



Dwelling Energy Assessment Procedure (DEAP) Survey Guide

VERSION 2.1

DEAP is the official procedure for the calculation of energy performance of dwellings in Ireland for the purposes of producing Building Energy Ratings (BER).

This document describes the DEAP survey methodology for dwellings. The DEAP Manual detailing the assessment methodology dwellings must be followed alongside this document. In particular, Appendix S in the DEAP Manual provides further survey guidance and suitable default data to be used where actual data cannot be determined.

BER assessors, building designers and other users should ensure that they are using the latest version of these documents and accompanying software. Information and any updates will be published on the SEAI website at www.seai.ie/ber

Full BER surveys are to be carried out for “New-final” or “Existing” dwelling assessments. “New-provisional” ratings do not require a site survey as the provisional rating is carried out off plans for dwellings at design stage.

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, the BER Assessor’s Code of Practice and all other directions issued by SEAI. In this regard a BER Assessor is responsible for ensuring that, within reason, the data compiled and inputted to SEAI approved calculation software and all other related and recorded calculations are an accurate representation of all characteristics relevant to the energy performance of the building and are capable of being verified as such in any subsequent monitoring and compliance processes commenced by SEAI.

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1 Introduction

This guide is designed to assist Building Energy Rating (BER) Assessors to carry out BER assessments on dwellings using the Dwelling Energy Assessment Procedure (DEAP) software. This guide must be used in conjunction with the DEAP Manual when BER Assessors are filling out the DEAP Survey Form¹ (Appendix I). This form must be used on site to gather survey data required to complete a BER assessment for a dwelling using the DEAP software.

This DEAP Survey Guide indicates the necessary supporting data or evidence required when completing Building Energy Rating (BER) assessments on dwellings particularly when using values other than the defaults listed in Appendix S of the DEAP Manual. Defaults from DEAP Appendix S are only to be used where evidence of non-defaults have been sought and are unavailable. Use of substantiated non-defaults is encouraged as it will result in a more accurate BER grade for the dwelling.

In addition, BER Assessors are required to adhere to the BER Assessor's Code of Practice at all times.

This DEAP Survey Guide is expected to be updated at regular intervals or as necessary. Up to date versions can be downloaded from www.seai.ie/ber.

When conducting a dwelling survey, BER Assessors must comply with the Safety, Health and Welfare at Work Act 2005 and regulations under that Act, as well as all other applicable health and safety legislation, regulations, codes and guidelines. It is the BER Assessor's duty to make himself or herself familiar with the relevant health and safety rules, to exercise due diligence during the survey and to prevent unreasonable risk of harm or injury. Please refer to the Health and Safety Authority website for further information: www.hsa.ie.

BER Assessors are solely responsible for undertaking dwelling surveys in a safe manner. The BER Assessor should under no circumstances expose himself or herself, or any other person, to unnecessary risks of harm or injury in conducting a dwelling survey. The BER Assessor must be mindful at all times of health and safety issues and, where the BER Assessor has reason to believe that obtaining any of the information set out in this document, the DEAP manual or any other guidance provided by SEAI may involve such risks, the BER assessor need not and must not attempt to obtain that information.

SEAI and its agents accept no liability or responsibility for any damage, injury, death, breach of contract or negligence in respect of any dispute, claim or cause of action arising out of, or in relation to, any BER assessment.

All dwelling surveys are expected to be non-invasive. Nothing in this document, the DEAP manual or any other guidance provided by SEAI shall be understood as requiring invasive surveys. Where, despite this, BER assessors or their client carry out invasive surveys this is carried out at the BER assessor's own and the householder's risk and is not required by SEAI.

¹ BER Assessors may use a survey form of their own format provided all of the information contained in the SEAI issued Survey Form is retained with the BER assessment.

If invasive survey methods are used such as to demonstrate an applicable non-default U-value, then, while these methods are not required in the DEAP methodology, they can be considered as a source of supporting evidence. This supporting evidence for each relevant exposed surface must clearly indicate that the non default U-value being specified is appropriate for the building element in question.

2 Survey Documentation and Equipment

A number of items should be brought to the survey site to enable the successful conduct of the survey of the dwelling. These include (but are not limited to):

Documentation:

- DEAP Manual
- DEAP Survey Guide
- DEAP Survey Form (Ref. Appendix I)
- Pencil, paper and eraser
- Graph Paper (for sketching dwelling plans and elevations)
- Dwelling architectural drawings and/or specifications

Equipment:

- Measuring tape (recommended minimum length of 10 metres). Electronic measuring devices may be used, provided all measurements are accurate and the equipment is properly calibrated. Appendix S of the DEAP Manual sets out further detail on acceptable levels of accuracy when performing BER assessments for existing dwellings.
- Ruler
- Calculator
- Directional compass
- Flashlight
- Camera with flash
- Key for electricity meter and key for gas meter (standard tools will not open gas or electricity meters)
- Ladder
- Personal protective equipment as necessary

3 Data Gathering

For all data gathered, supporting evidence may be required as detailed in this section. **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.** The list of supporting evidence detailed in this section is for guidance purposes and will be added to over time. Other methods/supporting data may be considered by SEAI on a case by case basis, as they arise. Specific queries related to the acceptability of supporting data should be directed to the BER Helpdesk.

The DEAP Survey Form (Appendix I) assists BER Assessors in ensuring that they have gathered all the necessary data during the survey. This includes data regarding the dimensions, building age, building fabric elements, relevant items per room, heating system(s), hot water services, heating controls and lighting. This

will generally be accompanied by dwelling sketches, architectural drawings or specifications and comments related to various aspects of the site survey.

Prior to performing a site survey for a BER assessment, 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 and information is not available from plans/specifications, then the defaults listed in the DEAP Manual (Appendix S and Table 4) should be used.

Please note that definitions in the DEAP Manual must be followed at all times.

