Ground Floor Construction: Floor Type 2*	
[ ] no wall type 2	wall thickness (mm)	[ ] no heat loss roof type 2	Roof insulation	[ ] no heat loss extension floor type 2	
[ ] stone	is wall semi exposed?	[ ] pitched - insulation btw joists	thickness (mm) fibre [ ]	[x] solid	
[ ] solid brick	Wall Insulation	[x] pitched - insulation in rafters	warmcell [ ]	[ ] suspended: sealed [ ]	unsealed [ ]
[ ] cavity	[x] as built bead [ ]	[ ] flat - insulation integral	EPS [ ]	[ ] above unheated basement	
[ ] solid concrete	[ ] cavity fill EPS [ ]	[ ] room in roof	[x] unknown dense [ ]	[ ] other Garage	
[ ] hollow block	[ ] external min fibre [ ]	[ ] other		Floor Insulation	Type of insulation (if any)
[x] timber frame	[ ] internal dense [ ]	Sunroom			thickness (mm) EPS [ ]
[ ] other/unknown Sunroom					(only if any observed) min fibre [ ]
insulation thickness if observable(mm)				[ ] none	unknown [x] dense [ ]

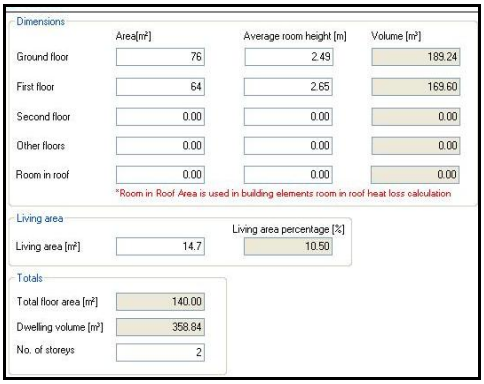
Wall construction Wall Type 3*		Roof Construction: Roof Type 3*		Ground Floor Construction: Floor Type 3*	
[ ] no wall type 3	wall thickness (mm)	[ ] no heat loss roof type 3	Roof insulation	[ ] no heat loss extension floor type 3	
[ ] stone	is wall semi exposed?	[ ] pitched - insulation btw joists	thickness (mm) fibre [ ]	[x] solid	
[ ] solid brick	Wall Insulation	[ ] pitched - insulation in rafters	warmcell [ ]	[ ] suspended: sealed [ ]	unsealed [ ]
[ ] cavity	[ ] as built bead [ ]	[ ] flat - insulation integral	EPS [ ]	[ ] above unheated basement	
[ ] solid concrete	[ ] cavity fill EPS [ ]	[ ] room in roof	[ ] unknown dense [ ]	[ ] other Sunroom	
[ ] hollow block	[ ] external min fibre [ ]	[ ] other		Floor Insulation	Type of insulation (if any)
[ ] timber frame	[ ] internal dense [ ]				thickness (mm) EPS [ ]
[ ] other/unknown					(only if any observed) min fibre [ ]
insulation thickness if observable(mm)				[ ] none	unknown [x] dense [ ]



***Dwelling Dimensions*:** As per section 1 of the DEAP manual, **dimensions** refer to the inner surfaces of the elements bounding the dwelling. Thus floor dimensions are obtained by measuring between the inner surfaces of the external or party walls, disregarding the presence of any internal walls. As there is no insulation between the dwelling and garage and the garage's external wall is insulated and has similar U-values to the external walls of the dwelling, the unheated garage is likely to reach the same or similar temperatures as the dwelling. Therefore the garage is included in the dwelling floor area as it is not thermally separated. The dwelling dimensions are calculated as follows:

1. **Ground Floor**
   - Main dwelling (8x8) = 64m^2 with ceiling height 2.4m
   - Extension (4x3) = 12m^2 with average ceiling height 3m
   - Total ground floor = 76m^2 with average ceiling height 2.49m (See Technical Bulletin August 2010 Section 5 for guidance on calculating average storey height)
2. **First Floor** is the same area as the main dwelling ground floor of 64m^2 and has a ceiling height of (2.4+0.25)= 2.65m. The 0.25m floor thickness default is taken from Section S4 of the DEAP manual.

See below for the DEAP Dimensions entries completed:

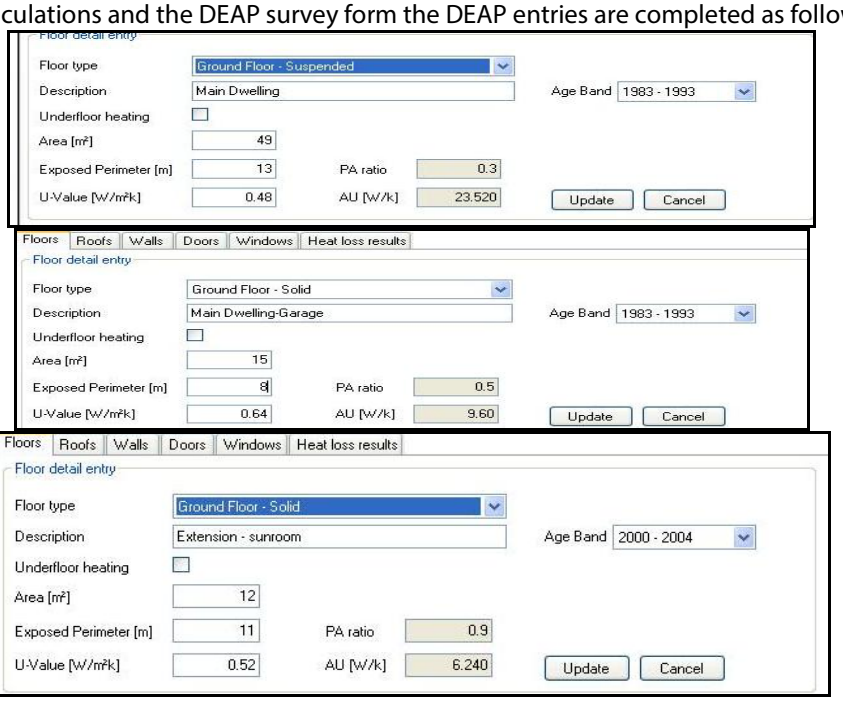


***Floor Area*:** Section 1 of the DEAP Manual describes the areas of a dwelling which should and should not be accounted for under the dimensions tab in DEAP as "floor area". A number of previous technical bulletins provide further details supplementary to that in Section 1 of the DEAP manual. It is critical that these areas are accounted for correctly in BER assessments. The floor area under the dimensions tab has a direct bearing on the BER result (which is expressed in kWh of primary energy per m^2 of floor area per year). See also Technical Bulletin October 2012 Section 6 for further guidance on floor area calculations in DEAP.

Below are the calculations for the three different heat loss floor types as detailed in the survey form:

1. Main Dwelling suspended floor (does not include garage floor):
    - Area (A) = (3x8)+(5x5)= 49m^2
    - Exposed perimeter (P)= 5(front)+3(side)+5(back)= 13m
2. Main Dwelling solid-garage floor (included in floor area):
    - A = 5x3= 15m^2
    - P= 3+5= 8m
3. Extension solid – Sunroom
    - A= 4x3= 12m^2
    - P= 4+3+4 (there is no extension on the neighbouring dwelling) = 11m

Using the calculations and the DEAP survey form the DEAP entries are completed as follows:



Wall Area: There are two external wall types as identified on the survey sheet calculated as follows:

	Cavity Wall–Main Dwelling	**Timber Frame-Extension**
Gross Wall Area	([8+8+8]x[2.4+2.65])-([3x2.6]+[0.5x3x0.8])[a]m^2 = 112.2 m^2	([4+4+3] x 2.6)+(0.5 x 3 x 0.8)[b]m^2 = 29.8 m^2
Opes [c]	18.9m^2	9.46m^2
Net Wall Area	93.3	20.34

The above areas are entered in DEAP as follows:

Delete	Copy	Wall Type	Wall Description	Age Band	Wall is semi-exposed	Area m²	U-Value [W/m²K]	AU Value [W/K]
X		300mm Cavity	Main Dwelling	1983 - 1993	NO	93.3	0.60	55.98
X		Timber Frame	Sunroom Extension	2000 - 2004	NO	20.34	0.55	11.19

Roof Area: There are two roof types as identified on the survey sheet calculated as follows:

- Pitched insulation btw joists – Main Dwelling with 150mm insulation (8x8) = 64m^2
- Pitched insulation in rafters - Sunroom Extension with insulation unknown (1.7(slope)*2(no. of slopes) *4(length)) = 13.6m^2

The above areas are entered in DEAP as follows:

Delete	Copy	Roof Type	Roof Description	Age Band	Insulation Thickness	Area m²	U-Value [W/m²K]	AU Value [W/K]
X		Pitched Roof - Insulated on C...	Main Dwelling	1983 - 1993	150 mm	64	0.26	16.640
X		Pitched Roof - Insulated on R...	Sunroom Extension	2000 - 2004	Unknown	13.6	0.36	4.896

The dimensions on page 2 of the Survey Form are as follows:

Total Floor Areas, Heat Loss Floor Areas, Gross Heat Loss Wall Areas, Gross Heat Loss Roof Areas, Storey Heights* (internal dimensions only)

	Storey height (m)	Total floor area (m^2)	Heatloss Floor 1 Area (m^2)	Heatloss Floor 2 Area (m^2)	Heatloss Floor 3 Area (m^2)	Heatloss Floor 4 Area (m^2)	Heatloss Perimeter (m)	Heatloss Wall 1 Area (m^2)	Heatloss Wall 2 Area (m^2)	Heatloss Wall 3 Area (m^2)	Heatloss Wall 4 Area (m^2)	Heatloss Roof 1 Area (m^2)	Heatloss Roof 2 Area (m^2)	Heatloss Roof 3 Area (m^2)	Heatloss Roof 4 Area (m^2)
Ground / Lowest Floor	2.49	76	49	15	12			93.3	20.34			64	13.6		
First / Next Floor	2.65	64													
Second / Next Floor															
Third / Next Floor															
Basement															

living area (m^2)	room in roof area (m^2)	perimeter/total ground floor (P/A) ratio			% draughtstripping	%low energy lights	Thermal mass	light	med	heavy
		F type#1	F type#2	F type#3			external wall			X
14.7		0.26531	0.533333	0.9166667			floor	X		
							separating walls			X
							internal walls			X

Room by Room record Overall thermal mass: Medium-High

Section 2.3 below discusses the derivation of the thermal mass entries in the Survey Form.

[a] Cavity heat loss wall area is the total main dwelling wall area (party wall area is not included) minus the area of wall to the sunroom as the sunroom is within the dwelling envelope.
[b] Top of sunroom gable wall (triangle shaded in red in the sketch above).
[c] Main dwelling opes have been calculated by the Assessor as 18.9m^2. Extension opes have been calculated by the Assessor as 9.46m^2.

3.3 Thermal Mass

This article provides examples deriving the overall thermal mass category being assigned to dwellings.

Thermal Mass Category for Existing Dwellings (refer to DEAP Table S10):
Referring to the case study in Section 3.2 above the construction elements are identified as follows:

- Ground Floor: Predominately light – thermal mass category: light
- External Walls: Predominately masonry with dense plaster (cavity wall) -thermal mass category: heavy
- Separating Wall: Masonry with dense plaster: heavy
- Internal Partitions: Masonry with dense plaster: heavy

For existing dwellings thermal mass category may be based on the defaults in Table S10. In accordance with DEAP manual Table S10, the overall thermal mass category is Medium-High. This is entered under the Net Space Heat Demand tab in DEAP.

The following table lists some typical construction elements and their associated mass category in Table S10. Note this table applies to existing dwellings only.

Construction Element	Thermal Mass Category in Table S10
Suspended timber floor	Light
Solid floor	Medium
Timber/steel frame walls (Internal or external)	Light
Masonry external walls(cavity fill or external insulation) with dense plaster	Heavy
Masonry external walls(cavity fill or external insulation) with plasterboard on dabs	Medium
Masonry external walls(internal insulation)	Light
Masonry internal walls with plasterboard on dabs	Medium
Masonry internal walls with dense plaster	Heavy

As detailed in the General Principles of the DEAP manual: "In some cases there are a limited number of data entry options available. Unless otherwise stated in SEAI guidance, the most prevalent option should be chosen". For example if an existing semi-detached house has solid internal walls with dense plaster on the ground floor of area 50m^2 and lightweight partitions on the first floor of area 30m^2, the solid internal walls with dense plaster on the ground floor are the most prevalent. Therefore, the category for internal partitions is "heavy" when referring to table S10.
While DEAP Table S10 is usually used for thermal mass category in existing dwellings, Assessors may use Table 11 or DEAP Section 7.3 instead.

Thermal Mass Category for New Dwellings:
The thermal mass category for new dwellings is determined using DEAP Manual Table 11 or Section 7.3. Table 11a of the DEAP Manual details the construction elements when using Table 11 to calculate the AmAf range (ratio of thermally massive elements to dwelling floor area). The elements are divided into "Thermally massive" or "Thermally light" constructions. The layers given in Table 11a are those nearest the internal surface of the construction. Note there are only two mass categories for each element when using Table 11 compared to three mass categories when using Table S10 for existing dwellings.

The **thermal mass category** entered in DEAP has five options: low, medium-low, medium, medium-high or high. The category is determined using the following procedure as per DEAP Section 7.3 when using Table 11:

(1) First, each opaque element type of the dwelling (walls, ceilings, floors, both external/ exposed and internal) is classed as either 'thermally light' or 'thermally massive'

(2) The ratio of total area of thermally massive elements to total floor area, 'AmAf', is then determined. Where internal elements (e.g. intermediate floors or internal partitions) are thermally massive on both sides, both sides should be included.
(3) The thermal mass category of the dwelling is then obtained by locating the 'AmAf' ratio in Table 11 that is closest to the calculated one.

Window and door areas are considered to be thermally light. If, from the guidance given in Table 11a, an element appears borderline between thermally light and thermally massive, it may be assumed that half its area is light and half massive.

As an alternative way of determining whether an element is thermally light or massive, the internal heat capacity of the element may be calculated as described in EN ISO 13786. A result of 38 kJ/m^2 K or greater is considered 'thermally massive', and a lower result 'thermally light'."

4 Water Heating

The Audit team have encountered a number of assessment errors in the DEAP Water Heating entries.

4.1 Water storage volume

The examples below show how to calculate cylinder volume.

Example 1
The cylinder below has no label detailing the cylinder volume and is uninsulated. It is necessary to obtain measurements on site to obtain the cylinder volume.
The following measurements were obtained on site:

- Cylinder Total Height: 900mm
- Circumference: 1413mm

As per DEAP Table 2a note (b), the diameter of the cylinder can be obtained by dividing the circumference by pi (3.142). This gives a diameter of 450mm for the above cylinder. The volume of the cylinder in litres is then obtained by choosing the nearest height and diameter options from DEAP manual Table 2a. In this case the volume of the cylinder is 117 litres. Insulation thickness is not included in the height or diameter measurement.

In some cases, the cylinder or storage may be clearly much larger or much smaller than the values in Table 2a. In such instances, and in the absence of other information on labels or technical data based on relevant standards, the volume of a cylinder can be calculated as described in the April 2009 Technical Bulletin. We have updated the April 2009 bulletin to reference Table 2a in DEAP unless the cylinder is outside of the range of Table 2a. The volume is calculated as follows where

outside the Table 2a range and in the absence of documentary evidence:

$$V = (pi \times d^2/4) \times h / 1000$$

Where:

- d = diameter of the cylinder not including insulation thickness (cm)
- h = average height of the cylinder not including insulation thickness (cm)
- pi = 3.142
- V = volume of the cylinder (litres)

Note: When using the above formula the average height should be estimated.

