BER Assessors – Dwellings Technical Bulletin

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.

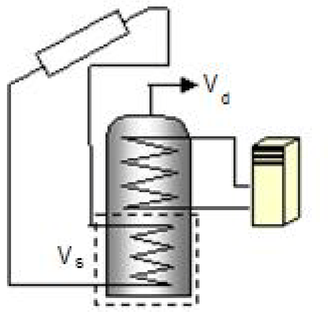
Adjusted Efficiency of Heat Pump	Renewable Contribution (%)	Total Renewable Energy Contribution For Space Heating from Heat Pump
350%	(350-250) = 100	$\frac{100}{350}$ x 10,000 = 2857 kWh/yr
245%	0 (because adjusted efficiency is less than 250)	$\frac{0}{245}$ x 10,000 = 0 kWh/yr
262.5%	12.5	$\frac{12.5}{262.5}$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

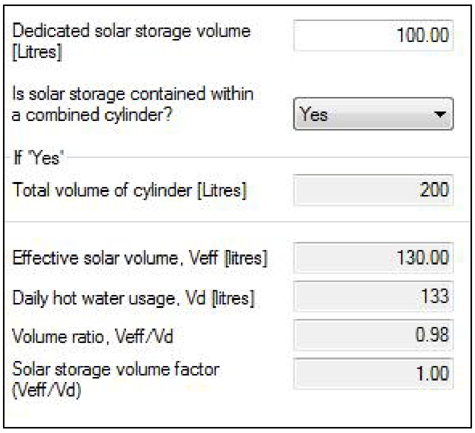
    If for example, the combined cylinder is 300L and the connections of the upper coil are halfway down the cylinder side, then the dedicated solar storage can be assumed to be 150L.

(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.

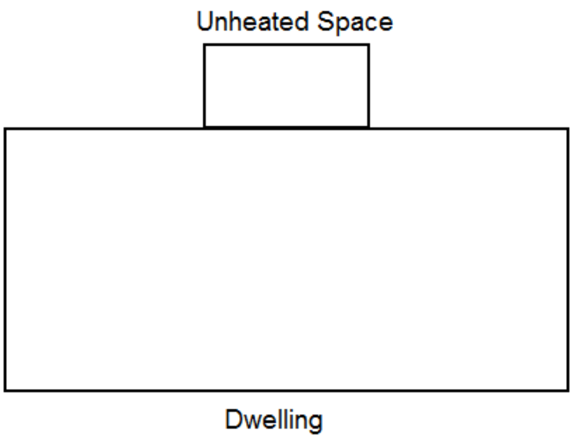
(iv) Where the dedicated solar volume is not known, then, as per DEAP Table S11, the dedicated solar volume can be assumed to be one third of the total cylinder volume.

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/m².

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,

- 2m² of panels on a south-facing roof with a tilt of 30°, and,
- 1m² 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/m² and the panels on the east-facing roof receive 778 kWh/m².

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

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 3m² 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/m²K)**
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 (m²K/W) =	**1.87**
		Original Wall U-value (W/m²K) =	**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 (m²K/W)**
Original Wall	-	-	1.87
Insulation	50	0.021	2.38
Plasterboard	12.5	0.25	0.05
		Total Thermal Resistance (m²K/W) =	**4.3**
		Wall U-value (W/m²K) =	**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**