3.1 External Survey

An initial survey of the outside of the dwelling (if possible) is very useful. Information which can be gathered through this external survey is as follows:

- External measurements to establish the overall footprint of the dwelling. External measurements must be converted to internal measurements before calculating floor area and heat loss areas. An external wall length is converted to an internal wall length by subtracting the wall thickness of the adjoining wall at both ends
- Establishing ventilation features such as number of vents, extract fans and sheltered sides
- Assessing age band indications, such as meter box date information
- Wall construction is often evident where the meter box has been fitted
- Confirming the orientation of the dwelling using a directional compass

3.2 Internal Survey

An initial walk around inside the dwelling is very useful and will assist in determining the following information:

- Confirming heat loss envelope elements such as ground floor type(s), wall types, window variations and in completing survey sketches for each floor, wall and other element types
- Assessing age band indications such as date stamp in the gap within double/triple glazing
- Confirming the ventilation as indicated from outside the dwelling. Checking that no vents have been blocked, and identifying the type of controls (if any) on the vents
- Identifying thermal mass composition, i.e. external wall, internal partitions, floors. Appendix S and Table 11 of the DEAP Manual provide guidance on thermal mass
- Average storey height for each dwelling storey.

3.3 Dwelling Sketches and Architectural Drawings

A sketch of the dwelling must be done with plans and elevations. Sketches, combined with the Survey Form and other evidence as outlined in this document, must provide enough data to complete a BER assessment using the DEAP software. Where architectural drawings (dwelling plans) are available, these can be used instead of sketches provided any differences between the architectural drawings and actual measurements taken on site are noted on the architectural

drawings by the BER Assessor. The sketches and/or architectural drawings must be kept on file as supporting evidence for the BER assessment. The dimensions entered in the DEAP assessment should reflect the actual measurements taken during the dwelling survey.

As a guide, the sketches/drawings should at least indicate the following:

- Extensions
- Different walls, floors and roof types
- Dimensions (total floor area, wall thickness, floor height, heat loss areas)
- Living area and dimensions thereof
- Unheated spaces – identifying walls between heated and unheated space
- Sheltered sides (indicating distance, height and width of sheltering objects and adjacent properties)
- Openings:
 - Door types, dimensions and orientations (with estimate of percentage glazing)
 - Window dimensions and orientations
 - Type(s) of glazing (e.g. single glazed, double glazed, any information about filling or glazing type)
 - Opening frame type(s) (PVC, Wood, metal and estimate of thermal break if possible to determine)
 - Estimated gap between panes if possible to determine
 - Overshading estimate on each opening

3.4 Room by Room Survey

Each room must be checked for the following:

- Total light bulb count and number of low energy lights
- Properties of openings such as:
 - Type of glazing (double, single, triple, stamp/brand on windows)
 - Dimensions
 - Frame type
 - Gap between glazing
 - Overshading
 - Orientation
 - Draught stripping
- Ventilation
- Living room area (for the appropriate room)
- Heat sources and controls (including TRVs and programmers)

This information must all be recorded in the DEAP Survey Form (Appendix I).

3.5 Attic Space Survey

Some useful dwelling compositional properties can be determined by accessing the attic space:

- Evidence of wall construction
- Roof insulation thickness (for insulation on the ceiling)

Particular attention must be paid to health and safety issues when accessing attic spaces.

3.6 DEAP Survey Tips

Where possible open the doors within the dwelling to establish the floor lengths when performing internal measurements. This reduces the number of internal measurements required.

The homeowner may have useful information on extensions to existing dwellings or other works which have been carried out. Supporting evidence (either photographic or documentary) regarding extension existence and age must be produced.

Ask the homeowner about “cold areas” in the house to indicate excessive ventilation draught or possible lack of insulation. The Assessor should also ask the homeowner if they know of any work which has been done on the dwelling which is likely to impact on the DEAP assessment. While the word of the homeowner in itself is not sufficient supporting evidence, it will help the Assessor to determine if they should aim to use non default data with the aid of appropriate supporting evidence as detailed in this document.

The local planning authorities may have information available pertaining to dwellings (particularly in relation to dwelling age). If a copy of the planning application, planning permission or commencement notice is available, this could also assist with the dwelling survey.

Where dwellings are fully renovated, the age band may be based on the age of the original building or the date of refurbishment. For example where an older building is converted into apartments, this is likely to be subject to extant Building Regulations at the time of refurbishment and the age band would be based on that refurbishment date. However, renovation or partial renovation of a house may not be subject to the extant Building Regulations and should have an age band based on the original building’s age.

Where a non default U-value is being used, then DEAP Tables 12a and 12b may be used to give thermal conductivity of common insulation materials and building materials. DEAP Table 12b may not be used for dwellings undergoing a “new-final” assessment.

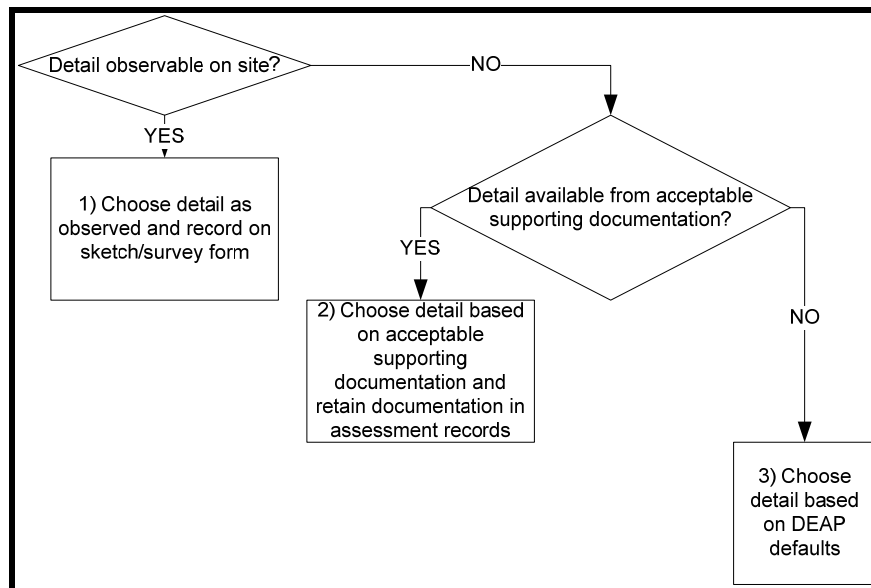
All stated non-default U-values must be accompanied by calculations done to the relevant standards.