For Enclosed Water Heaters:

For rectangular storage units, the water heater volume is calculated by recording the height, width and depth of the unit if the heater is cuboid or the above formula if cylindrical. The cuboid volume is as follows:

$$V = h \times d \times w \times 1000$$

Where:

- d = depth of unit (m) minus the insulation thickness as appropriate.
- h = height of unit (m) minus the insulation thickness as appropriate.
- w = width of unit (m) minus the insulation thickness as appropriate
- V = volume of the cylinder (litres)

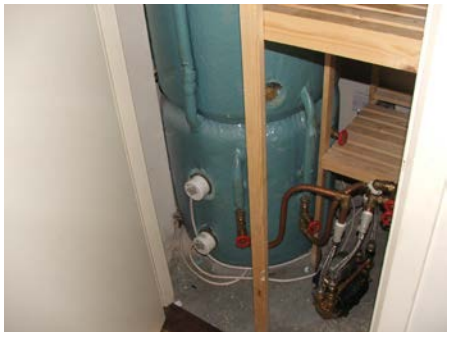
Example 2

The dimensions of the cylinder below measured on site were as follows:

- Circumference: 1630mm. The diameter is therefore 1630/pi = 518.8mm
- Total height: 1120mm.

The insulation thickness could not be determined on site. The cylinder was installed in 2008 as proven by a receipt from the installer. A default insulation thickness from DEAP manual Table S11 of 35mm (factory applied insulation) is applied to the cylinder. The cylinder diameter without the insulation is 518.8mm-70mm=448.8mm. The cylinder height without the insulation is 1120mm-70mm=1050mm. From DEAP manual Table 2a, the nearest height and diameter options are a diameter of 450mm and a height of 1050mm giving a cylinder volume of 140 litres.

Example 3
The cylinder below is a dual cylinder as is often used in apartments. The top half of the cylinder contains the Cold Water Storage Tank in this case. The bottom half of the cylinder contains the hot water storage and is identifiable by the immersions.



We are only concerned with the hot water storage cylinder for storage losses in DEAP. We only measure the diameter and height of the bottom hot water storage to determine the hot water cylinder volume in this instance. The total diameter of the cylinder = 500mm. An insulation thickness of 25mm was determined. Therefore the diameter of the cylinder without the insulation is 450mm. The total height of the hot water storage tank (bottom tank) was 700mm – 50mm(insulation thickness) = 650mm. From DEAP manual Table 2a, the nearest height and diameter options are a diameter of 450mm and a height of 675mm giving a cylinder volume of 84 litres.
Note for the examples above the hot water storage vessel volume may alternatively be determined from Agrement Certificates or a label on the vessel, **provided the label also references a European or national standard (such as BS1566 or IS161) or is CE Marked**. While labels can regularly be seen on hot water storage vessels they do not always reference relevant standard or CE mark.

Is hot water storage indoors or in group heating scheme?
Assessors must ensure that the hot water storage is correctly identified as being indoors, outdoors or part of a group heating scheme. This entry in DEAP affects the annual heat gains from the water heating system and thus affects the BER result. As the hot water storage is located inside the dwelling in this example, '**Yes'** must be selected for the above DEAP entry.

4.2 Primary Circuit Loss Type

The 'primary circuit loss type' in the Water Heating tab directly affects the hot water demand calculated in DEAP. This entry relates to heat loss between the main water heater and the hot water storage. Values for primary losses are obtained from DEAP Table 3.

For boiler (or heat pump) systems with separate hot water storage, primary losses are incurred in transferring heat from the boiler to the storage. For combi boilers the additional losses in Table 3a are included to allow for the draw-off of water until an adequate temperature is attained at the taps.

The primary pipework refers to the pipes between the main water heater (e.g. gas or oil boiler) and hot water storage. There will be a flow and return pipe from the primary water heater to the hot water storage. When specifying that the primary pipework is insulated, bear in mind that this refers to **all of the pipework between the primary water heater and the water storage**. Where some of the pipework is not visible (if for example it runs through walls or floors), it is assumed to be uninsulated unless it can be proven to be insulated. For guidance on supporting evidence see Section 4 of the Survey Guide.

The presence of a cylinder thermostat affects a number of DEAP entries as follows:

- Temperature factor multiplier – refer to DEAP manual Table 2.
- Primary circuit loss type. Refer to DEAP manual Table 3 and DEAP 9.3.7.
- Efficiency adjustment factor for both space and water heating if boiler interlock is present. Refer to DEAP manual section 9.3.9 and Appendix S11.
- Yield from solar water heating system.

When an Electric immersion is the main water heater the Primary circuit loss type is set to Electric Immersion. Technical Bulletin March 2009 deals with the other DEAP entries in this scenario.

4.3 Combi Boiler Entry

The helpdesk have received a number of queries on combi boilers. The Technical Bulletin January 2012 deals with identification of combi boilers and determining additional losses for instantaneous and storage combi boilers.
The examples below show how to populate the DEAP fields for both instantaneous and storage combi boilers.

Example 1 – Instantaneous combi boiler
The screen shot below shows the HARP listing for an instantaneous combi boiler.

Manufacturer: Immergas
Trade name: Immergas
Model name: Victrix 24kW -
First Manufactured: 2006
Last manufactured: Current
Efficiency band A

Seasonal efficiency(%):	90.6		
Efficiency category:	SEDBUK based on certified data	**SAP equation used:**	104
Output Power:	26 - 26 kW		
Main type:	Combi	**Fuel:**	Gas
Mounting:	Wall	**Exposure:**	Indoor only
	Condensing	**Flue:**	Room-sealed
Fan assistance:	Fan	**Run Time Indicator:**	True
Burner control:	Variable (Stepped or modulating)	**Ignition:**	No
Elec. power firing:	130W	**not firing:**	8 W
Store type:	NA	**Store loss in test:**	Unknown/Inapplicable
Separate store:		**Store volume:**	0 litres
Store insulation thickness:	0 mm	**Store insulation type:**	Unknown/Inapplicable
Store temperature:	NA/Unknown	**Store heat loss:**	NA/Unknown
"Keep-hot" facility:	NA	**"Keep-hot" timer:**	No Control
"Keep-hot" electric heater:	W		

Water storage losses are set to zero for instantaneous combi boilers. As they normally serve several outlets, they will have distribution losses. Where the combi boiler can supply domestic hot water separate to space heating, Supplementary electric water heating is set to 'No'.
There is no keep hot facility as detailed in the particular HARP lookup above. Some instantaneous combi boilers will have a keep hot facility.

- 'Combi boiler type ' = 'instantaneous without keep hot facility'
- 'Electric keep hot facility type' = 'None'.
- 'Primary circuit loss type' = 'Combi boiler'.

See DEAP entry below.

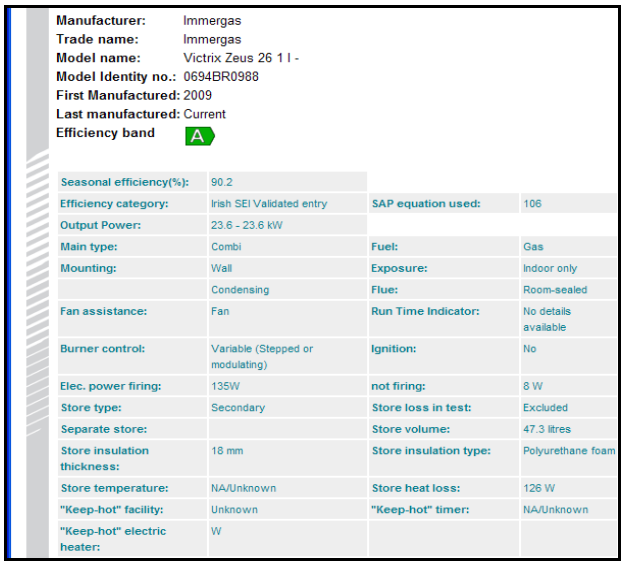
Combi-boiler

Combi-boiler type	Instantaneous, without keep-hot facility		
Electric keep hot facility type	None		
Additional loss for combi-boiler [kWh/y]	600	Electricity consumption of electric keep hot facility of combi boiler [kWh/y]	0.00

Storage loss and energy output

Storage loss [kWh/y]	0	Storage loss adjusted for dedicated solar storage [kWh/y]	0
Primary circuit loss type	Combi boiler		
Primary circuit loss [kWh/y]	0	Primary circuit loss adjusted for occupancy [kWh/y]	0
Output from main water heater [kWh/y]	3236	Heat gains from water heating system [W]	104

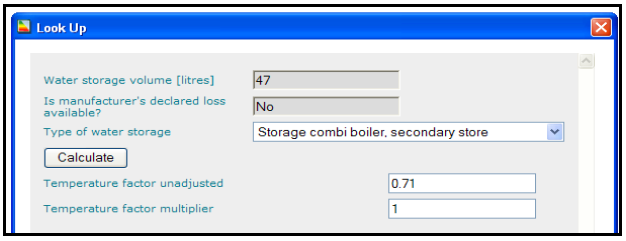
Example 2 – Storage combi boiler store volume <55litres.
The screen shot below shows the HARP listing combi boiler with store volume < 55 litres and > 15 litres. This volume implies that this is not an instantaneous combi boiler or CPSU – it is a storage combi boiler.



Manufacturer: Immergas
Trade name: Immergas
Model name: Victrix Zeus 26 1 I -
Model Identity no.: 0694BR0988
First Manufactured: 2009
Last manufactured: Current
Efficiency band A

Seasonal efficiency(%):	90.2		
Efficiency category:	Irish SEI Validated entry	SAP equation used:	106
Output Power:	23.6 - 23.6 kW		
Main type:	Combi	Fuel:	Gas
Mounting:	Wall	Exposure:	Indoor only
	Condensing	Flue:	Room-sealed
Fan assistance:	Fan	Run Time Indicator:	No details available
Burner control:	Variable (Stepped or modulating)	Ignition:	No
Elec. power firing:	135W	not firing:	8 W
Store type:	Secondary	Store loss in test:	Excluded
Separate store:		Store volume:	47.3 litres
Store insulation thickness:	18 mm	Store insulation type:	Polyurethane foam
Store temperature:	NA/Unknown	Store heat loss:	126 W
"Keep-hot" facility:	Unknown	"Keep-hot" timer:	NA/Unknown
"Keep-hot" electric heater:	W		

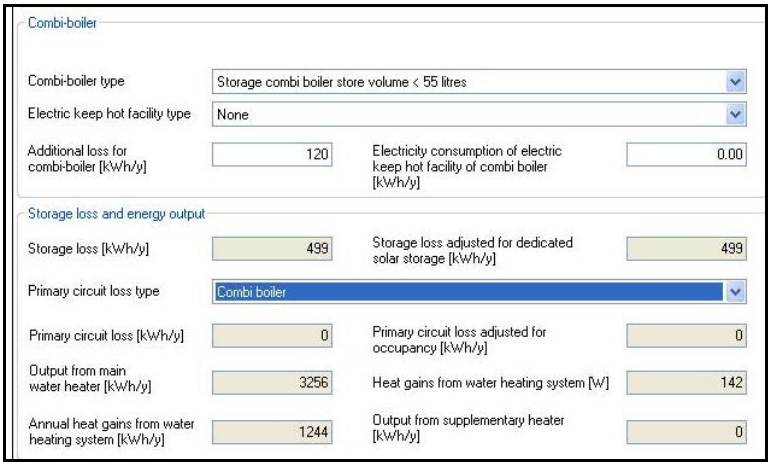
Water storage losses are set to 'Yes' for storage combi boilers. As they normally serve several outlets, they will have distribution losses. Where the combi boiler can supply domestic hot water separate to space heating, Supplementary electric water heating is set to 'No'.
When the unit is located indoors, 'Yes' is selected for 'Is hot water storage indoors or in group heating scheme?'
The store type is secondary, the store insulation is polyurethane foam and the store insulation thickness is 18mm from the above listing. Using the Table 2 lookup in DEAP for temperature factor, the following detail is applied to the DEAP entry:



The combi boiler type selected is Storage Combi boiler store volume <55litres. The store volume from HARP is 47.3 litres, rounded to 47 litres in DEAP.

As the volume is less than 55 litres (but greater than 15 litres) the additional loss is calculated by the Assessor for entry in DEAP as follows using DEAP Table 3a: Additional Loss = 600 – [(V-15) * 15]. This gives an Additional Loss of 120KWh/yr for the combi boiler. This is entered by the Assessor.

As there is no keep hot facility in storage combi boilers, 'None' is selected for electric keep hot facility type. The associated electricity consumption automatically derived by DEAP is zero as there is no keep-hot facility. 'Combi boiler' is selected for the primary circuit loss type. See DEAP entry below.



Note the Following:

- As per DEAP Section 4.2: For combi boilers, the storage loss factor is zero if the efficiency is taken from Table 4b. The loss is included for a storage combination boiler if its heating efficiency is based on certified data or is obtained from HARP, using the calculated hot water storage loss factor and volume on the 'Water Heating' tab and the temperature factor from Table 2. The insulation thickness and volume should be provided by the manufacturer or obtained from HARP.
- Always assume the more pessimistic option if information is not available. For example, if unsure about 'keep hot' on an instantaneous combi boiler, select YES to keep hot. Where it is unclear if a storage combi boiler has a primary or secondary store, assume primary store present.
- Boiler interlock can be achieved for combi boilers by fitting a room thermostat.
- If there is a keep hot facility present that operates by burning boiler fuel the "Electric keep hot facility type" entry is set to "None".

There is further detail on treatment of domestic hot water in DEAP in the following video.

5 Renewables in "renewable and energy saving technologies"

There have been a number of queries to the BER Helpdesk about renewable and energy saving technologies.
This section provides a method to allow for the benefits of new energy-saving technologies that are not included elsewhere in the DEAP software.

This method may only be used for technologies whose characteristics have been recognised as part of DEAP and described on the web page http://www.seai.ie/ber (or a web page linked to it).

In the DEAP software, in the 'Energy Requirements' tab, go to the 'Renewable and energy-saving technologies' sub-section, and enter the delivered energy produced or saved, and the delivered energy consumed by the technology. Then enter the primary energy and CO_2 factors for the energy produced or saved, and the energy consumed.

The technologies likely to be included in this section of DEAP are:

- Wind energy using micro-turbines (see Appendix M2);
- Space heating from solar thermal panels (see BER FAQ) and Technical Bulletin May 2011
- Flue gas heat recovery systems (these are not the same as ventilation heat recovery systems) with efficiency data from SAP Appendix Q. See also Technical Bulletin March 2011
- Photovoltaics (See Appendix M1).

This section does not include technologies already specifically dealt with in the DEAP methodology (such as ventilation heat recovery, solar thermal for hot water, CHP, heat pumps, wood fuel boilers).

Heat Pumps: Technical Bulletin Oct 2009 Section 1.3 contains a case study on how to populate DEAP for a Heat Pump. The renewable energy contribution is calculated automatically by the DEAP software in checking compliance with Part L of the Building Regulations. Technical Bulletin Jan 2011 Section 2 demonstrates how DEAP calculates the heat pump renewable contribution.

Energy from photovoltaic (PV) technology:
Photovoltaic technology converts sunlight into electricity. It works during daylight hours but more electricity is produced when the sunshine is more intense (a sunny day) and is striking the PV modules directly.

The energy produced per year depends on the installed peak power (kWp) of the PV module. The peak power corresponds to the rate of electricity generation in bright sunlight, formally defined as the output of the module under radiation of 1 kW/m^2 at 25°C.

Example:

A new dwelling is served by 12m^2 of photovoltaics installed on a South facing roof at an angle of 30^0 with no overshading. The installed peak power kWp as verified from CE Marked document referencing IS EN 61215 is 0.08 kWp/m^2or 0.96kWp in total.

The electricity produced by the PV module in kWh/year is

0.80 x kWp x S x Z_{PV} (M1) = 0.80 x 0.96 x 1074 x 1 = 825 kWh/year

where S is the annual solar radiation from Table H2 (depending on orientation and pitch), and Z_{PV} is the overshading factor from Table H3. If there are two PV modules, e.g. at different tilt or orientation, apply equation (M1) to each and sum the annual electricity generation.
Enter the calculated energy produced by PV in the 'Energy produced or saved' input cell in the 'Fuel Data' section of the 'Energy Requirements' tab. The delivered energy is acceptable as renewable (electrical) energy for TGD L conformance. This is similar to the method applied to Wind Turbines in Section 6 of the March 2011 Technical Bulletin.

For calculation of CO_2 emissions and primary energy savings, the current published factors for electricity from the BER FAQ are used. The same factor is used for all electricity generated on site and connected to the dwelling, whether used within the dwelling or exported.

See DEAP entries below:

Renewable and energy saving technologies

	Technology/Comment	Type	Part L total contribution [kWh/y]	Delivered energy [kWh/y]	Primary energy conversion factor	CO_2 emission factor [kg/kWh]
Renewable energy 1						
Energy produced or saved	Photovoltaic	Renewable Electrical	825	825	2.45	0.555
Energy consumed	None			0.000	0.00	0.000

BER Assessors – Dwellings Technical Bulletin #26

Issue No. 2/14 **December 2014**

Contents:

1 Maximum EPC and CPC for Part L 2011 in DEAP

BER assessors must check that the dwelling complies with certain sections of Part L for new-final and new-provisional BERs. The calculated Energy Performance Coefficient (EPC) and Carbon Performance Coefficient (CPC) should not exceed the Maximum Permitted Energy Performance Coefficient (MPEPC) and the Maximum Permitted Carbon Performance Coefficient (MPCPC). The MPEPC is 0.4, meaning that the dwelling's calculated energy usage must be no more than 40% of the TGD L Appendix C reference dwelling EPC. Likewise, the dwelling's calculated CO_2 emissions must be no more than 46% (the MPCPC) of the TGD L Appendix C reference dwelling CPC. A BER cert may be published for new dwellings regardless of whether or not the building meets Part L requirements. However, the BER Assessor is required, under the Code of Practice for BER Assessors to notify their client in writing which elements of the dwelling design do not comply with Part L as calculated in DEAP.

SEAI has published a FAQ to assist DEAP users demonstrate compliance with Building Regulations Part L 2011 energy and CO_2 requirements for new dwellings. The FAQ is published here.

SEAI may share the contents of potentially Part L non-compliant BER Records with the relevant Building Control Authority.

2 Energy Requirements

2.1 Heating System Efficiency

The Audit team have encountered a number of issues in BER assessments related to the selection of primary and secondary heating systems and their associated efficiencies.

DEAP assumes that the dwelling has heating system(s) capable of heating the entire dwelling. Calculations are on the basis of a main heating system and secondary heaters as described in Appendix A. This Appendix also covers whether secondary heating is to be specified in DEAP. The apportionment of heat supplied from the main and secondary systems is given in Table 7.

As detailed in DEAP Manual Section 9, gross seasonal boiler efficiency can be taken from any one of the following sources:

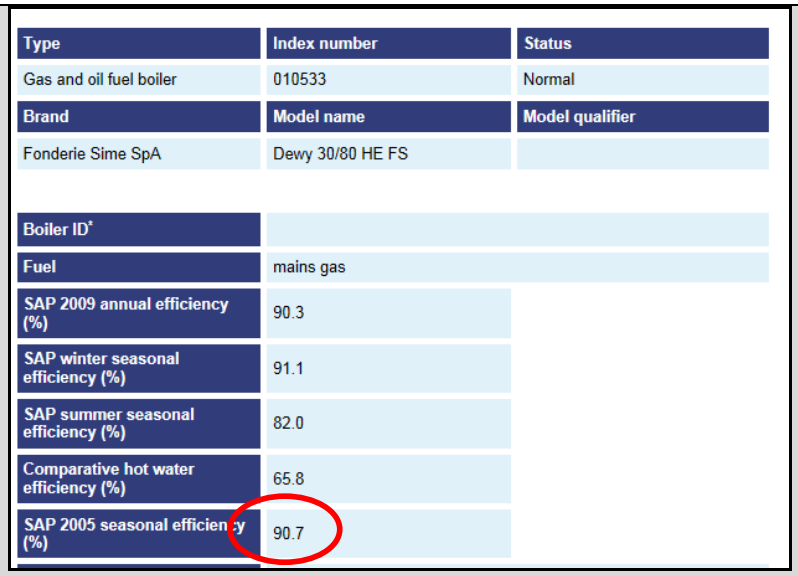
- HARP database (www.seai.ie/harp) - this is the preferred option;
- SEDBUK database - Please note SEDBUK boiler data is now located at the Products Characteristics Database website. When referencing the boiler efficiency data from this website, the SAP 2005 seasonal efficiency data must be used in DEAP;
- Certified test data. Follow guidance in Appendix D/J/E/G of the DEAP manual to convert to gross seasonal efficiency for use in DEAP;
- Defaults in Table 4a and Table 4b in the DEAP manual.

Example: Converting to Gross Efficiency
(See October 2011 Bulletin Section 5 for more examples)

- Test certificate for wood fuel stove: net efficiency 77.2%.
- Stove warranty states that only wood fuel may be used in the appliance.
- The efficiency used in DEAP is given by:
  Gross efficiency = 77.2 x 0.91 = 70.25%.

Example: Using SEDBUK 2005 data

The screenshot below is a sample from the SEDBUK Products Characteristics Database.



Type	Index number	Status
Gas and oil fuel boiler	010533	Normal
Brand	**Model name**	**Model qualifier**
Fonderie Sime SpA	Dewy 30/80 HE FS	

Boiler ID*	
Fuel	mains gas
SAP 2009 annual efficiency (%)	90.3
SAP winter seasonal efficiency (%)	91.1
SAP summer seasonal efficiency (%)	82.0
Comparative hot water efficiency (%)	65.8
SAP 2005 seasonal efficiency (%)	90.7

Efficiency used in DEAP from "SAP 2005 Seasonal Efficiency" = 90.7%

Where an appliance does not have the exact same name as an appliance on HARP/SEDBUK/certified data or the full name is not visible on the appliance, HARP/SEDBUK/certified data can be used if one of the following is available and **clearly** equates the appliance in the dwelling to a HARP/SEDBUK/certified data entry:

- Appliance installation manuals or instruction manuals;
- Statement on printed letterhead (in softcopy or hardcopy) from one of:
  - appliance manufacturer;
  - appliance supplier;
  - service engineer or maintenance firm.

Secondary heating system efficiencies are taken from the HARP database, certified data or defaulted based on DEAP Tables 4a and 4b.

Selection of fuel types for solid fuel appliances is detailed in DEAP Manual Section 10.3.3. This method applies to both secondary and primary solid fuel heating systems. Section 2.2 of the February 2014 Technical Bulletin shows examples of fuel type identification in DEAP.

Notes: Smokeless coal areas are detailed on the Department of Environment, Community and Local Government (DECLG) website here. These areas are also referred to as areas in which the sale of bituminous coal is banned. Individual Local Authorities may have further details. Section 1.3 of the October 2012 Technical Bulletin details how the EPA website is used to identify smokeless coal areas.

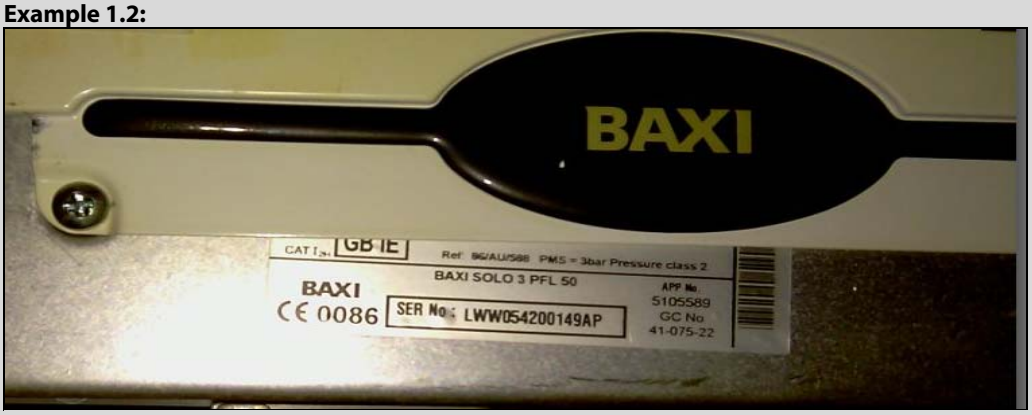
Example 1

The Audit team have encountered a number of errors related to the incorrect use of boiler efficiency data from the HARP database in DEAP Assessments. These examples deal with the correct identification of boiler efficiency on the basis of the evidence available.

Example 1.1:

The oil boiler recorded on site had no visible make or model number. There is no brochure or user manual available. It was determined that the house was built in 1997. As there is no further evidence available it is necessary to use the default efficiency from DEAP Manual Table 4b for a standard oil boiler 1985 to 1997 of 70%.

Example 1.2:



Manufacturer: Baxi UK
Trade name: Baxi
Model name: Solo 3 PFL - 50
Model qualifier: 50
Model Identity no.: GC No. 41-075-22
First Manufactured: 2001
Last manufactured: 2010
Efficiency band D

Seasonal efficiency(%):	78.0		
Efficiency category:	SEDBUK based on certified data	SAP equation used:	101
Output Power:	18.3 - 18.3 kW		
Main type:	Regular	Fuel:	Gas
Mounting:	Wall	Exposure:	Indoor only
	Non-condensing	Flue:	Room-sealed
Fan assistance:	Fan	Run Time Indicator:	No details available
Burner control:	On-off	Ignition:	No
Elec. power firing:	W	not firing:	W
Store type:	NA	Store loss in test:	Unknown/Inapplicable
Separate store:	Included	Store volume:	0 litres

A Baxi Solo 3 PFL 50 Mains Gas boiler with GC no. 41-075-22 was identified on site on a data plate on the boiler's external casing. This gas boiler has an efficiency of 78% on the HARP database as shown.

Example 2
The main heating system in a semi-detached dwelling built in 1999 is a Sirrus Radiant Combi gas boiler with automatic ignition. There is a condensate drain[a] from the boiler indicating the type of boiler as a condensing boiler. The boiler has a flow and return pipe for space heating as well as a mains water inlet and DHW outlet as you would expect for a combi boiler. The boiler is fuelled by Mains Gas and is wall hung. The boiler provides all space heating to all habitable rooms as well as water heating. There is no detail available on the model type of the boiler. There is a two channel programmer controlling both water and space heating. There are no fixed secondary heaters in place.

As there are no other details available on the type of gas boiler a default efficiency of 83% for "*condensing (including combi) boilers with automatic ignition*" is applied to the gas boiler (1998 or later) from DEAP Manual Table 4b.

The following data entry applies for DEAP:

Heating System	**Heating System Type**	**Fuel Type**
Main Space Heating System	Condensing Gas Combi Boiler	Mains Gas
Secondary Space Heating System	None	None
Main Water Heating System	Condensing Gas Combi Boiler	Mains Gas
Supplementary Water Heating System	None	None

As there are no fixed secondary heaters in place and all habitable rooms are heated by the main space heating system 'None' is selected for the Secondary Space Heating System. There is separate zoned time control (DHW separate from space heating). Therefore "None" is selected for Supplementary Electric Water Heating. See Section 4.6 of the DEAP manual for further guidance on Supplementary Water Heating. See Technical Bulletins January 2012 and February 2014 for further detail on combi boiler data entry in DEAP.

Example 3:
A single storey dwelling built in 1930 located in Dublin has five habitable rooms with the following:

- 1 single burner dry heat range cooker in kitchen/diner with a discrete seating area.
- 1 open fire in living room
- 1 open fire in one bedroom
- 2 bedrooms not heated

There are no radiators in the house. There is no water heating system in the house.

Note: Single burner dry heat range cooker: DEAP Manual Appendix B Section 4.3 specifies this type as an appliance with a single burner that provides a cooking function.
It is not included in DEAP calculations[b]. The kitchen/diner is therefore assumed to be unheated.

The DEAP methodology assumes that a good standard of heating is achieved throughout the dwelling.

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[a]  Sample image of condensate drain on a gas boiler.

[b] Ranges without a back boiler to space heating are not assumed to provide space heating in DEAP. In cases where a solid fuel range provides space or water heating (e.g. to radiators or cylinder), use the defaults for **ranges** rather than closed room heaters as detailed in DEAP Manual Table 4a 'Solid Fuel Boilers' when using defaults.

For dwellings in which the heating system is not capable of providing the standard, it is assumed that the additional heating is provided by electric heaters as detailed in DEAP Appendix A[c]. For new dwellings that have no heating system specified, DEAP assumes that all heat is provided by electric heaters. See A2 and A3 in the DEAP manual for full details of how to assess an unheated, partly heated or fully heated dwelling.

In the case above, of the 5 habitable rooms 40% are heated by an open fire room heater, 60% are unheated. As per DEAP Manual A3.2 – 'If the number of habitable rooms actually heated is more than 25% but not exceeding 50%, and there is one type of heater installed, this heating system is the primary and the (assumed) electric heaters are the secondary. Where there is more than one type of heater installed in this case, Sections A1 and A2 apply when identifying the primary and secondary space heating systems'.

The following data entry therefore applies for DEAP:

Heating System	**Heating System Type**	**Fuel Type**
Main Space Heating System	Open fire	Manufactured Smokeless Fuel
Secondary Space Heating System	Electric Room Heater (assumed)	Electricity
Main Water Heating System	Electricity	Electricity
Supplementary Water Heating System	None	None

Where a dwelling has no water heating system present, direct electric water heating is assumed to meet the hot water demand. In this case supplementary electric water heating is not specified as the main water heating is an electrical heat source. If there is no cylinder present then hot water storage losses are not specified.
Note: If 60% of the habitable rooms were heated by fixed heating systems, additional electric heating would not be assumed as the secondary heater as detailed in DEAP A3.2.

2.2 Flueless Appliances

The Audit team have encountered a number of issues in BER assessments related to flueless appliances.

DEAP uses the number of chimneys, extract fans, open flues, passive or background vents and flueless combustion room heaters to determine the contribution to overall air change rate from individual ventilation openings and fans.

When considering ventilation openings in the same room as a chimney, open flue or flueless appliance, DEAP Manual Section 2 says: **"The specified ventilation rate for chimneys, flues and flueless appliances includes an allowance for the associated permanent vent for air supply, so this vent should not be entered separately".**

For flueless combustion devices such as flueless gas fires, for health and safety reasons, it is required that both a high level and low level permanent vent are installed to ensure the supply of oxygen for combustion and to dispose of the resultant fumes and water vapour. The 40m^3/hr in DEAP Table 2.1 for flueless appliances includes an allowance for these permanent vents.

A flueless appliance does not have a flue to exhaust combustion gasses to the exterior. This type of appliance releases all the combustion products directly into the room it is heating.

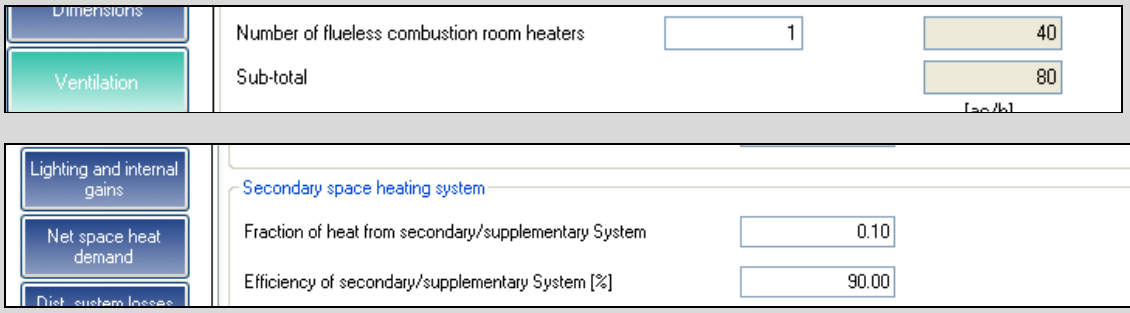
[c] For highly insulated inadequately heated small dwellings refer to DEAP Manual Section A3.3

Example:

An Assessor identifies the following appliance as the secondary heating system in a dwelling:


- There are no chimneys in the house.
- There is a false fireplace where the gas heater is installed.
- There are two permanent wall vents in the room with the gas heater
- The appliance is identified as "inset flueless" on site.