4 Guidance on Supporting Evidence

As a general rule the defaults values in DEAP are conservative and must be used unless non-defaults can be supported through other documentation or evidence captured on site. For example, the BER Assessor should assume basic on/off heating controls unless they observe and collect evidence of zoning, timers, thermostats, etc.

The following diagram illustrates the order of priority for each data item in a BER assessment.

1. The actual data observed on site takes precedence.
2. Where the data item is not observable, it should be detailed using documentary evidence. Documentary evidence must be retained with the assessment records.
3. Where the data item is not observable on site or via documentary evidence, then a default is used.



This order of priority must be born in mind for all parameters entered in the DEAP software.

Photographs (or scans/copies if feasible) must be taken of documentation such as bills, invoices, receipts, dwelling specifications (from the developer, architect or engineer). All copies of supporting evidence and documentation should be clear and legible.

Receipts and invoices (for retrofitted insulation for example) must be clearly related to the specific dwelling address and display the date the work was carried out or the product was supplied.

Guidance in relation to the use of supporting evidence to enable the entry of data other than default data into the different tabs in the DEAP software is given in tabular form below. All items relevant to the particular dwelling must be recorded in the DEAP Survey Form as supporting evidence. Additional forms of supporting evidence are also identified, e.g. photographs, etc.

Reports of works carried out in the dwelling from a supervising engineer or architect are acceptable as supporting evidence. Reports need to provide sufficient detail for the DEAP entry in question. For example, for retrofitted insulation, the report must detail the material type, thickness and thermal conductivity, density of fill, etc.

In cases where Assessors are unsure if they have sufficient supporting evidence they should contact the BER Helpdesk for guidance.

<u>DEAP Software Tab: "Start"</u>	
Data Entry Item	Guidance
Dwelling type	External photo of the dwelling must be taken to indicate dwelling type. Any adjoining dwellings must also be shown in the dwelling photos so that the dwelling type may be correctly determined. The photograph must be marked or outlined such that the dwelling can be identified and distinguishable from the adjacent properties.
Dwelling and extensions age	<p>Legal documents indicating dwelling age are preferable. In the absence of relevant legal documentation, then at least two of the following indicators may be used:</p> <ul style="list-style-type: none"> • Stylistic evidence • Dwelling or development age plates • Electricity meter age • Glazing age printed within double or triple glazing • Homeowner knowledge <p>Similar methods must be applied when determining the age of extensions.</p>
MPRN number	The MPRN can be found on the electricity bill for the dwelling. In the absence of electricity bills, the MPRN may be printed in the electricity meter box or this information can be sourced from the ESB. The MPRN extranet on the National Administration System (NAS) should be used to confirm that the MPRN is correct.
Is there an extension?	<p>There are a number of potential indicators as to the existence and area covered by the extension such as:</p> <ul style="list-style-type: none"> • 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.
Purpose of rating	The client should indicate the purpose of the rating to the BER Assessor.
Comment box	The comment boxes in the DEAP Survey Form (and DEAP software) should be used to describe unusual aspects of the dwelling such as retrofitted insulation, extensions, renewables installed and so on.

<u>DEAP software tab: "Property and Assessor Details"</u>	
Data Entry Item	Guidance
Property address	Property address should be taken from electricity bills. In the absence of these, other utility bills should be used. The address must 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. Assessors should confirm the address with the client. Further guidance on attaining the correct property addresses is published in the September 2009 Domestic BER Technical Bulletin.

<u>DEAP software tab: "Dimensions"</u>	
Data Entry Item	Guidance
Floor areas	Dwelling sketches or architectural drawings must contain details of floor dimensions.
Storey heights	Floor thicknesses between storeys should be taken from drawings where available or may be taken from defaults, particularly for existing dwellings (see DEAP Manual Appendix S).
Room in roof floor areas	Dwelling sketches or architectural drawings must contain details of floor dimensions. The DEAP Software auto-calculates room in roof heat loss areas for existing dwellings.
Living area	Follow DEAP Manual guidance using living area recorded in dwelling sketches or architectural drawings.

<u>DEAP software tab: "Ventilation"</u>	
Data Entry Item	Guidance
Count of chimneys	Follow guidance in the DEAP Manual. Note, as per Section 2.1 of the DEAP Manual, the specified ventilation rate for chimneys (and open flues) "includes an allowance for the associated permanent vent for air supply, so this vent should not be entered separately".
Count of open flues	The DEAP Manual must be followed as it distinguishes between open flues, chimneys and room sealed appliances.
Intermittent fans and background / passive vents	Photographs of typical wall/window background vent must be taken as evidence. Pay close attention to Section 2.2 of the DEAP Manual in relation to trickle vents, controllable vents and permanently open vents. The minimum open area of 3,500mm ² equates to an (open) circle of 67mm diameter.
Flueless combustion roomheaters	See ventilation section in DEAP Manual

Draught lobby	Sketch/architectural drawings and/or photograph required as supporting evidence for draught lobby.
Pressure (permeability) test	Clear photograph or photocopy of pressure test certificate (with legible text) required. Address of dwelling and date of pressure test must be visible. Test data must be from an individual or organisation with relevant accreditation. Alterations to the dwelling envelope subsequent to pressure test render that test certificate invalid. DEAP defaults (“no pressure test”) may be used.
Structure type	Photographic evidence must be provided to show structure type. Detail from dwelling plans and/or specifications may also be used in determining the structure type.
Solid/suspended ground floors	For suspended floors, assume unsealed unless it can be easily proven otherwise. See DEAP Manual for further detail.
% Draught stripping	Double/triple glazed windows usually have draught stripping. If draft stripping fitted to single glazed windows, photographic evidence must be taken to support this. Draught stripping on doors and attic hatches must also be accounted for.
Sheltered sides	Follow section 2.5 of the DEAP manual when determining the number of sheltered sides. Sheltered sides must be shown on sketches/ architectural drawings (indicating distance, height and width of sheltering objects and adjacent properties).
Whole house mechanical ventilation	Photographic evidence can be used to record make, model and configuration/ducting of heat recovery unit (or other mechanical ventilation types) in cases where non-default SAP Appendix Q data is being used. If the unit is inaccessible, then dwelling specifications, invoices or receipts may be used to determine the make/model of the ventilation system.