The appliance is therefore a flueless gas heater. The appliance is not listed on the HARP database. A default efficiency of 90% from Table 4a is therefore entered in DEAP for the secondary heating system. See DEAP entries below:

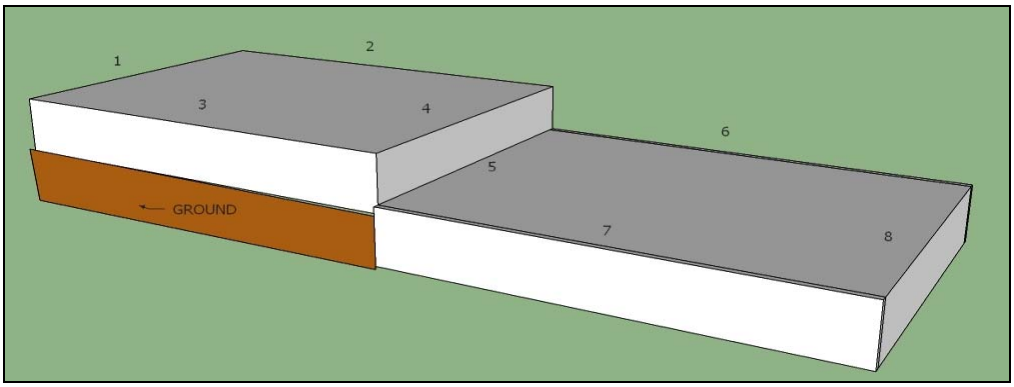


3 Building Elements

3.1 Split Level Dwellings

The Helpdesk have encountered a number of queries relating to split level dwellings. These queries generally relate to evaluation of heat loss floors and walls as well as the application of guidance for partially underground basements in the case of split level dwellings. This article details relevant DEAP guidance for split level dwellings.

The diagram shows a basic layout of a split level floor slab in an existing dwelling. The entire floor area of the dwelling is shown. Both floors bounded by perimeter "1234" and bounded by perimeter "5678" are solid and the entire dwelling is heated. There are steps down from floor "1234" to floor "5678".



The vertical section (bounded by "4,5") exposed to the exterior is entered as a wall in DEAP.

For the floor "5678" and any of the wall exposed to external ground (bounded by "4,5"), refer to heated basements guidance in the Table S8 footnote in the DEAP manual. This is elaborated in the August 2010 technical bulletin "Heated Basement Partially Underground" - see figure 1.3 and figure 1.4, August 2010. The method used depends on the average depth of the room below ground being <1.2m or >=1.2m. Follow the August 2010 Technical Bulletin for the correct approach for the wall "4,5" and floor "5678" in both of these scenarios.

Regarding the exposed perimeter for the floor "5678", as stated on the footnote to Table S8 of the DEAP manual:
For P/A ratio of the basement for default U-value calculation:

- Perimeter is the basement floor perimeter (this is 5+6+7+8 in the diagram).
- Area for P/A ratio calculation is the basement floor area.

The face of the step down is considered a wall exposed to the external ground and the base of that wall, "5" is included within the exposed perimeter calculation for the lower floor "5678".

For the upper solid floor "1234", as side 4 is adjacent to a heated room (i.e. the volume above floor "5678" is heated) then the exposed perimeter for the upper floor is 1+2+3.

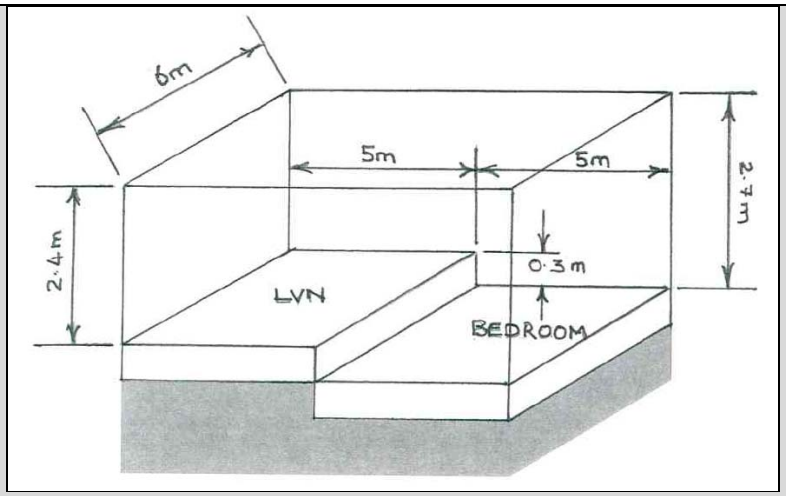
Example

Take a simple example where a detached single storey dwelling has two rooms; a living room and a bedroom. The dwelling was built in 1985 and has a cavity wall construction and solid ground floor. There is a 0.3m step from the living area to the bedroom. Both rooms are heated. The area of opes in the dwelling is 12.5m^2. In dealing with the bedroom refer to the August 2010 technical bulletin "Heated Basement Partially Underground" as outlined above. Default U-values are being used.

In cases where some of a basement's outer walls are below ground, and some are above ground, calculate the average basement depth below the external ground level. The average basement depth is weighted by the wall length.

The bedroom is partially below ground.
The floor slab and dimensions of the basement (bedroom) walls are shown in the diagram below:

- back wall adjoining living room= 6m wide * 2.7m high (0.3m below ground)
- front wall (to the right hand side in the diagram) = 6m wide * 2.7m high (0m below ground)
- each side wall= 5m wide * 2.7m high (0m below ground)



So, the depths below ground of the walls surrounding the **bedroom** are as follows. These are used in deriving average basement depth below ground.

- Back wall adjoining living room is 6m across with a depth of 0.3m below ground.
- The front wall (to the right hand side of the diagram above) is 6m across and is 0m below ground.
- Each of the side walls are 5m across and are 0m below ground.

The following data entry applies for DEAP based on the average depth of the walls below ground:

$$\textit{Average Basement Depth} = \frac{(6*0.3)+(5*0)+(5*0)+(6*0)}{6+6+5+5} = 0.082\text{m}$$

As the average basement depth below ground < 1.2m then:

- the basement floor is considered to be a solid ground floor for the purposes of determining its default U-value
- all basement walls are entered as walls in DEAP using the default wall U-values

Gross Wall Area = (2.4*6) + (2.4*5*2) + (2.7*6) + (2.7*5*2) + (6*0.3) = 83.4m^2
Net Wall Area = 83.4 – 12.5 (opes) = 70.9m^2

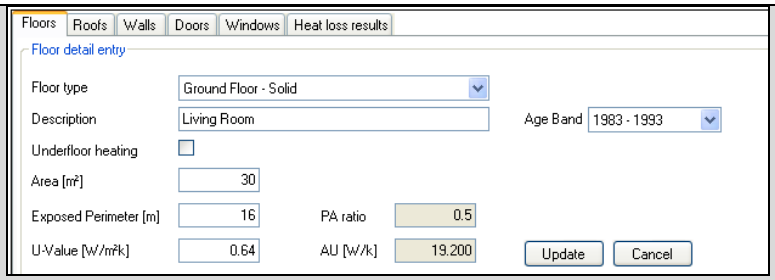
This is entered in DEAP as follows:

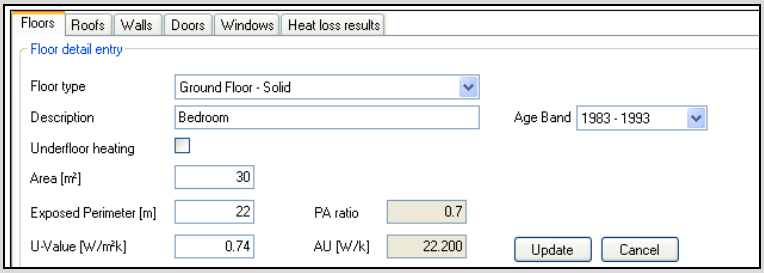
Delete	Copy	Wall Type	Wall Description	Age Band	Wall is semi-exposed	Area m²	U-Value [W/m²K]	AU Value [W/K]
X		300mm Cavity	Exposed Wall Area	1983 - 1993	NO	70.9	0.60	42.54

Floor area Living Room = 5*6 = 30m^2
Exposed Perimeter Living Room = 5+6+5 = 16m[d]
Floor area Bedroom = 5*6 = 30m^2
Exposed Perimeter Bedroom = 5+6+5 +6 = 22m[e]

These are entered in DEAP as follows:

[d] Exposed perimeter of the living area section. This does not include the perimeter of the wall between the living room and bedroom as both rooms are within the heated section of the dwelling and this is not exposed to ground when viewed from the living room.
[e] Exposed perimeter of the bedroom area section, the face of the step down is an exposed wall and so the base of that wall is included within the perimeter calculation.



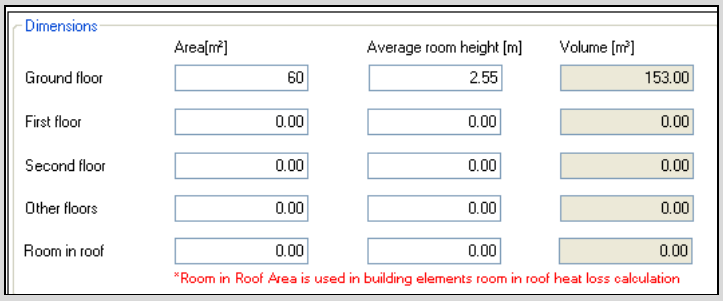


In accordance with DEAP Manual 'Dwelling Dimensions', **storey height** is the total height between the ceiling surface of a given storey and the ceiling surface of the storey below. For a single storey dwelling (including single storey apartments), or the lowest floor of a dwelling with more than one storey, the measurement should be from floor surface up to ceiling surface. In cases where the storey height varies in a single floor, the area weighted average storey height should be used.

$$Average\ Storey\ Height = \frac{(5 \times 6 \times 2.4) + (5 \times 6 \times 2.7)}{(10 \times 6)} = 2.55\text{m}$$

Refer to Technical Bulletin August 2010 Section 5 for guidance on calculating Average Storey Heights.

This is entered in DEAP as follows:



3.2 Data Entry for Wall, Floor and Roof Areas

The Audit team have encountered a number of issues in BER assessments related to incomplete sketches and calculations for walls, roofs and floors. This article addresses these issues as well as providing guidance on the heat loss elements included in calculations along with identifying the age band used in DEAP.

All calculations, sketches, photos and survey forms as related to a published BER, must be kept on file by the Assessor as outlined in the Code of Practice.

There is further guidance on the DEAP survey and sketches in the February 2014 Technical Bulletin and in the following video.

The example below addresses these issues.

Example:
The house being assessed is a bungalow built in 1990. The room in roof was converted from an uninhabitable attic to a habitable space circa the year 2000 according to the homeowner, however there is no evidence on site to support this. The room in roof is accessible via a fixed staircase, is heated and contains two bedrooms. There is no access to the unheated spaces to the side or top of the room in roof. Other parameters of the dwelling are as follows:

- A 300mm cavity wall with partial fill insulation as built.
- The floors of the main dwelling are solid.
- The average storey height of the ground floor is 2.4m.
- The external window area on the ground floor is 20m^2 (this does not include the porch windows).
- There are 4 roof windows (double glazed, air filled 12mm gap) on the pitched roof insulated on rafter with a total area of 3.88m^2. These are located on the north facing roof.
- The porch at the entrance to the dwelling is unheated and there is a solid internal door between the porch and the main dwelling of area 1.85m^2.

See the survey sketches below. Figure 1 shows the insulated envelope of the room in roof. Figure 2 shows the dimensional sketches of same.

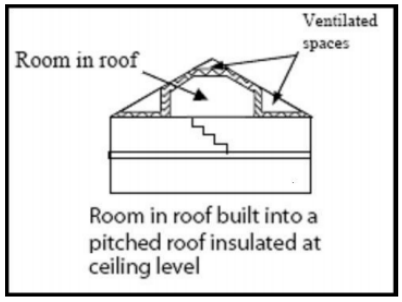


Figure 1

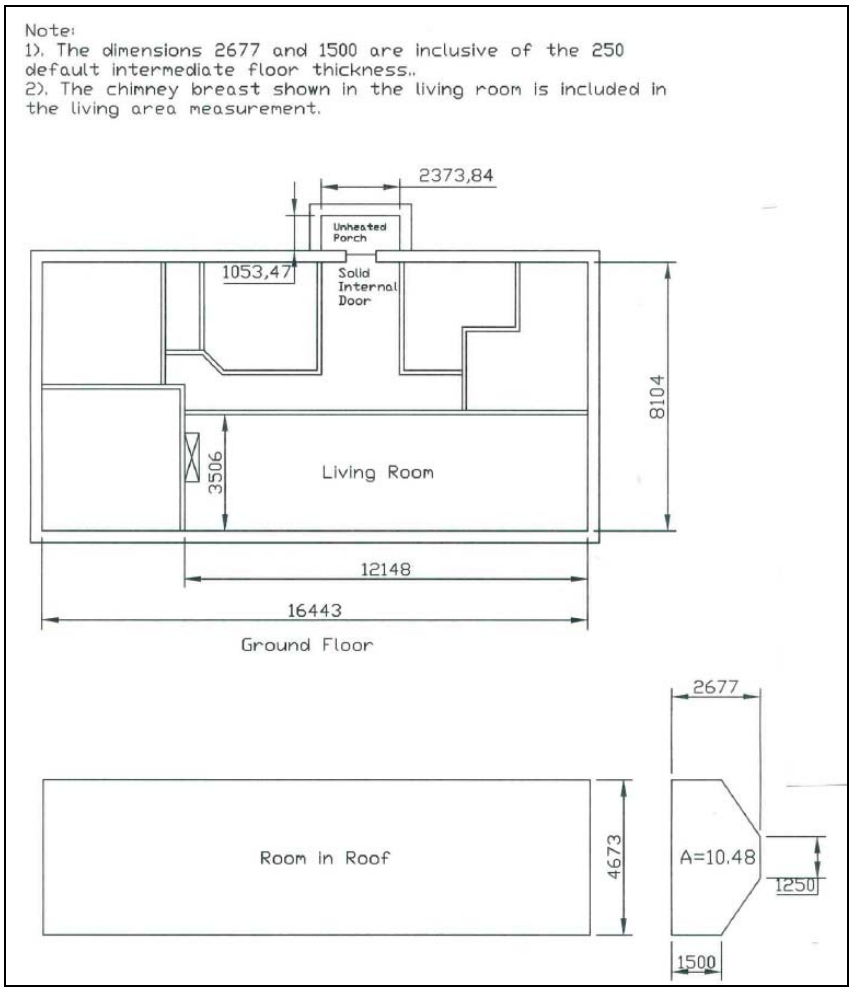


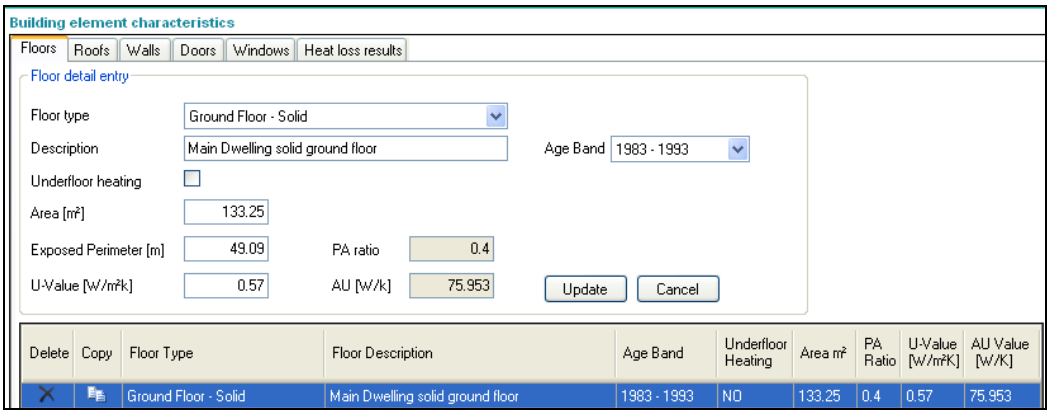
Figure 2

***Floor Area*:** Section 1 of the DEAP Manual describes which areas of a dwelling should and should not be accounted for under the dimensions tab in DEAP within the "floor area". A number of previous technical bulletins provide further details supplementary to that in Section 1 of the DEAP manual. See Technical Bulletins October 2012 Section 6 and February 2014 Section 3.2 for further guidance on floor area calculations in DEAP.

A porch is a dwelling entrance lobby protruding from the line of the external wall of the dwelling. As this porch is protruding entirely from the line of the external wall of the dwelling, is unheated and there is a separating door to the dwelling it is not included in the dwelling measurements. This porch is not considered a draught lobby as it does not have a minimum depth of at least 1.2m and hence does not satisfy the criteria for a draught lobby specified in Section 2.4 of the DEAP Manual. The floor area dimensions are calculated as follows:

- **Ground Floor :** (16.443*8.104) = 133.25m^2 with ceiling height 2.4m
- **Exposed Perimeter(P):** = 16.443+8.104+16.443+8.104 = 49.094m

See below for Floor Area entries completed:

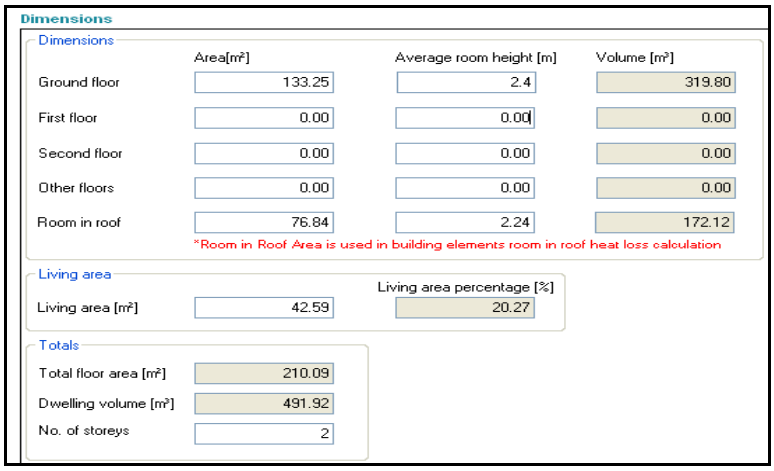


***Dimensions**:* As per Section 1 of the DEAP manual, **dimensions** refer to the inner surfaces of the elements bounding the dwelling. Thus floor dimensions are obtained by measuring between the inner surfaces of the external or party walls, disregarding the presence of any internal walls.
As the room in roof is habitable and is accessed by a fixed staircase it is included in the dwelling floor area.
For existing dwellings, DEAP gives the option to automatically calculate the total exposed area and default U-value of the room in roof's heat loss surfaces. The automatically calculated area is an approximation of the total area "**Arr"** of the heat loss roof and wall sections of the room in roof as described in Appendix S6.2 of the DEAP manual. Account for the heat loss area "**Crr"** of the ceiling of the storey below separately (ceiling below exposed to the ventilated crawl-spaces). This room in roof approximation is used for the DEAP entries. Technical Bulletin April 2012 Section 2.4 gives further guidance on room in roof data entry in DEAP. Refer to diagrams in DEAP manual Section S6.2 for room in roof examples.
The dwelling dimensions are calculated as follows when using the room in roof approximation:

- **First Floor / Room in Roof floor area (Frr):** (16.443*4.673) = 76.84m^2
- **Room in Roof 'Average Storey Height':** (10.48*16.443) / 76.84 = 2.24m[f]. The 0.25m floor thickness default is taken from Section S4 of the DEAP manual and is already included in the room height, wall height and area measurements detailed on the drawing.
- **Living Area:** (12.148*3.506) = 42.59m^2
  The living area is the largest public room (irrespective of usage by occupants), added to all rooms not separated from that room, and including cupboards directly accessed from that room. Bay windows, chimney breasts and other small areas within the living room area must be included in the living room area measurement.

The dimensions tab is completed in DEAP as follows:

[f] 10.48 is the cross sectional area. The room volume is the cross sectional area multiplied by the length of the room. Divide volume by Frr to get the average room height.



***Wall Area**:* The external wall has a partial fill cavity as built and its area is calculated as follows:

	Cavity Wall–Main Dwelling
Gross Wall Area	49.094(P) x 2.4(Ground floor height)m^2 = 117.83 m^2
Opes	21.85m^2(Ground floor windows and doors)
Net Wall Area	95.98m^2

Note: The gable wall in the room in roof is included in the room in roof approximation Arr value and is not added separately under the cavity wall area. The area of wall semi exposed to the porch is subsumed within the larger main dwelling wall area.[g]

The wall area is entered in DEAP as follows:

Delete	Copy	Wall Type	Wall Description	Age Band	Wall is semi-exposed	Area m²	U-Value [W/m²K]	AU Value [W/K]
X		300mm Cavity	Main Dwelling - partial fill cavity wall as built	1983 - 1993	NO	95.98	0.60	57.59

***Roof Area**:* The room in roof approximation is used for the roof data entry in DEAP in this assessment. Technical Bulletin April 2012 Section 2.4 gives further guidance on room in roof data entry in DEAP. To account for the room in roof in this existing dwelling using default U-values and the automated room in roof approximation in DEAP:

- Take a room in roof with floor area Frr, where Frr is part of a ceiling of the storey below of area Crr. **Frr = 76.84m^2**
- Determine the heat loss ceiling area of the storey below (not including the room in roof area)[h]. This is entered under "roofs" in building elements with area (Crr - Frr).
  Crr – Frr = 133.25(ground floor area) – 76.84 = 56.41m^2
- Frr is entered under the dimensions tab in DEAP as a room in roof floor area, along with average height of the room in roof as shown above.
- Under building elements (roofs), select "room in roof insulated on side":
- Use the default U-value listed on this tab (without using an "Ru" adjustment).
- The automatically calculated area, Arr, includes all heat loss walls and roof sections in the room in roof. Openings are not subtracted from Arr as it is an approximate value. Windows in the room in roof must still be entered in the "windows" tab under the "building elements" section of the software.

[g] In accordance with DEAP manual Section S4 where a specific floor, wall or roof area within a dwelling represents less than 10% of the respective total floor, wall, or roof area of the dwelling, then the differences in construction or U-value can be ignored, and the smaller area subsumed within the larger area.

[h] The heat loss area of the storey below has a ventilated unheated space above it.

There is no information other than the homeowner knowledge to substantiate the date the room in roof was converted. It is defaulted to the same age as the original dwelling. Technical Bulletins July 2009, October 2009 and The DEAP Survey Guide give guidelines on determining the original dwelling age and the age of any material change such as a room in roof conversion.

The above areas are entered in DEAP as follows:

Dele	Copy	Roof Type	Roof Description	Age Band	Insulation Thickness	Area m²	U-Value [W/m²K]	AU Value [W/K]
X		Pitched Roof - Insulated on C...	Heat loss ceiling of ground floor (Crr-Frr)	1983 - 1993	Unknown	56.41	0.49	27.641
X		Room in Roof - Insulated on s...	Autocalculated from RIR floor area and avg ht. entry in dims	1983 - 1993	Unknown	155.57	0.49	76.229

Roof windows:
Windows in the room in roof are entered separately in DEAP and are not subtracted from the automatically calculated area as it is an approximation. There are only two possible orientations in DEAP for roof windows (North and Horizontal). The windows in this example are north facing. The U-value and solar transmittance are taken from Table 6a and Table 6b in this assessment. See windows FAQ here for further guidance on window default data entry in DEAP.

See below for Roof Window DEAP entry:

Delete	Copy	Glazing area description	Glazing type	Orientation	Area m²	U-Value [W/m²K]	Adj. U-Value [W/m²K]	Solar Transmittance	Frame Factor
X		Roof windows	Double-glazed, air filled	North	3.88	2.8	2.679	0.760	0.700

Solid Internal Door:
The solid internal front door is semi-exposed to the porch. A U value of **1.71W/m²K** is readily available from DEAP Manual Table 6a 'Solid door between house and an unheated space (semi-exposed)' for this door type.

See below for Semi Exposed Door DEAP entry:

Delete	Copy	Number of Doors	Door Description	Area m²	U-Value [W/m²K]	AU Value [W/K]
X		1	Solid internal front door	1.85	1.71	3.16

3.3 Wall U-values

The Audit team have encountered a number of issues related to U-value calculations for retrofitted cavity walls. This article demonstrates how to calculate the U-value of a retrofitted cavity wall and the necessary information required by the BER Assessor to substantiate the U-value calculation.
Previous guidance provided detail on specification of non-default U-values in DEAP assessments. The DEAP manual (Section 3) and The DEAP Survey Guide detail how insulation properties are substantiated and how supporting U-values are calculated. In addition, further guidance on wall U-value calculation is detailed in the Technical Bulletins April 2009 ',Building Elements - Wall and Roof U-Value Calculation' January 2011, Section 8 and October 2011, Section 3. Examples of inadequate substantiation of non default U-values are given in the table below. Examples 1 and 2 demonstrate the use of non-default U-values in BER assessments and the procedure to be followed for same.

The procedures for Existing and New Final BER assessments require that BER Assessors carry out a full building survey to collate and verify data for assessment before publishing the BER.

Issue	Non Compliance detail	Correct U-value detail
The thermal conductivity value used to calculate the U-value of the retrofitted wall is not the same as the NSAI Agrément Board certificate value.	The insulation contractor certificate states a thermal conductivity of 0.033W/mK and references NSAI certificate 06/0168. The NSAI cert states a thermal conductivity of 0.035W/mK.	Either the NSAI cert number is incorrect or the incorrect thermal conductivity has been used in the U-value calculation. In light of no further evidence the correct thermal conductivity of 0.035W/mK from the NSAI certificate is used.
A U-value of 0.29W/m²K has been entered in DEAP by the Assessor based on contractor input to the Declaration of Works form for cavity fill insulation under the Better Energy Homes Scheme.	No Assessor U-value calculation provided or evidence to specify the exact insulation type, thickness and certified evidence of thermal conductivity. In line with DEAP methodology a contractor's statement of U-value is not acceptable alone but must be accompanied by full calculations (Technical Bulletin January 2011).	In the absence of acceptable documentary evidence, the U-value defaults to filled cavity value of 0.6W/m²K (this reflects the construction age of the dwelling) based on guidance in Manual and Technical Bulletin October 2011.

Example 1:
A BER is required for an existing dwelling built in 1963 in which the walls have been retrofitted with external wall insulation. The original wall makeup is unknown. The contractor has provided supplier invoices with the following information:

- Address of the dwelling to which the material was supplied.
- The area (m²)of material supplied.
- The insulation type and thickness.
- The IAB Cert number of the insulation installed in the house.

The Assessor determined on site that the wall area insulated and thickness of insulation matches that specified by the contractor.

In order to calculate the U-value of the wall after insulation upgrade works, the default U-value of the original wall is taken from Table S3, as insufficient information is available to calculate the U-value in full. For an unknown wall type built in 1963 (age band D) this is 2.1W/m²K. The thermal resistance is therefore 0.4762 m²KW(1/2.1). The contractor has specified that 100mm insulation has been added to the original wall. IAB Cert number 10/0347 has been specified by the contractor for the insulation material used. The insulation type specified by the contractor is Graphite Enhanced EPS. The IAB Cert for the material shows a thermal conductivity of 0.031W/mK.

The U-value is calculated as follows:

Layer	Thickness(mm)	Thermal conductivity (W/mK)	Thermal Resistance (m²K/W)
Original Wall	-	-	0.4762
Insulation	100	0.031	3.2258
		Total Thermal Resistance (m²K/W) =	**3.7020**
		Wall U-value (W/m²K) =	**0.27**

Example 2:
A BER is required for an existing dwelling built in 1995 in which the walls have been retrofitted with cavity fill insulation. An architect's report is available providing detail of the original wall makeup enabling a full U-value to be calculated:
Cavity wall with:
• 100mm concrete block inner leaf and 100mm brick outer leaf;
• 100mm gap between inner and outer leaf partially-filled with 50mm of polystyrene insulation;
• 13mm skim plaster internal finish.
The walls have been retrofitted with cavity fill insulation:
• 50mm Cavity Wall Insulation (Certified thermal conductivity, λ = 0.037 W/mK);

The U-value is calculated as follows:

Layer	Thickness(mm)	Thermal conductivity (W/mK)	Thermal Resistance (m^2 K/W)
External Surface	-	-	0.04
Outer brick	100	0.77	0.13
Retrofit Insulation	50	0.037	1.351
Existing Insulation	50	0.038[i]	1.316
Inner block	100	1.33	0.075
Plaster (lightweight)	13	0.18	0.072
Internal Surface			0.13
Total Thermal Resistance (m^2K/W) =			**3.11**
Wall U-value (W/m^2K) =			**0.32**

Thermal Conductivity values for common building materials are taken from Table 12a/12b of the DEAP manual. The internal and external surface resistances are taken from Table 1 of ISO6946:2007 . See also BR443 'Conventions for U-value calculations'.

4 BER Assessments for Partially Completed Buildings

There have been a number of queries to the BER Helpdesk about partially constructed dwellings. This section provides guidance on this type of dwelling, how to categorise the dwelling, how to determine if a Provisional BER is required and the steps to follow in completing a BER rating.

4.1 Partially Completed Dwellings

For the purpose of this section a partially complete dwelling is described as a dwelling where planning has been obtained, a commencement notice has been issued to the local authority and works have been undertaken on the dwelling. If a partially complete dwelling has not previously been sold or rented it is classified as 'New'. When being sold as is, these dwellings require a 'New Provisional Rating' when being offered for sale. A 'New Final Rating' is required when works are complete.

As stated in the BER Assessors Code of Practice, Section 5:
"*In accordance with the Regulations[j], a New Provisional BER assessment can be carried out by BER Assessors based on design drawings and specifications of an uncompleted building provided that, on completion of the building in question, a New Final BER assessment is carried out on the completed building in accordance with the procedures for Existing and New Final BER assessments. A New Provisional assessment must be carried out in compliance with the appropriate methodology and is subject to audit.*"

The dwelling can be assessed from plans and specifications along with site survey given that there is some work already done. Where there is insufficient information on site or from plans/specs, then DEAP defaults are applied. In applying DEAP defaults it is critical to determine the accurate age for the building and the version of TGD L that applies to the planning for the dwelling being assessed.

For Part L compliance checking, check the "transitional arrangements" sections of different versions of TGD L here. This enables identification of the correct version of TGD L for the dwelling. The commencement notice can be obtained from the local authority and will help determine when

[i] The Thermal conductivity for the existing polystyrene insulation is taken from DEAP Manual Table 12b. As the type of polystyrene insulation has not been specified by the architect, worst case 'Expanded polystyrene (EPS) slab (SD)' is used in the U-value calculation.
[j] European Union (Energy Performance of Buildings) Regulations 2012 (S.I. 243 of 2012).

works commenced on the dwelling. As the vast majority of this type of dwelling will have commenced in the last ten years planning details should be available online from the local authority.

A pessimistic default position is taken where plans/specs for the provisional rating and site survey do not indicate what heating system is installed or is to be installed. DEAP manual Section A3.4 and Technical Bulletin May 2013, Section 6 give guidance on dealing with missing or broken heating systems. Technical Bulletin Jan 2012, Section 6 gives guidance on completing a Provisional BER.

As specified in DEAP Manual Section 4.6 where a dwelling has no water heating system present (or specified in the case of a provisional rating), direct electric water heating is assumed to meet the hot water demand. In this case supplementary electric water heating is not specified as the main water heating is an electrical heat source. If there is no cylinder present then hot water storage losses are not specified.

For new dwellings with no heating system specified or installed, assume that all heat is provided by electric heaters as per DEAP Manual Appendix A3.1.
The new final rating will reflect the oil system and cylinder etc. if that is indeed what is actually installed once the dwelling is complete.

Example:

A partially completed bungalow is being sold as is and a BER is required.

From the information supplied - this dwelling is:

- Not complete
- Has not previously been sold or rented.

Therefore a New Provisional Rating is required. The Assessor determines that the house commenced construction in 2008 from the commencement notice which is dated January 2008. TGDL 2005 applies to the dwelling based on the transitional arrangements for TGDL 2007 as substantial work[k] has been completed on the dwelling before 1st July 2009.
Key site survey details are as follows:

- A partially filled cavity wall
- Solid ground floor
- Ground floor area: 131m^2
- Perimeter: 51m
- Solid internal walls
- Double glazed PVC windows with 16mm gap
- 100mm insulation in attic
- No plumbing has been completed in the dwelling
- No ventilation has been installed
- There is one chimney in the dwelling with a hearth capable of supporting an open fire
- There are 6 habitable rooms in the dwelling

As there are no plans or specs available for the dwelling a pessimistic default position is taken where no information is available and a DEAP default can be applied.