DEAP software tab: “Building Elements”

Data Entry Item	Guidance
Heat loss floor U-values	<p>It is unlikely that there will be sufficient information available on site to calculate the floor U-value. However, detail of the actual floor parameters on site must be used where available. Photographs of the relevant information must be kept on file.</p> <p>Where insulation is not accessible, documentary evidence of type and thickness of installed insulation and other layers in the building element in question must be used where available. Copies of documentation must be kept with the records for the assessment. When using documentary evidence, the documentation must indicate that the entire heat loss surface has achieved the non default U-value.</p> <p>Certified data for insulation thermal conductivity is required when calculating non-default U-values for new dwellings. Thermal conductivities from DEAP Table 12b may be used for existing dwellings if certified data is not available.</p>

	Where there is insufficient information available to calculate U-values, then defaults from DEAP Appendix S must be used as indicated in Section 4 above.
Floor perimeter and areas	Internal areas and exposed perimeters must be measured and recorded on dwelling sketches or architectural drawings.
Heat loss roof U-values	<p>It may be possible to gather information on site in relation to the dwelling roofs and this information must be used where available. Photographs of the relevant information must be kept on file. Ensure insulation depth is established by taking the average of a number of measurements (including insulation levels on attic hatches). Different U-values (e.g. significantly different depths or materials) must be treated as separate roofs in DEAP.</p> <p>Where insulation is not accessible, documentary evidence of type and thickness of installed insulation and other layers in the building element in question must be used where available. Copies of documentation must be kept with the records for the assessment. When using documentary evidence, the documentation must indicate that the entire heat loss surface has achieved the non default U-value.</p> <p>Certified data for insulation thermal conductivity is required when calculating non-default U-values for new dwellings. Thermal conductivities from DEAP Table 12b may be used for existing dwellings if certified data is not available.</p> <p>Where there is insufficient information available to calculate U-values, then defaults from DEAP Appendix S must be used as indicated in Section 4 above.</p>
Roof area	Internal areas must be measured on site and recorded using dwelling sketches or architectural drawings.
Heat loss wall U-values	<p>It may be possible to gather information on site in relation to the dwelling walls and wall type and this information must be used where available. Photographs of the relevant information must be kept on file. Note that a filled cavity wall may show drill marks above, below and to the sides of each window and spread out across larger wall sections. These marks are typically filled with mortar. If using the presence of these marks as evidence of cavity wall fill insulation, they must be visible on each facade for which the filled cavity wall U-value is to be applied.</p> <p>Where insulation is not accessible, documentary evidence of type and thickness of installed insulation and other layers in the building element in question should be used where available. Copies of documentation must be kept with the records for the assessment. When using documentary evidence, the documentation must indicate that the entire heat loss surface has achieved the non default U-value.</p>

	<p>Certified data for insulation thermal conductivity is required when calculating non-default U-values for new dwellings. Thermal conductivities from DEAP Table 12b may be used for existing dwellings if certified data is not available.</p> <p>Where there is insufficient information available to calculate U-values, then defaults from DEAP Appendix S must be used as indicated in Section 4 above.</p> <p>If the wall type is unidentifiable you must assume that the wall is "unknown" wall type.</p>
Wall area	Internal areas must be measured and recorded using dwelling sketches or architectural drawings.
Door U-value	The default door U-values in DEAP Table 6a must be used unless proven otherwise by photographs or certificates of thermal performance. Table 6 in the DEAP Manual provides details on how to determine the U-value of a partially glazed door.
Door area	Doors should be measured on site, although for existing dwellings, Assessors may use the default values given in DEAP unless it is obvious that they are not applicable. Measured door areas are recorded as openings on the DEAP Survey Form and may also be shown on sketches or architectural drawings. When using the default door area, double doors are input as 2 doors in the DEAP software.
Window U-value	<p>Original installation documentation from the developer or installer detailing window make and model can be used if available (to obtain certified data). When a non-default window U-value is being used, then a non-default, certified solar transmittance value must also be specified in DEAP.</p> <p>Representative photographs of the window, gap between glazing, manufacturer's stamp can be used as supporting evidence when using defaults from DEAP Table 6.</p> <p>DEAP Section 3.2 outlines how default window U-values and solar transmittance values are obtained in the absence of certified data.</p>
Window Area	On site measurements must be recorded on dwelling sketches or architectural drawings. Window details can also be recorded on the DEAP Survey Form.
Window overshadowing	Use of non defaults is encouraged and photographs are used as supporting evidence.
Window orientation	The window orientation must be recorded on the dwelling sketches or architectural drawings.
Thermal bridging factor	Default of 0.15 as per Appendix S of DEAP Manual for new and existing dwellings. For new dwellings, follow DEAP Appendix K. Use of non-defaults is based on documentation from the developer/architect/engineer specified in DEAP Appendix K. Documentation supporting a non-default thermal bridging factor must contain or refer to each of the relevant items/detail diagrams.