The DEAP entry for the Provisional Rating is completed in accordance with the following table:

DEAP Tab	Name of entry	Value	Comment
Dimensions	Ground floor area	131m^2	As determined on site
	Average room height	2.6m	As determined on site
	Living area	31.5m^2	Largest public room as determined on site
	No. of storeys	1	As determined on site
Ventilation	Number of chimneys	1	As determined on site
	Number of open flues	0	As determined on site

[k] As per TGD L 2007: "Substantial work has been completed" means that the structure of the external walls has been erected.

	Number of intermittent fans and passive vents	0	As determined on site
	Number of flueless combustion room heaters	0	As determined on site
	Is there a draught lobby on main entrance	No	As determined on site
	Percentage of windows and doors draughtstripped	90[l]	As determined on site
	Number of sides sheltered	0	As determined on site
Building Elements	Floors	Ground floor, solid, U-value = 0.34W/m^{2}K	Default used as no details on floor spec. Perimeter and area as measured on site. Age band 2005 onwards
	Roofs	Pitched roof insulated on ceiling	100mm insulation as per site survey. Area as measured on site
	Walls	300mm cavity, U-value = 0.37W/m^{2}K	Default used for cavity wall, 2005 onwards as verified on site. Area as measured on site.
	Doors	Solid door, U-value = 3.0W/m^{2}K	As determined and measured on site
	Windows	2.2W/m^{2}K	Default from table S9 for 2004 or later double glazed PVC window. Area, orientation and shading as determined on site.
Water heating	Are there distribution losses?	No	No cylinder, sinks, taps or pipes installed.
	Are there storage losses?	No	No cylinder present.
	Is supplementary water heating used in summer?	No	Where a dwelling has no water heating system present, direct electric water heating is assumed to meet the hot water demand per DEAP Manual Section 4.6. In this case supplementary electric water heating is not specified as the main water heating is an electrical heat source
	Primary circuit loss type	None	As above
Lighting and internal gains	Percentage of low energy lighting	0	Worst case assumed as none installed.
Net Space Heat Demand	Thermal Mass Category of Dwelling	High	Based on Table 11 for this new dwelling. Use measurements on site
Distribution system losses and gains	Temperature adjustment (^{0}C)	0.3	Worst case for electric heaters assumed – no thermostatic control from Table 4e
	Heating system control category	2	For new dwellings that have no heating system specified, assume that all heat will be provided by electric heaters as per DEAP Manual Appendix A3.1. Control category from Table 4e for electric room heaters with no thermostatic control
	Heating system responsiveness	1	Electric room heaters, Table 4a
	Central heating pump	0	
	Boiler controlled by room Thermostat	No	

[l] Attic hatch is not draught proofed

Energy requirements -> individual -> space heating	Efficiency of main (space) heating system (%)	100	Electric Room Heaters assumed
	Efficiency adjustment factor (space)	1.0	Value from Table 4c in the DEAP Manual or 1 if not applicable
	Fraction of heat from secondary/supplementary system	0.2	Taken from Table 7. Main heating system is electric room heaters. Secondary space heater is present in one habitable room (open fire) meaning the fraction of heat from secondary heating is 0.2.
Energy requirements -> water heating	Efficiency of main (water) heating system (%)	100	Where a dwelling has no water heating system present, direct electric water heating is assumed to meet the hot water demand.
	Efficiency adjustment factor (water)	1.0	Value from Table 4c or 1 if not applicable.
Energy requirements -> individual -> Fuel data	Main space heating system	Electricity	For new dwellings that have no heating system specified, assume that all heat will be provided by electric heaters as per DEAP Manual Appendix A3.1.
	Secondary space heating system	Solid Multi Fuel	Follow guidance in Section 10.3.3 of DEAP Manual
	Main water heating system	Electricity	Where a dwelling has no water heating system present, direct electric water heating is assumed to meet the hot water demand per DEAP Manual Section 4.6. In this case supplementary electric water heating is not specified as the main water heating is an electrical heat source
	Supplementary water heating	None	

4.2 Derelict Dwellings

There is no automatic exemption from the BER requirement for derelict buildings. A BER is produced where it is possible to do so and in accordance with the BER assessor Code of Practice.

In accordance with Section 7 of the Code of Practice '*If a BER Assessor is of the opinion that a building or any of its equipment is in such a condition as to make it unsafe or impractical to carry out an assessment, the BER Assessor may refuse to carry out the assessment. In such circumstances, the BER Assessor shall return any fee received in respect of that proposed BER assessment*'.

The Energy Performance of Buildings Regulations (S.I. 243 of 2012) document from DECLG is here.

BER Assessors – Dwellings Technical Bulletin #27

Issue No. 1/15 December 2015

Contents:

1 Audit Targeting

SEAI regularly review commonly occurring issues identified during audits that lead to significant or frequent energy value errors and can therefore lead to inaccurate BER certificates being registered. These issues identified can result in audit non-compliances and the imposition of penalty points. Some frequently occurring issues are identified in the table below along with reference to the DEAP Manual and other supporting guidance available to BER assessors to assist in ensuring correctly defined inputs to DEAP. SEAI will be targeting errors in these areas for audit. BER assessors are therefore advised to review the relevant guidance, especially the items outlined below, when compiling BER assessments and to ensure appropriate supporting evidence is retained as appropriate in line with the QADP. As always, if you require clarification on the methodology or guidance, please contact the BER Helpdesk for assistance.

Audit target area	**References**
Building elements – wall areas incorrect	• DEAP Manual Section 3 and Table S12 • DEAP Survey Guide Sections 3 and 4 • Technical Bulletin 1/14 Section 3.2 • Technical Bulletin 2/14 Section 3.2
Building elements - wall U-values incorrect	• DEAP Manual Sections 3.1/3.3 and Appendix S6.1 • DEAP Survey Guide Sections 3 and 4 • Technical Bulletin 2/09 p4 • Technical Bulletin 1/11 Section 8 • Technical Bulletin 5/11 Section 3 • Technical Bulletin 2/14 Sections 3.1/3.3 • BRE 443: Conventions for Calculating U-values
Building elements - window performance incorrect	• DEAP Manual Section 3.2, Section S8 and Table 6a-d • DEAP Survey Guide Sections 3 and 4 • Technical Bulletin 1/09 p2 • Technical Bulletin 3/09 p4 • Technical Bulletin 3/10 Section 1.7 • Technical Bulletin 3/11 Section 1 • Technical Bulletin 1/14 Section 3.1 • FAQ (How do I use default data for windows in DEAP?) • Video (Building Energy Rating - Room by room survey)
Code of practice - data and records infringement	• Code of Practice Sections 8 and 9 • DEAP Survey Guide Sections 3 and 4
Dimensions - floor area incorrect	• DEAP Manual Section 1 and S6.2 (Room in Roof. Includes diagrammatic examples) • DEAP Survey Guide Sections 3 and 4 • Technical Bulletin 5/09 p4 (conservatories) • Technical Bulletin 7/09 Section 2.5 (room in roof) • Technical Bulletin 1/10 Section 3.2 • Technical Bulletin 3/10 Section 2.1 • Technical Bulletin 4/10 Section 2 (basements) • Technical Bulletin 4/11 Section 1.5 (porches) • Technical Bulletin 2/12 Section 2.4 (room in roof) • Technical Bulletin 3/12 Section 6 • Technical Bulletin 1/14 Section 3.2 (case study) • Technical Bulletin 2/14 Section 3 (including split level dwellings) • Video (Survey forms and sketches) • FAQ (room in roof)
Dimensions - living area incorrect	• DEAP Manual Section 1 and Section 7.2 • DEAP Survey Guide Sections 3 and 4 • Technical Bulletin 2/11 Section 1 • Technical Bulletin 2/14 section 3.2 • Video (Survey forms and sketches)
Distribution system losses and	• DEAP Manual Section 9.3 and Table 4e

gains - control category incorrect	• Technical Bulletin 1/13 Section 4 • DEAP Survey Guide Sections 3 and 4 • Video (Heating System Controls)
Distribution system losses and gains - heating responsiveness	• DEAP Manual Table 4a and Table 4d • Technical Bulletin 3/10 Section 1.1
Energy requirements - fuel type incorrect	• DEAP Manual Section 10.3 • DEAP Survey Guide Sections 3 and 4 • Technical Bulletin 8/09 Section 1.1 (smokeless fuel zones) • Technical Bulletin 9/09 Section 2.2 (wood fuels) • Technical Bulletin 3/11 Section 3 (electrical heating) • Technical Bulletin 3/12 Section 1 • Technical Bulletin 1/14 Section 2.2
Energy requirements - secondary/ supplementary heating efficiency incorrect	• DEAP Manual Section 9.2 and Table 4a • DEAP Survey Guide Sections 3 and 4 • Technical Bulletin 3/12 Section 1.4 • Technical Bulletin 2/14 Section 2.1
Energy requirements - space/water heating efficiency incorrect	• DEAP Manual Section 9.2, Tables 4a and 4b • DEAP Survey Guide Sections 3 and 4 • DEAP Manual Appendix B (Gas and oil boiler systems, boilers with a thermal store, and range cooker boilers) • DEAP Manual Appendix C (Group heating) • DEAP Manual Appendices E and J (Solid fuel appliances) • Technical Bulletin 8/09 Section 1.2 • Technical Bulletin 5/11 Section 5 • Technical Bulletin 3/12 Section 1 • Technical Bulletin 1/14 Section 4.3 • Technical Bulletin 2/14 Section 2.1
Start - year of construction incorrect	• DEAP Manual Section S5 • Technical Bulletin 6/09 Section 2.3 • Technical Bulletin 8/09 Section 2.4 • Technical Bulletin 1/10 Section 3.5
Ventilation - intermittent fans and passive vent number incorrect	• DEAP Manual Section 2 • DEAP Survey Guide Sections 3 and 4 • Technical Bulletin 2/09 p3 • Technical Bulletin 3/09 p4 • Technical Bulletin 8/09 Section 3 • Technical Bulletin 1/13 Section 3 • Video (room by room survey includes guidance on ventilation) • Video (inside the property includes guidance on ventilation)
Net Space Heating Demand - thermal mass category incorrect	• DEAP Manual Section 7.3, Tables 11 and 11a, Appendix S10 • DEAP Survey Guide Sections 3 and 4 • Technical Bulletin 1/14 Section 3.3
Water heating - storage volume incorrect - thickness of water cylinder insulation incorrect	• DEAP Manual Section 4.2 and Table 2a • DEAP Manual Appendix H (solar) • DEAP Manual Section S11.1 • DEAP Survey Guide Sections 3 and 4 • Technical Bulletin 2/09 p3 • Technical Bulletin 1/11 Section 3 (solar) • Technical Bulletin 3/11 Section 2 (solar) • Technical Bulletin 3/12 Section 1.1 (instantaneous heaters) • Technical Bulletin 1/14 Section 4.1

2 Space Heating Control Category

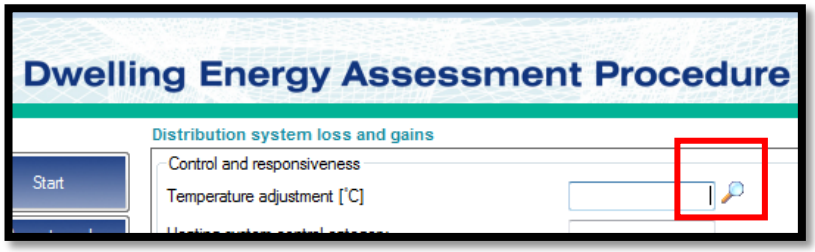
2.1 General Guidance to Ensure Correct Entry of Control Category

The Audit team have encountered a number of errors in BER assessments related the control category entered in the Distribution System Losses and Gains section of DEAP. The control category can have a significant impact on the energy value calculated by DEAP and is flagged as an issue under Section 1 – "Audit Targeting" above.

Table 4e of the DEAP manual defines the control category based on the type of controls installed in the dwelling. There are different groups of controls to select from based on the heating system type in Table 4e.

Section 9.3 of the DEAP manual defines specific control types. Assessors must understand these definitions in order that the control category can be selected correctly. Technical Bulletin 1/13 (Section 4) and Section 1 of this technical bulletin (Distribution system losses and gains - control category incorrect) are also useful reference points.

We recommend that Assessors use the DEAP lookup function when identifying the correct control related entries in DEAP to reduce the probability of selecting the incorrect controls entries (including control category). The definitions in DEAP Section 9.3 must be understood to enable correct use of the lookup function in DEAP:



2.2 Control Category: Common Errors

2.2.1 Insufficient Documentary Evidence

During audit, the retention of insufficient documentary evidence is often identified as a code of practice non-compliance issue (Code of Practice Section 8). As stated in the DEAP Survey Guide Section 4 photographic evidence of heating controls is required:

DEAP software tab: "Distribution System Losses and Gains"	
Data Entry Item	**Guidance**
Temperature adjustment	Follow guidance in the DEAP Manual. Representative photographs of heating controls (such as TRVs, zone valves room thermostats, water thermostats, timers and any other relevant controls) must be taken. Details must be recorded on the DEAP Survey Form.
Control category	Follow guidance in the DEAP Manual. Representative photographs of heating controls must be taken. Details must be recorded on the DEAP Survey Form.
Responsiveness category	Follow guidance in the DEAP Manual. Representative photographs of heating controls must be taken. Details must be recorded on the DEAP Survey Form.

Always ensure that full, clear and transparent evidence is retained. Insufficient record retention can be particularly problematic in the case of desktop audits as the auditor is not able to:

- Affirm that the assessment is in compliance with Code of Practice Section 8 requirements.

- Insufficient record retention can result in non-compliance with Section 8 (Records, Data and Documentation) of the Code of Practice.

2.2.2 Control Category Value of "3" Entered in Error for Boiler Systems

One of the most common errors encountered during audit is the selection of control category 3 (time and temperature zone control) where site observations and/or the assessors survey notes do not support this category.

As per the Section 9.3 definition in the DEAP Manual:

"*In order to specify time and temperature zone control it must be possible to program the heating times of at least two space heating zones independently in addition to independent temperature controls. It is not necessary for these zones to correspond exactly with the zone division that defines the living area fraction (Section 7.2)*".

There are two key requirements in the above definition:

1. Independent time control of at least 2 space heating zones
2. The ability to be able to set the temperature of each of the space heating zones

If only one of these requirements is met time and temperature control (Cat 3) cannot be stated in DEAP.

Some examples of typical programmers and timers in dwellings are shown below. The right hand column of the table describes whether the controller(s) are capable of providing time and temperature control when installed in conjunction with sufficient thermostatic control. Note that some other conditions (as described) may need to be met to constitute time and temperature control.

Controller	**Description**	**Capable of independent time control of 2 space heating zones?**
	Electronic programmer. 1 channel for domestic hot water (left side controls). 1 channel for space heating.	**No.** Only one channel is available for control of the space heating. If this is the only time programmer in the dwelling then time and temperature zone control is not possible regardless of the number of thermostats present.
	Electronic programmer. 1 channel for domestic hot water (right side control). 2 channels for space heating (left and middle controls).	**Yes.** 2 channels are available for controlling time for space heating zones. Time and temperature zone control is possible. At least two room thermostats must be present in the dwelling in conjunction with this controller to specify time and temperature control in DEAP.

	1 x Programmable Thermostat.	**No.** These controllers are often identified as a standard programmer in error. They provide time and temperature control to a single zone. They are often characterised by a grille to the casing to allow air from the room to pass over a thermostat element. If unsure if the device is a programmable thermostat take the model number and attempt to identify the type through an on-line search. If this does not resolve the type contact the Helpdesk for advice.
	2 x Programmable Thermostats.	**Yes.** Same controller as above but there are two. It is therefore possible to control both the time and temperature of two zones independently. Time and temperature control can therefore be specified in DEAP. Additional thermostats are not required for time and temperature control as the thermostat is integrated with the programmers.
	1 x Mechanical Timeclock.	**No**. The timeclock provides time control but only has one channel and is therefore not capable of providing independent time control of two space heating zones.
	2 x Mechanical Timeclocks	**Yes.** Two channels are available for the time control of two space heating zones. Notes: The assessor must be sure that both timers are for the space heating zones, e.g. through labels or the presence of an additional controller that is clearly for control of the domestic hot water. Two mechanical time clocks could be for one space heating zone and the domestic hot water. Two room thermostats must be present in conjunction with the timeclocks to specify time and temperature zone control.

3 Dimensions - Floor Area Entries in DEAP

The Audit team have encountered a number of issues in BER assessments related to floor areas entered in the dimensions section of DEAP. Incorrect floor areas can have a significant impact on the energy value calculated by DEAP. This can cause errors with the rating band stated on the BER certificate. Subsequently floor area errors can have a significant impact on error sizes identified during audit and result in penalty points being assigned to the Assessor.

A number of technical bulletin articles have been issued on this topic. See Section 1 table above under "Dimensions - Floor Area Incorrect". In addition, the following guidance identifies common errors and means of ensuring correct/accurate floor areas are entered in DEAP.

BER Assessors are required to record all dimensions on the site sketch (or architectural drawings verified on site) in accordance with the Code of Practice and the DEAP Survey Guide.

3.1 Floor areas – General Guidance

When calculating the floor area(s) to be entered in the dimensions section of DEAP, definitions must be observed as defined in the DEAP Manual Section 1:

- ***Dimensions*** *refer to the inner surfaces of the elements bounding the dwelling. Thus floor dimensions are obtained by measuring between the inner surfaces of the external or party walls, disregarding the presence of any internal walls.*
- ***Floor area*** *should be measured as the actual floor area, i.e. if the height of a room extends to two storeys or more only the actual accessible floor area should be entered. However, as an exception to this rule in the case of stairs, the floor area should be measured as if there were no stairs but a floor in their place at each level.*

Floor area(s) can be calculated by first measuring either the internal dimensions or the external dimensions on site. With the latter ensure the external wall thickness is deducted during calculation noting that external wall thicknesses can vary between different parts of the dwelling, especially where extensions are present.

For a **staircase leading to a single dwelling**, the following guidance from DEAP Section 1 applies:

Where there is a staircase between a single dwelling (such as an apartment) and an external door:

- *The staircase is excluded and is treated as a heated or unheated space adjoining the dwelling where there is an internal door between the staircase and the dwelling.*
- *The staircase is included where there is no door between the staircase and the dwelling (the staircase is open to the dwelling). This is counted as an extra storey.*

Good practice guidance to ensure floor areas are calculated correctly:

- Measure key dimensions (width/length) twice as a cross check. As the measurements taken can significantly impact the floor area (and are often used to determine other heat loss areas such as walls and floors) it is worthwhile spending the extra time to make sure measurements are correct. Laser measurement devices can sometimes give an erroneous reading due to a bad reflection and it is easy to misread a tape measure.
- Where dwellings do not have a square or rectangular footprint, split the dwelling floor area into parts and measure each part. If different parts of the dwelling were constructed at different times, the respective floor areas are entered in DEAP as separate heat loss building elements due to differing U-values (unless the different parts of the dwelling have identical constructional details and fall within the same age band). Ensure that sketch/plans define different parts of the dwelling clearly with enough dimensions recorded to allow the accurate calculation of respective floor areas for input to DEAP against the appropriate age bands.
- If it is not possible to measure the entire width/length of parts of the dwelling with one measurement due to obstructions such as internal walls, measure the internal dimensions of

rooms. Ensure internal wall thicknesses are also recorded and included in the overall dimension used to calculate the area(s). BER Assessors should always carry out a sense check to ensure that all measurements are accurate and are recorded correctly.

- A common error encountered during audits is the omission of the wall thickness between the two storey main part of the dwelling and a single storey extension to the side/rear. The internal wall dividing the two storey and single storey part of the dwelling is often as thick as the main external walls. If an internal wall is omitted in the calculations, it can have a significant impact on the floor area calculated.
- After all inputs have been input to DEAP carry out a sense check on the floor areas entered:
    - Do the floor areas appear correct based on a walk around of the dwelling?
    - Do the floor areas for different storeys make sense in relation to each other compared to observations on site?
    - Does the ground floor area entered in the dimensions section of DEAP match the ground floor heat loss area entered in the building elements section of DEAP where all the ground floor is comprised of heat loss elements?
    - Is enough heat loss roof area entered in the building elements section to cover at least the largest floor area entered in the dimensions section? When carrying out this sense check bear in mind that insulated rafter roofs and roof light windows can cause differences between roof area and the largest floor area. Understand what these differences might be and allow for them in the sense check.

  Bear in mind that there are always exceptions to these general checks, e.g. apartments without heat loss floors and/or roofs and non-standard geometry dwellings. These basic sense checks are useful to identify fundamental errors with the DEAP inputs for typical house type geometries commonly encountered.

3.2 Floor Area Measurements in Existing Dwellings

DEAP Manual Section S4 allows for the following simplifications when calculating floor areas:

"*Small bay windows, small porches, small door entrances or recesses, small chimney breasts, where they affect the total floor area by less than 10% overall, can all be ignored for the purposes of total floor area measurement. Bay windows, chimney breasts and other small areas within the living room area must be included in the living room area measurement.*"

The simplifications apply only to the floor areas to be used in the "Dimensions" section in DEAP. As defined in the DEAP Manual the simplification is not applied to living area under "Dimensions".

3.3 Porches, Conservatories, Utility/Store Rooms, Basements, Garages and Attics.

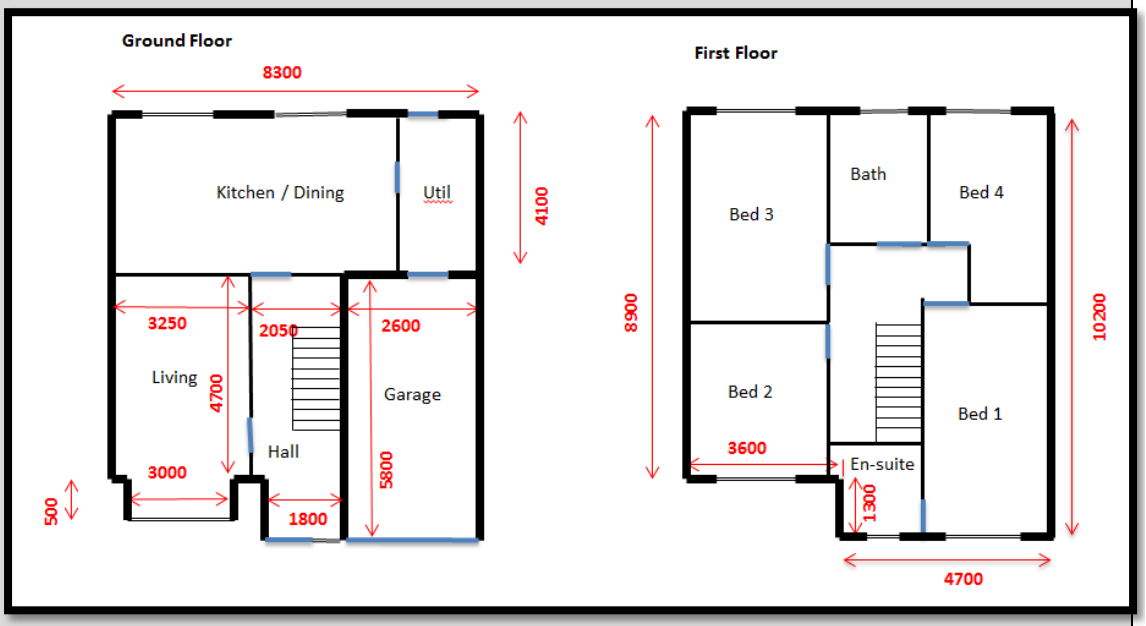
The audit team have encountered a number of errors related to inclusion of some types of rooms in the BER assessment floor area. Inclusion can significantly impact the floor area entered in DEAP and must be done correctly.

Where porches, conservatories, utility/store rooms, basements, garages and attics are identified during the site survey they must be assessed in accordance with the following references:

- The DEAP Manual Section 1 is the primary reference point for deciding whether these parts of the dwelling should be included in the floor area or not. The definitions must be adhered to.
- Technical Bulletins listed in Section 1 above provide further guidance.
- Where doubt remains, contact the BER Helpdesk for clarification. The BER Helpdesk will be better able to assist with queries if full details (and preferably sketches) are provided with your query.

3.4 Case Study – Floor Areas (for DEAP Dimensions Section)

Example: Detached 2 storey house with integral garage.



- All dimensions internal (mm)
- External wall and separating wall to garage 300mm width
- Internal partition walls 100mm width
- Unheated garage with well insulated separating wall. Therefore, the garage is not included in the floor area calculation. See DEAP Manual Dimensions Section guidance on garages.
- Utility room: This is included in the floor area calculation as it is directly accessible from the occupied area of the dwelling. See DEAP Manual Dimensions Section guidance on utility rooms.

Ground Floor Area

- 8.3m x 4.1m = 34.03m^2 (kitchen/diner/utility)
- (3.25m + 0.1m + 2.05m) x (4.7m + 0.1) = 25.92m^2 (Main parts of living and hall)
- 0.5m x 3.0m = 1.5m^2 (living bay)
- 1.8m x 1.3m = 2.34m^2 (hall area near entrance)
- Total Ground Floor Area = 63.79m^2

First Floor Area

- 8.9m x 8.3m = 73.87m^2 (largest square section)
- 1.3m x 4.7m = 6.11m^2 (smaller rectangular section including part of ensuite / bed 1)
- Total First Floor Area = 79.98m^2

Notes:

- Always use internal dimensions ensuring the width of internal walls are included if a required dimension spans multiple rooms. See notes under Section 3.1 above for guidance on conversion of external dimensions to internal dimensions.
- The bay window area to the living room could be omitted for the ground floor area. However, the bay area was included in this particular example. See above guidance referencing small bay windows as per DEAP Section S4.

Examples of Quick Sense Checks

- In the example above it would be expected that the first floor area is greater than the ground floor area based on visual inspection. Check to make sure it is as calculated. If it is not, re-examine the calculation and check for errors.
- A review of the plans suggests that the first floor area is equal to the ground floor area plus the area of the garage and separating wall minus the bay area. The measurements are used in a cross check as follows:
  First Floor Area = 63.79m^2 +(2.9*6.1) m^2 – 1.5m^2 = 79.98m^2. Cross check confirms correct.
- After calculating the roof areas and entering them into DEAP, is the total roof area of the order of the first floor area plus the bay area? If not then recheck calculations noting this is a rough guide as insulated at rafter roof and roof lights can cause differences when carrying out this sense check.
- It may be difficult to get exact matches during cross checks due to variability in actual measurements taken on site. The cross checks should give very close results. If the rough cross checks yield large differences then check the calculations again.

4 Net Space Heat Demand – Thermal Mass Category

Errors in the thermal mass category entered in DEAP are frequently encountered during audits. The thermal mass category influences the heat demand and energy value result from DEAP. The overall thermal mass category is one of Low; Medium-low; Medium; Medium-high or High.

- For existing dwellings, follow Table S10 in Appendix S of the DEAP Manual and record the thermal mass of walls and floors in the DEAP Survey Form (or other survey notes). Alternatively, the same methodology may be used as described below using Table 11. Do not use Table S10 for new dwellings.
- For new or existing dwellings, use the "AmAf" methodology defined in DEAP Table 11. Calculations to determine the overall mass category via the derivation of the "AmAf" value must be held on file.

4.1 Recording Supporting Evidence for Thermal Mass

Thermal mass of building elements must be recorded during the site survey. The options for recording the thermal mass of elements are:

- New and existing dwellings "AmAf" approach: Record the elements as either thermally massive or thermally light using the categories in Table 11a of the DEAP Manual. Take this route if it is intended to use the "AmAf" methodology for new or existing dwellings.
- Existing dwellings only: record the elements as "light", "medium" or "heavy" as per the descriptions in Table S10 of the DEAP manual.
- New and existing dwellings: Record the characteristics of each of the elements during the site survey. The elements can then be categorised using one of the approaches defined in the bullet points above. This allows the option to categorise the thermal mass of the elements off-site if required.

4.2 Thermal Mass: Common Issues

Auditors have identified the following frequently occurring issues/errors:

- **Error 1:** Element descriptions / thermal mass data inadequately recorded or not recorded during survey: The information required to identify the thermal mass category of an element must be recorded during the survey. This can be on the survey form, sketches and/or additional notes. As with all survey supporting documentation, ensure the records are clear, complete and transparent. While elements such as ground floors, walls and ceilings tend to be recorded during the site survey where the SEAI survey form is used, elements such as internal partitions and separating (party) walls are sometimes overlooked.

- **Error 2:** Building elements assigned the incorrect thermal mass categorisation, e.g. external wall categorised as light when it should be heavy based on site observations. Ensure elements are correctly categorised before assigning an overall thermal mass category using Table S10 or Table 11a for the dwelling.
- **Error 3:** Incorrect interpretation of the difference between separating walls and internal partitions. The key differences are identified below:
    - **Separating walls:** These are the walls between the dwelling in question and an adjoining heated or enclosed unheated space, e.g. garage in a house or corridor in an apartment block. Typically, a separating wall will be a party wall between the dwelling in question and an adjoining dwelling. For example a semi-detached house will have a separating (party) wall. When using Table S10 and there is no separating wall, e.g. a detached house without adjoining garage, assume the separating wall has the same characteristics as the predominant external wall.
    - **Internal Partitions:** These are the walls dividing the spaces internally within the dwelling. They are not heat loss walls. As stated above, it is common for these partitions to be overlooked when recording the dwelling characteristics during the site survey.
- **Error 4:** Incorrect assignment of thermal mass to an element where there are two or more types of the same element type with different thermal mass categories: This scenario is common where there is an extension built later than the main part of the dwelling. As detailed in the General Principles of the DEAP manual:

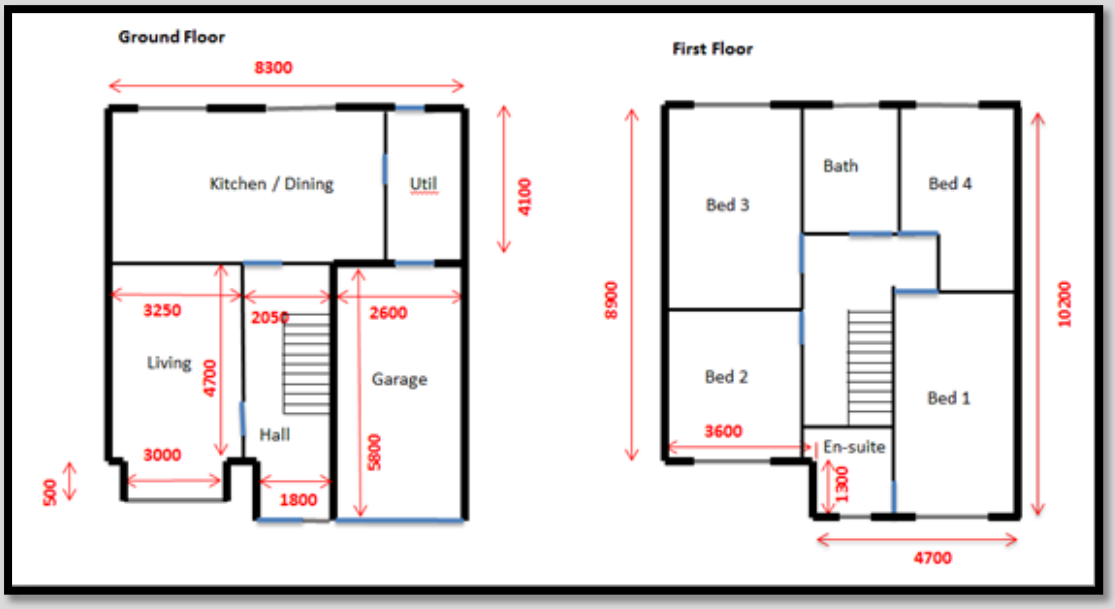
  "*In some cases there are a limited number of data entry options available. Unless otherwise stated in SEAI guidance, the most prevalent option should be chosen*".

  This general rule applies when selecting the mass category of a specific element using table S10. For example, where the external walls of the original dwelling have an area of 150m^2 (high thermal mass) and the external walls of an extension have an area of 75m^2 (low thermal mass), the main dwelling walls are predominant. Therefore "high" is assigned to the external walls when considering the overall thermal mass using Table S10. This rule is not required when following the AmAf methodology in Table 11 as the areas of each wall type are calculated and assigned a thermal mass category as appropriate when using Table 11.