DEAP software tab: "Water Heating"	
Data Entry Item	Guidance
Distribution losses y/n	Generally the answer will be "yes". If entering "no" evidence must be provided (for example representative photographs of heaters at hot taps can be taken).
Storage losses y/n	Generally the answer will be "yes". If entering "no" evidence must be provided (for example representative photographs of an instantaneous combi-boiler without storage).
Supplementary electric water heating in summer y/n	Follow guidance in DEAP Manual Section 4.6. Representative photographs of heating controls must be taken (such as switch or timer separating space and water heating).
Combi-boiler y/n	Common Indicators to look for are as follows: Make and model of the boiler. There may be no storage outside of boiler. The boiler is likely to have two sets of flow/return pipes. Note that a combi boiler could have an internal store. The relevant supporting data must be recorded on the DEAP Survey Form.
Storage temperature factors	Follow guidance in DEAP Manual. Representative photographs of heating controls must be taken (such as water heating timer and/or thermostat).
Water storage volume	Assessors must record the water storage volume and the means by which that volume was determined. Follow DEAP Table 2a to derive the hot water storage volume. Height and width of the storage volume should not include the insulation thickness. The means by which the water storage volume was derived must be detailed in assessment records.
Insulation type of the water storage volume	Hot water storage insulation type must be measured on site or derived from labels on the storage volume or product documentation. Details are to be recorded on the DEAP Survey Form. Alternatively, please follow the rules as per Appendix S of the DEAP Manual.
Is hot water storage indoors or in group heating scheme?	This is set to "yes" if the majority of the installed hot water storage as entered under the DEAP "water heating" tab is within the dwelling total floor area and is therefore contributing to the dwelling's heat gains. It is also set to "yes" if the hot water storage is part of a group heating scheme.
Thickness of storage insulation	Measure insulation thickness where accessible and record the details on the DEAP Survey Form. Otherwise use defaults in Appendix S of the DEAP Manual.
Primary circuit loss type	It may be difficult to show evidence of primary circuit insulation between all pipes from heat source to the hot water storage volume. Dwelling specification or retrofit works documentation may be used as supporting evidence. The default is that primary pipework is uninsulated.

Solar thermal panels	Photographic evidence of existence and layout of solar panels must be taken to support the data inputs. Installation and manual documentation or product labelling should be sought. If available, a copy of relevant documentation must be taken. Determine make and model where possible. Solar panels on the dwelling may be listed on the HARP database or certified data may be obtainable.
Aperture area of solar panels.	Use data from HARP where available. Alternatively data may be obtained from certified data. If relying on defaults, follow Appendix S Table S11 and Appendix H in the DEAP Manual. Data must be recorded on the DEAP Survey Form.
Zero loss collector efficiency	
Collector heat loss coefficient	
Annual solar radiation	Refer to Appendix H. Tilt and orientation needs to be established and then Table H2 in DEAP is used. This data must be recorded on the DEAP Survey Form.
Solar collector overshadowing, orientation and tilt	Follow Appendix S Table S11 and Appendix H, Table H3 in DEAP. This data must be recorded on the DEAP Survey Form.
Dedicated solar storage	Follow guidance in Appendix H. For combined cylinder, measure below boiler/heat pump coil pipes. Volume and location of pipes may also be available from water storage datasheets. This data must be recorded on the DEAP Survey Form.

DEAP software tab: "Lighting and Internal Gains"

Data Entry Item	Guidance
% of low energy fixed lighting outlets	Follow DEAP Manual guidance, particularly Appendix L. Data gathered during the dwelling survey must be recorded on the Survey Form, dwelling sketches or architectural drawings.

DEAP software tab: "Net Space Heat Demand"

Data Entry Item	Guidance
Thermal mass category	For new dwellings, use DEAP Table 11 and indicate the overall thermal mass category on the DEAP survey form. Calculations to determine the overall mass category via the derivation of the "AmAf" value must be held on file. 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 indicate the thermal mass of walls and floors in the DEAP Survey Form.

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.
Central heating pump	Follow guidance in the DEAP Manual. Details must be recorded on the DEAP Survey Form relating to central heating pumps distributing heat to space heating emitters. Calculations for non-default central heating pump power as per Table 4f may be carried out if sufficient information is available. Also, record presence of room thermostat on heating system and details of pump location (inside or outside dwelling area being assessed).
Oil boiler fuel pumps	Follow guidance in the DEAP Manual. It is likely that an oil boiler will contain an internal fuel pump. There may be another external fuel pump and this must be accounted for. Details must be recorded on the DEAP Survey Form. Also, record presence of room thermostat on heating system and details of pump location (inside or outside dwelling area being assessed).
Gas boiler flue fan	Follow guidance in the DEAP Manual. It is likely that a gas boiler will have a gas boiler flue fan. Details must be recorded on the DEAP Survey Form.
Warm air heating or fan coil radiators present?	Follow guidance in the DEAP Manual. Warm air may be installed as an alternative to radiators or underfloor heating. Warm air heating should not be selected to represent heat recovery systems as related fan power is already accounted for in ventilation tab. Fan coil radiators have an electric fan to distribute heat to the room from the radiator. Details must be recorded on the DEAP Survey Form.

<u>DEAP software tab: “Energy Requirements”</u>	
Data Entry Item	Guidance
Main Space and Water heating system	Photographs of the heating system must be taken to support data inputs. Photographs of nameplates with manufacturer name and model number can also be taken for HARP lookup. Make and model should be recorded in DEAP. Appendix A and Table 4 in DEAP manual must be followed. Heating system manuals or installation certificates can also be copied and used as supporting data. DEAP Manual rules apply when determining heating system efficiencies. Details must be recorded on the DEAP Survey Form.
Secondary heating system	Photographs of the heating system can be taken to support data inputs. Photographs of nameplates with manufacturer name and model number can also be taken for HARP lookup. Make and model should be recorded in DEAP. Appendix A and Table 4 in DEAP manual must be followed. Heating system manuals or installation certificates can also be copied and used as supporting data. DEAP Manual rules apply when determining heating system efficiencies. Details must be recorded on the DEAP Survey Form.
Fuel data	If a solid fuel burner is capable of burning more than one type of fuel, follow Section 10.3.3 of the DEAP manual in determining the correct fuel type. Details must be recorded on the DEAP Survey Form.
Group heating scheme.	A bill showing evidence of a group heating scheme is required to support the data inputs. Documentary evidence from the group heating provider or system designer, etc. is also acceptable. Details must be recorded on the DEAP Survey Form.
Distribution loss factor	The age of the dwelling is required here. Supporting data / documentation from the service provider is also required for group heating schemes. See DEAP Appendix C1.1. Details must be recorded on the DEAP Survey Form.
Combined Heat and Power (CHP) for group or individual heating system.	DEAP Appendix N applies. Details must be recorded on the DEAP Survey Form. Where available, efficiency data is taken from test reports based on a national standard or the CHP Directive 2004/8/EC.

Appendix I: DEAP Survey Form

DEAP for NEW-FINAL and EXISTING HOMES SURVEY FORM																																																																																																	
Client name: _____			Assessor name / BER reg. no. _____																																																																																														
Property address: _____			Survey Date: _____																																																																																														
MPRN			Number of occupants: <input type="checkbox"/> adults <input type="checkbox"/> children																																																																																														
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<input type="checkbox"/> no wall type 3 <input type="checkbox"/> wall thickness (mm) _____ <input type="checkbox"/> stone <input type="checkbox"/> is wall semi exposed? <input type="checkbox"/> solid brick Wall Insulation <input type="checkbox"/> cavity <input type="checkbox"/> as built <input type="checkbox"/> bead <input type="checkbox"/> <input type="checkbox"/> solid concrete <input type="checkbox"/> cavity fill <input type="checkbox"/> EPS <input type="checkbox"/> hollow block <input type="checkbox"/> external <input type="checkbox"/> min fibre <input type="checkbox"/> timber frame <input type="checkbox"/> internal <input type="checkbox"/> dense <input type="checkbox"/> other/unknown _____ insulation thickness if observable(mm) _____	<input type="checkbox"/> no heat loss roof type 3 Roof insulation <input type="checkbox"/> pitched - insulation btw joists thickness (mm) _____ fibre <input type="checkbox"/> <input type="checkbox"/> pitched - insulation in rafters _____ warmcell <input type="checkbox"/> <input type="checkbox"/> flat - insulation integral _____ EPS <input type="checkbox"/> <input type="checkbox"/> room in roof _____ unknown <input type="checkbox"/> dense <input type="checkbox"/> <input type="checkbox"/> other _____	<input type="checkbox"/> no heat loss extension floor type 3 <input type="checkbox"/> solid <input type="checkbox"/> suspended: sealed <input type="checkbox"/> unsealed <input type="checkbox"/> <input type="checkbox"/> above unheated basement <input type="checkbox"/> other _____ Floor Insulation Type of insulation (if any) _____ thickness (mm) _____ EPS <input type="checkbox"/> (only if any observed) min fibre <input type="checkbox"/> <input type="checkbox"/> none <input type="checkbox"/> unknown <input type="checkbox"/> dense <input type="checkbox"/>																																																																																															
Wall construction Wall Type 4*	Roof Construction: Roof Type 4*	Heat Loss Upper Floors (Floor Type 4)*																																																																																															
<input type="checkbox"/> no wall type 4 <input type="checkbox"/> wall thickness (mm) _____ <input type="checkbox"/> stone <input type="checkbox"/> is wall semi exposed? <input type="checkbox"/> solid brick Wall Insulation <input type="checkbox"/> cavity <input type="checkbox"/> as built <input type="checkbox"/> bead <input type="checkbox"/> <input type="checkbox"/> solid concrete <input type="checkbox"/> cavity fill <input type="checkbox"/> EPS <input type="checkbox"/> hollow block <input type="checkbox"/> external <input type="checkbox"/> min fibre <input type="checkbox"/> timber frame <input type="checkbox"/> internal <input type="checkbox"/> dense <input type="checkbox"/> other/unknown _____ insulation thickness if observable(mm) _____	<input type="checkbox"/> no heat loss roof type 4 Roof insulation <input type="checkbox"/> pitched - insulation btw joists thickness (mm) _____ fibre <input type="checkbox"/> <input type="checkbox"/> pitched - insulation in rafters _____ warmcell <input type="checkbox"/> <input type="checkbox"/> flat - insulation integral _____ EPS <input type="checkbox"/> <input type="checkbox"/> room in roof _____ unknown <input type="checkbox"/> dense <input type="checkbox"/> <input type="checkbox"/> other _____	<input type="checkbox"/> no heat loss upper floor <input type="checkbox"/> partially heated below <input type="checkbox"/> exposed <input type="checkbox"/> semi exposed Floor Insulation Type of insulation (if any) _____ thickness (mm) _____ EPS <input type="checkbox"/> (only if any observed) min fibre <input type="checkbox"/> <input type="checkbox"/> none <input type="checkbox"/> unknown <input type="checkbox"/> dense <input type="checkbox"/>																																																																																															

*note: Actual U-value should be calculated and used if the wall /roof /floor construction detail is available on site or through documentation. Substantiation supporting the U-value calculation is required.