  Further guidance is also provided in Technical Bulletin 1/14 Section 3.3.
- **Error 5:** Both sides of internal partitions not accounted when using the Table 11 AmAf methodology. As both sides of internal partitions absorb/release heat to the dwelling, the area of both sides must be accounted when using the Table 11 methodology as per Section 7.3 of the DEAP Manual.
- **Error 6:** Openings not deducted from element areas when carrying out a Table 11 AmAf calculation. Windows and doors are categorised as light thermal mass when carrying out an AmAf calculation in accordance with Table 11a of the DEAP Manual. The area of thermally massive elements is therefore net of the area of windows and doors. Note that when dealing with internal partitions the opening area is deducted from both sides of the internal partition area calculation.

4.3 Case Study – Thermal Mass

Example: Detached existing 2 storey house with integral garage (as used in floor area case study).



Dwelling Details Required

- All dimensions internal (mm)
- Ground Floor: suspended timber
- Intermediate Floor: timber joists
- External Walls: render / block / full cavity fill / block / dense plaster
- Ground Floor Internal Partitions: dense plaster / block / dense plaster
- First Floor Internal Partitions: timber stud / plasterboard
- Garage / Dwelling Wall: insulation / concrete block on flat / dense plaster to heated side.
- Roof: plasterboard / timber ceiling joists / insulated ceiling
- Ground Floor Height = 2.4m
- First Floor Height (includes intermediate floor/ceiling) = 2.6m
- Ground Floor Area = 63.79m^2
- First Floor Area = 79.98m^2
- Total Floor Area = 143.77m^2
- Windows = 28.75m^2
- Doors = 1.85m^2 per door
- Gross External Wall = (29m x 2.4m) + (37m x 2.6m) = 165.80m^2
- Gross Garage Separating Wall = (9m x 2.4m) = 21.6m^2
- Doors are shown light blue in the above diagram (2 external, 1 to garage and 9 internal).

Existing Dwellings: Table S10 Methodology

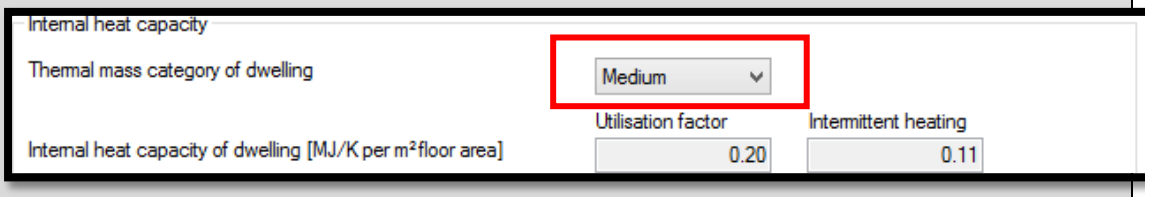
First identify the relevant mass of the construction elements. These are:

- Ground Floor = **light** (suspended timber floor)
- External Walls = **heavy** (masonry external walls (cavity fill or external insulation) with dense plaster)
- Separating Walls = **heavy** (masonry separating walls with dense plaster). This is the wall between the garage and the heated dwelling.
- Internal Partitions = **light** (plasterboard on timber/steel stud internal partitions). While there are "heavy" internal partitions to the ground floor (masonry internal walls with dense plaster) the first floor partitions are timber studs with plasterboard and their area is greater than for the ground floor partitions. As the internal partitions are predominantly light, the mass category "light" is selected for this element.

The mass of the elements is therefore **light, heavy, heavy, light** for the ground floor, external walls, separating walls and internal partitions respectively and the overall thermal mass category is **medium**. The Table S10 entry is:

light	heavy	heavy	light	Suspended timber floor, masonry external walls (cavity fill or external insulation) with dense plaster, masonry separating walls with dense plaster, plasterboard on timber/steel stud internal partitions	Medium

For this dwelling **medium** is selected from the drop down menu in the Net Space Heat Demand tab in DEAP. Internal heat capacity is automatically completed by DEAP.



New or Existing Dwellings AmAf methodology. Tables 11 and 11a of DEAP Manual.
If there is a complex mixture of elements in an existing dwelling and an appropriate thermal mass category cannot be identified through Table S10 then the AmAf methodology is used for existing dwellings.

Identify the mass category of the individual elements in accordance with Table 11a of the DEAP Manual (thermally massive and thermally light constructions). The thermally massive elements for the dwelling in the example above are listed below along with the areas required for the AmAf calculation. The relevant Table 11a descriptor is given in brackets.

- External Walls = thermally massive (Dense plaster on clay brickwork or solid concrete blockwork)
- Separating Walls (garage wall) = thermally massive (Dense plaster on clay brickwork or solid concrete blockwork)
- Ground Floor Internal Partitions (Dense plaster on clay brickwork or solid concrete blockwork)

All other elements, i.e. ground floor, windows, doors, first floor partitions, intermediate floor and ceilings are all thermally light as identified in Table 11a of the DEAP manual.

Next, calculate the relevant areas of the thermally massive elements as follows:

(1) External Walls
The gross area of the external wall, window area and door area is shown in the dwelling details section above. These areas are calculated as a matter of course during the calculation of DEAP inputs and therefore do not represent additional work.

Net external wall area = Gross external wall area – window area – door area

In this case there is one front door to the main entrance and one rear external door to the utility room.

Net external wall area = 165.80m^2 – 28.75m^2 – (2 x 1.85m^2) = 133.35m^2

(2) **Separating Wall** (wall between the garage and the main dwelling)
Similar to the external wall area this is calculated as a matter of course during the normal DEAP input calculation process. The area of the wall is net of the door from the garage to the dwelling interior.

Net separating wall area = gross separating wall area – door area

Net separating wall area = 21.60m^2 – 1.85m^2 = 19.75m^2

(3) Ground Floor Internal Partition Walls

This represents an additional calculation compared to the calculations normally carried out for other DEAP inputs. First calculate the length of the ground floor internal partitions.

Length of ground floor internal partitions = 4.1m + 5.4m + 4.7m = 14.2m

Next, calculate the area of one side of the ground floor internal partitions.

Gross area of one side of internal partitions = 14.2m x 2.4m = 34.08m^2

The area of the internal doors must then be deducted, as the doors are thermally light. There are 3 internal doors to the ground floor.

Net area of one side of internal partitions = 34.08m^2 – (3 x 1.85m2) = 28.53m^2

The area is then doubled to account for the ground floor internal partitions having two sides.

Total area ground floor internal partitions (two sides) = 28.53m^2 x 2 = 57.06m^2.

(4) Add the areas calculated in (1) to (3) above to get the area of thermally massive elements

Area of thermally massive elements = 133.35m^2 + 19.75m^2 + 57.06m^2 = 210.16m^2

AmAf = Area of thermally massive elements divided by total floor area

AmAf = 210.16m^2/143.77m^2 = 1.46 Note: AmAf is dimensionless

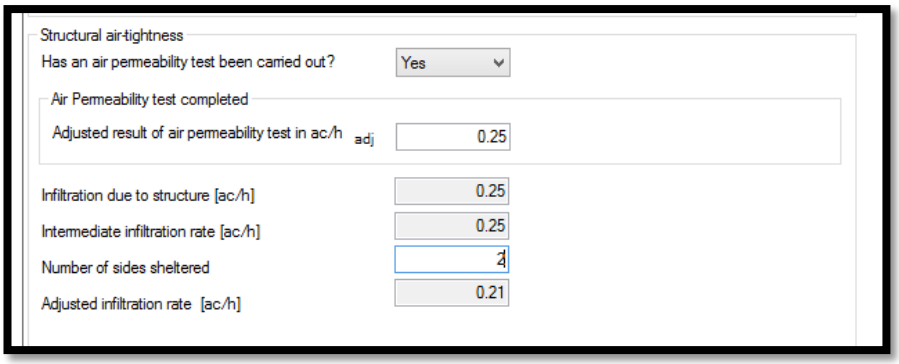
The calculated AmAf is then used to lookup the dwelling thermal mass category in Table 11 of the DEAP Manual. In this case the AmAf is between 0.76 and 1.50. The dwelling thermal mass is therefore **medium**.

The Table S10 (existing dwelling) methodology is an approximation of the dwelling thermal mass. For this reason it is possible to get a different answer compared to using the AmAf approach. This does not mean the assessment of thermal mass is incorrect as long as either methodology is followed and documented correctly. It is therefore important to record/document the thermal mass methodology used sufficiently, clearly and transparently to support the dwelling thermal mass category entered in the DEAP Net Space Heat Demand section.

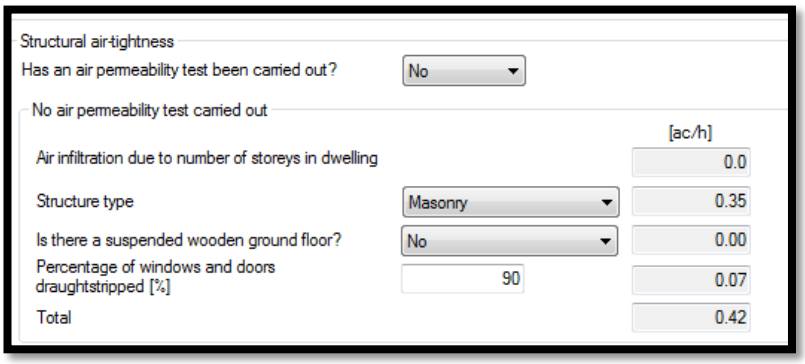
5 Ventilation – Draught Stripping

The Audit team have encountered a number of issues in BER assessments related the percentage draught stripping entered in the Ventilation section of DEAP. Previous guidance is provided in the October 2011 Technical Bulletin Section 4.

Where an air leakage pressurisation test has been carried out to the relevant requirements (see SEAI website guidance), the percentage of draught stripping is not required for the DEAP assessment. In such cases, the result of the air pressure test is entered in DEAP. The screenshot below shows typical DEAP inputs where air pressure test results are available. In this case the percentage of windows and doors draught stripped field is unavailable.



Where an air pressure test has not been carried out, typically in existing dwellings, uncontrolled air infiltration heat losses are estimated by the DEAP software based on structure type, presence of a suspended wooden ground floor and the percentage of windows and doors draught stripped. The screenshot below shows typical DEAP entries for a dwelling where air pressure testing has not been carried out.



This technical bulletin article describes typical audit issues encountered and provides guidance on determining the percentage of windows and doors draught stripped.

Note 1 to Section 2.3 of the DEAP manual defines the percentage draught stripping as follows:

The "Percentage of windows and doors draughtstripped" is used to estimate air infiltration through gaps between the openable part of a door or window and the surrounding frame. In practice, it is unnecessary to measure the perimeter or area of each openable section when determining the percentage draught stripping. The Assessor may identify the number of openings with draught stripping and divide this by the total number of openings in the dwelling. Openings include openable windows, doors and attic hatches between the dwelling and unheated spaces or open air.

5.1 Common Errors – Percentage draught stripping

The most common errors encountered during audit are as follows:

- **Error 1:** Draught stripping not adequately recorded in the site visit notes. To enable the calculation of draught stripping percentage, a record should be kept on an opening by opening basis. The SEAI survey form (see the DEAP Survey Guide Appendix I for details) template provides a column to record the draught stripping status of openings and this can be used as the record. Other methods include recording the draught stripping next to each opening on the sketch/plan or using a bespoke list specifically for draught stripping.
- **Error 2:** Misinterpretation of the type of opening that should be accounted within the draught stripping calculation:
    - Windows with no opening sections incorrectly included in calculations. As per the Note 1 extract above, only windows with openable sections are included. Windows with no openable sections are not included in the total openings calculation.

- Loft hatches incorrectly omitted from the draught stripping calculation. As per Note 1 above, attic hatches are included in the draught stripping calculation. This can have a significant impact on the energy value calculated by DEAP if there are multiple attic access points, e.g. in a room in roof type construction where there may be several access doors provided to crawl spaces.

- **Error 3:** Entrance doors, e.g. front door and or back doors, not accounted within the draught stripping calculation.

5.2 Example Opening Types

The images in the table below show typical openings found in dwellings. The total number of openable sections to be assessed in the draught stripping calculation is identified in each case.

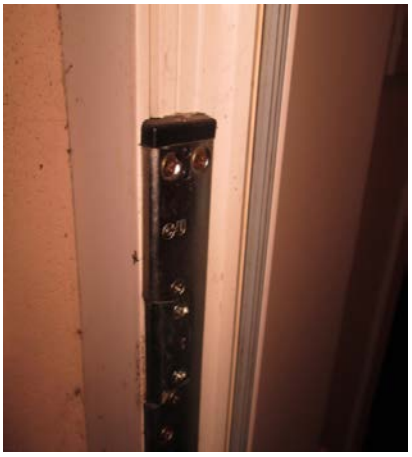
Image	Description	Total number of openable sections considered for the draught stripping calculation.
	uPVC double glazed door with side windows.	1
	uPVC double glazed window. Upper right and lower right sections are openable.	2
	Wood fully glazed door.	1

	uPVC patio doors. Both sides openable.	2
	Loft hatch with fold down ladder	1
	uPVC wrap around uPVC window. Openable sections to left and right sides.	2
	Wood single glazed window. Openable sections to top right and top left.	2
	Access door to crawl space (room in roof)	1

	Metal frame double glazed window. No openable sections.	0

5.3 Identification of Draught Stripping

After the number of openable sections has been identified a record must be made of whether the openable section is draught stripped or not. Examples of openings with and without draught stripping are provided in the table below.

	Example of single glazed wood window without draught stripping.
	Example of uPVC door with draught stripping (grey coloured strip).

If an openable section is only partially draught stripped, it should be assigned as not draught stripped in the percentage draught stripping calculation. An incomplete length of draught stripping would not create a seal to the openable section.

5.4 Calculation of Percentage Draught Stripping

Having identified and recorded the number of openable sections and the number of draught stripped openable sections the calculation of the percentage windows and doors draught stripped for entry into DEAP is as follows:

$$\text{Percentage windows and doors draught stripped} = \frac{\text{Number of openable sections with draught stripping}}{\text{Total number of openable sections}} \text{x}100\%$$

Note that the DEAP entry must be a percentage and not a fraction. The equation above includes the conversion from a fraction to a percentage value.

5.5 Case Study – Percentage windows and doors draught stripped

Example: Percentage windows and doors draught stripped.

Description of dwelling openings:

- Front Door = uPVC double glazed – draught stripped
- Rear Door = wood, half single glazed – no draught stripping
- Windows = 14
- Openable sections of windows = 17
- Openable sections of windows with full draught stripping = 8
- Loft access hatch = 1 without draught stripping

$$Percentage\ windows\ and\ doors\ draught\ stripped = \frac{Number\ of\ openable\ sections\ with\ draught\ stripping}{Total\ number\ of\ openable\ sections}\ x100\%$$

$$Percentage\ windows\ and\ doors\ draught\ stripped = \frac{9}{20}\ x100\% = 45\%$$

6 QADP and Error Matrix for Domestic BER Assessments

The Quality Assurance and Disciplinary Procedure (QADP) is available from the SEAI website. Changes have been implemented based on assessor feedback from SEAI BER Assessor workshops, insights from a recent satisfaction survey and also as part of the ongoing review of BER Quality Assurance. The QADP is to be complied with at all times.

The revised error matrix applies since 1st June 2015:

Where technical errors are identified in audits, their impact on the rating is classified in order to determine the severity of non-compliance based on the following measures:

- Net Change (NC) – Non-compliance(s) resulting in % change in the energy value;
- Gross Error (GE) – Non-compliance(s) sized in terms of the sum of the absolute % change of each non-compliance; and
- Grade Change (GC) – Non-compliance(s) which have resuletd in a change of grade of the rating.

The severity of technical non-compliance is classified as follows:

Technical Error	**Severity of Non-compliance**
NC >10%	Severity 1
NC % (7.5 ≤ X ≤ 10)	Severity 2
NC % (5 ≤ X < 7.5)	Severity 3
NC <5%	N/a (Compliant)
GE >20%	Severity 1
GE % (15 ≤ X ≤ 20)	Severity 2
GE % (10 ≤ X < 15)	Severity 3
GE <10%	N/a (Compliant)
GC	Severity 2 (Advisory)

The revised error matrix is based on a percentage error approach rather than absolute energy value. This provides a more uniform approach across the different rating bands. Assessors should be aware of and familiarise themselves with the revised error matrix and QADP.