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Ventilation Factors			
<input type="checkbox"/> draught lobby on main entrance	<input type="checkbox"/> number of sides sheltered	<input type="checkbox"/> pressure test results available	<input type="checkbox"/> If yes, enter adjusted result (ac/h)
<input type="checkbox"/> natural ventilation	<input type="checkbox"/> positive input ventilation from loft	<input type="checkbox"/> positive input ventilation from outside	<input type="checkbox"/> whole house extract ventilation
<input type="checkbox"/> balanced whole-house mechanical ventilation without heat recovery	<input type="checkbox"/> balanced whole-house mechanical ventilation with heat recovery		
Mechanical ventilation system details if available (e.g. model & number, along with number of rooms from which air is extracted and use of flexible/rigid ducting) DEAP manual contains guidance on using non default SFP and efficiency for mechanical ventilation units.			
Space heating system (general information)			
Primary Heating System	Secondary Heating System	Primary Heating Fuel	Secondary Heating Fuel
<input type="checkbox"/> radiator system <input type="checkbox"/> storage heaters <input type="checkbox"/> underfloor <input type="checkbox"/> warm air <input type="checkbox"/> room heaters only <input type="checkbox"/> community <input type="checkbox"/> fan coil radiators <input type="checkbox"/> other (describe briefly):	<input type="checkbox"/> no secondary system <input type="checkbox"/> radiator system <input type="checkbox"/> storage heaters <input type="checkbox"/> underfloor <input type="checkbox"/> warm air <input type="checkbox"/> room heaters only <input type="checkbox"/> fan coil radiators <input type="checkbox"/> other (describe briefly):	<input type="checkbox"/> mains gas <input type="checkbox"/> bulk LPG <input type="checkbox"/> bottled LPG <input type="checkbox"/> heating oil <input type="checkbox"/> electricity <input type="checkbox"/> heat from CHP <input type="checkbox"/> bioethanol <input type="checkbox"/> other:	<input type="checkbox"/> housecoal <input type="checkbox"/> anthracite <input type="checkbox"/> smokeless <input type="checkbox"/> peat briquettes <input type="checkbox"/> sod peat <input type="checkbox"/> wood pellets <input type="checkbox"/> wood chips <input type="checkbox"/> biodiesel <input type="checkbox"/> other:
Gas / Oil / LPG Boilers	primary	secondary	Comments on heating system
Boiler type <input type="checkbox"/> standard <input type="checkbox"/> combi <input type="checkbox"/> condensing <input type="checkbox"/> back boiler <input type="checkbox"/> CPSU <input type="checkbox"/> range cooker <input type="checkbox"/> single burner <input type="checkbox"/> twin burner Manufacturer / make / model number	Flue type <input type="checkbox"/> open <input type="checkbox"/> balanced <input type="checkbox"/> fan assisted <input type="checkbox"/> wall <input type="checkbox"/> floor	Age <input type="checkbox"/> 1998 or later <input type="checkbox"/> pre 1998 <input type="checkbox"/> oil: pre 1985 <input type="checkbox"/> gas/ LPG pre 1979 Ignition <input type="checkbox"/> auto <input type="checkbox"/> permanent pilot	Comments on heating system
Solid Fuel Boilers primary secondary <input type="checkbox"/> open fire + back boiler range cooker boiler with integral oven <input type="checkbox"/> closed room heater + back boiler independent oven grate: rectangular trapezium <input type="checkbox"/> manual feed boiler biomass boiler <input type="checkbox"/> auto feed boiler wood chip / pellet boiler MF / AF boiler in heated space? Manufacturer / make / model number			
Electric Storage Heaters	primary	secondary	Electric Boilers
<input type="checkbox"/> modern / slimline <input type="checkbox"/> convector <input type="checkbox"/> integrated storage / direct acting (inc. room stat) Control options <input type="checkbox"/> manual charge control <input type="checkbox"/> automatic / weather dependent <input type="checkbox"/> Celect-type	<input type="checkbox"/> fan assisted <input type="checkbox"/> old (pre-1980) large volume	<input type="checkbox"/> direct acting <input type="checkbox"/> dry core <input type="checkbox"/> dry core / water storage in heated space	<input type="checkbox"/> CPSU <input type="checkbox"/> water storage
Warm Air Systems	primary	secondary	Gas Room Heaters
Ducted or Stub Ducted <input type="checkbox"/> on - off <input type="checkbox"/> modulating Age <input type="checkbox"/> 1998 or later <input type="checkbox"/> pre 1998 Other types <input type="checkbox"/> Room heater with in floor ducts <input type="checkbox"/> Electric electricaire	Other Features (tick all that apply) <input type="checkbox"/> fan assisted <input type="checkbox"/> condensing <input type="checkbox"/> with flue heat recovery	<input type="checkbox"/> coal effect - sealed flue <input type="checkbox"/> coal effect - open to chimney <input type="checkbox"/> flueless <input type="checkbox"/> condensing <input type="checkbox"/> back boiler (no rads) <input type="checkbox"/> other (none of above)	<input type="checkbox"/> pre 1980 <input type="checkbox"/> open-fronted <input type="checkbox"/> glass-fronted Flue type <input type="checkbox"/> open <input type="checkbox"/> balanced <input type="checkbox"/> fan assisted
Heat Pumps	primary	secondary	Oil Room Heaters
<input type="checkbox"/> air-to-air <input type="checkbox"/> air-to-water <input type="checkbox"/> gas-fired - ground / water heat pump includes auxiliary electric heater Manufacturer / make / model number	<input type="checkbox"/> ground-to-air <input type="checkbox"/> ground-to-water <input type="checkbox"/> gas-fired, air source	<input type="checkbox"/> water-to-air <input type="checkbox"/> water-to-water	<input type="checkbox"/> room heater / range <input type="checkbox"/> room heater/range with boiler (no rads) Age <input type="checkbox"/> pre 2000 <input type="checkbox"/> 2000 or later
			Solid Fuel Room Heaters
			<input type="checkbox"/> open fire in grate <input type="checkbox"/> open fire with backboiler (no rads) <input type="checkbox"/> closed room heater <input type="checkbox"/> closed room heater with backboiler (no rads)
			Electric Room Heaters
			<input type="checkbox"/> panel, convector, or radiant heater <input type="checkbox"/> fan heater
			Secondary heating make / manufacturer/model number _____
			Individual CHP? <input type="checkbox"/> % heat from CHP CHP efficiencies Electrical % Thermal % Fuel

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Heating system (Domestic Hot Water)													
Primary Hot Water System <input type="checkbox"/> from primary heating system <input type="checkbox"/> gas instant: single point <input type="checkbox"/> backboiler / kitchen range <input type="checkbox"/> electric immersion <input type="checkbox"/> gas instant: multi point <input type="checkbox"/> gas <input type="checkbox"/> oil <input type="checkbox"/> SF <input type="checkbox"/> electric instantaneous <input type="checkbox"/> gas circulator pre 1998 <input type="checkbox"/> gas circulator 1998 or later If instantaneous combi boiler: <input type="checkbox"/> keep hot facility controlled by <input type="checkbox"/> timeclock <input type="checkbox"/> no timeclock If storage combi: store volume <input type="checkbox"/> <55 litres <input type="checkbox"/> >= 55 litres		Solar Water Heating System <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> evacuated tube <input type="checkbox"/> flat plate, glazed <input type="checkbox"/> Flat plate unglazed <input type="checkbox"/> solar collector area (m ²) <input type="checkbox"/> area is "gross" area <input type="checkbox"/> <input type="checkbox"/> area is "aperture area" overshadowing: <input type="checkbox"/> very little (<20%) <input type="checkbox"/> modest (20-60%) <input type="checkbox"/> significant (61-80%) <input type="checkbox"/> heavy (>80%)											
Hot Water Cylinder, Insulation and Controls <input type="checkbox"/> cylinder <input type="checkbox"/> combi <input type="checkbox"/> CPSU <input type="checkbox"/> thermal store <input type="checkbox"/> no access Insulation: <input type="checkbox"/> no insulation primary pipework insulated <input type="checkbox"/> Controls: <input type="checkbox"/> capacity (litres) <input type="checkbox"/> lagging jacket <input type="checkbox"/> insulation cylinder thermostat <input type="checkbox"/> <input type="checkbox"/> or dimensions <input type="checkbox"/> factory fitted <input type="checkbox"/> thickness (mm) independent timer <input type="checkbox"/> <i>Cylinder volume/dimensions does not include insulation thickness</i> storage is outdoors <input type="checkbox"/>		dedicated solar storage volume (litres) <input style="width: 50px;" type="text"/> contained within combined cylinder <input type="checkbox"/> contained within separate cylinder <input type="checkbox"/> orientation <input style="width: 50px;" type="text"/> tilt ° <input style="width: 50px;" type="text"/> Solar panel make and model: <input style="width: 100px;" type="text"/>											
Supplementary Summer Hot Water <input type="checkbox"/> not applicable <input type="checkbox"/> electric heater present for supplementary hot water heating* <i>*only if space heating and water heating cannot be separated and main water heating isn't electric. See DEAP manual</i>													
Comments on water heating system <div style="height: 40px;"></div>													
Heating system (Controls)													
Heating Controls (tick all that apply) <input type="checkbox"/> no controls <input type="checkbox"/> programmer / timeclock <input type="checkbox"/> room thermostat number <input style="width: 30px;" type="text"/> <input type="checkbox"/> TRV's % rads with TRVs <input style="width: 30px;" type="text"/> <input type="checkbox"/> bypass <input type="checkbox"/> load compensator <input type="checkbox"/> weather compensator <input type="checkbox"/> full zone control <input type="checkbox"/> boiler energy management system <input type="checkbox"/> delay start thermostat <input type="checkbox"/> boiler interlock <input type="checkbox"/> appliance thermostat <input type="checkbox"/> appliance timeclock		Underfloor heating (UFH) <input type="checkbox"/> in insulated timber floor <input type="checkbox"/> whole house UFH <input type="checkbox"/> in screed <input type="checkbox"/> Partial UFH including living area <input type="checkbox"/> in concrete <input type="checkbox"/> Partial UFH not including living area											
		Pumps <input type="checkbox"/> How many central heating pumps for space heating? Central heating pump(s) outdoors <input type="checkbox"/> <input type="checkbox"/> How many oil boiler fuel pumps? Oil fuel pump(s) outdoors <input type="checkbox"/> <input type="checkbox"/> How many gas boiler flue fans?											
Comments on Heating Controls <div style="height: 40px;"></div>													
Group Heating													
Distribution Loss Factor and charge method <input type="checkbox"/> pre 1991 full flow mid-high temp: not pre-insulated <input type="checkbox"/> pre 1991 full flow low temp: pre-insulated <input type="checkbox"/> 1991 or later variable flow mid temp: pre-insulated <input type="checkbox"/> 1991 or later variable flow low temp: pre-insulated <i>See DEAP C1.1 for dist. loss factor derivation method</i> consumption charged: flat rate <input type="checkbox"/> linked to use <input type="checkbox"/>		<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #e0e0e0;">Heating system #1</th> <th style="background-color: #e0e0e0;">Heating system #2</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> efficiency %</td> <td><input type="checkbox"/> efficiency %</td> </tr> <tr> <td><input type="checkbox"/> proportion of group heating %</td> <td><input type="checkbox"/> proportion of group heating %</td> </tr> <tr> <td>Fuel type of heating system <input style="width: 100px;" type="text"/></td> <td>Fuel type of heating system <input style="width: 100px;" type="text"/></td> </tr> <tr> <td>Make and model of heating system <input style="width: 100px;" type="text"/></td> <td>Make and model of heating system <input style="width: 100px;" type="text"/></td> </tr> </tbody> </table>		Heating system #1	Heating system #2	<input type="checkbox"/> efficiency %	<input type="checkbox"/> efficiency %	<input type="checkbox"/> proportion of group heating %	<input type="checkbox"/> proportion of group heating %	Fuel type of heating system <input style="width: 100px;" type="text"/>	Fuel type of heating system <input style="width: 100px;" type="text"/>	Make and model of heating system <input style="width: 100px;" type="text"/>	Make and model of heating system <input style="width: 100px;" type="text"/>
Heating system #1	Heating system #2												
<input type="checkbox"/> efficiency %	<input type="checkbox"/> efficiency %												
<input type="checkbox"/> proportion of group heating %	<input type="checkbox"/> proportion of group heating %												
Fuel type of heating system <input style="width: 100px;" type="text"/>	Fuel type of heating system <input style="width: 100px;" type="text"/>												
Make and model of heating system <input style="width: 100px;" type="text"/>	Make and model of heating system <input style="width: 100px;" type="text"/>												
CHP / Waste Heat <input type="checkbox"/> % heat from CHP (or power station) <input type="checkbox"/> power station <input type="checkbox"/> CHP CHP efficiencies <input type="checkbox"/> Electrical % <input type="checkbox"/> Thermal % Fuel <input style="width: 50px;" type="text"/>													
Any other comments or details on assessment including items observed which affect the rating but not shown elsewhere on survey form/sketches. <div style="height: 100px;"></div>													