Dwelling Energy Assessment Procedure (DEAP) Survey Guide

VERSION 3.0 (draft)

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 is a draft version of the DEAP Survey Guide specifically to assist with compliance checking for Part L of the Building Regulations 2019. The previous DEAP Survey Guide (Version 2.1) must be used by DEAP Assessors when publishing BER assessments on SEAI's National Administration System until notified otherwise by SEAI. 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 https://www.seai.ie/energy-in-business/ber-assessor-support/deap/.

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 Form[1] (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 https://www.seai.ie/energy-in-business/ber-assessor-support/deap/ .

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 fixed light bulb count and type of each light bulb. Additional data is collected for DEAP where lighting design is known: lamp power, lamp types and efficacy (if known). This additional lighting design information must be used where available for both new and existing dwelling assessments.
- 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)
- Identify baths and showers, including type of showers (electric/mixer, pumped/not pumped, vented/unvented), flow restrictors.

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.

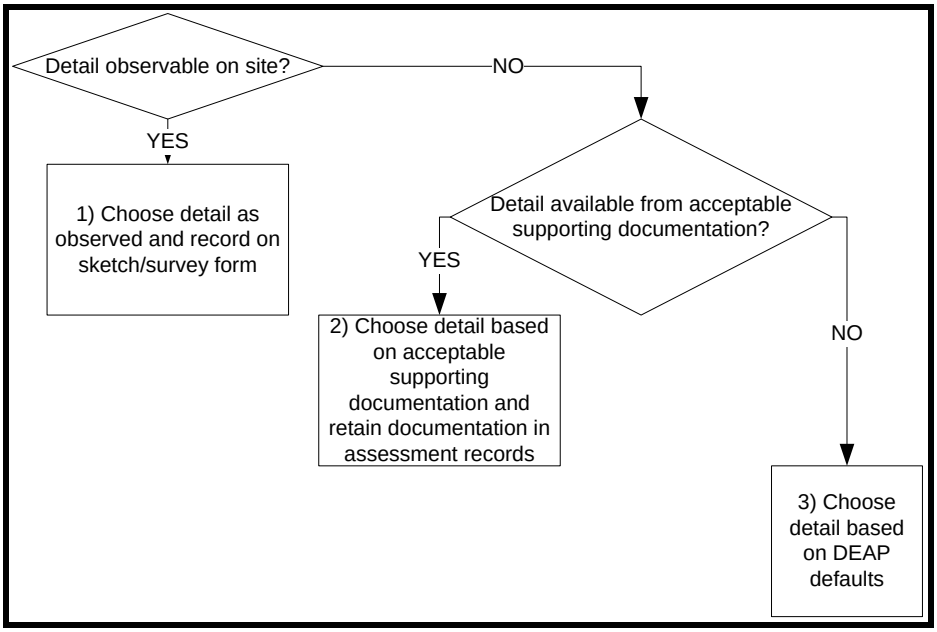
All stated non-default U-values must be accompanied by calculations done to the relevant standards.

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. Assessors are advised to replicate pages of

the survey form if there is insufficient space in the four pages included in the original format. In addition, Assessors should use more than one row in the "room by room" record, if any room requires additional space (e.g. several types of light bulb in a single room).

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.

DEAP Software Tab: "Start"	
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	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:** • Stylistic evidence • Dwelling or development age plates • Electricity meter age • Glazing age printed within double or triple glazing • Homeowner knowledge Similar methods must be applied when determining the age of extensions.
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?	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.
Purpose of rating	The client should indicate the purpose of the rating to the BER Assessor. This will be one of: • New dwelling for owner occupation; • Sale; • Private letting; • Social housing letting; • Grant support; • Major renovation (see TGD L 2019 Section 2.3); • Other.
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.

DEAP software tab: "Property and Assessor Details"	
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.

DEAP software tab: "Dimensions"	
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.

DEAP software tab: "Ventilation"	
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 3,500mm² 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. The air tightness test result (q50) and the air tightness test report reference number are both collected for DEAP. 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 PCDB (formerly 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. Heat exchanger efficiency is collected for heat recovery systems, as well as a record of whether ducting outside the dwelling envelope is insulated (as defined in the DEAP Manual). For exhaust air heat pumps, the unit air flow rate (m^3/h) is also recorded.

DEAP software tab: "Building Elements"	
Data Entry Item	**Guidance**
Heat loss floor U-values	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.

	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. 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. 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	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. 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. 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. 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.
Roof area	Internal areas must be measured on site and recorded using dwelling sketches or architectural drawings.
Heat loss wall U-values	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. 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. 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. 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. If the wall type is unidentifiable you must assume that the wall is "unknown" wall type.
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	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. Representative photographs of the window, gap between glazing, manufacturer's stamp can be used as supporting evidence when using defaults from DEAP Table 6.

	DEAP Section 3.2 outlines how default window U-values and solar transmittance values are obtained in the absence of certified data.
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 overshading	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. Any y-value other than 0.15 requires supporting documentation. 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).
Shower types, flow restrictors, Waste Water Heat Recovery Systems (WWHR), baths	Follow guidance in the DEAP manual. Details must be recorded on the DEAP Survey Form.
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 overshading, 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**

Number and type of each lamp is recorded	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.
Lighting design information	Additional lighting design information is to be kept on file by the Assessor where available in dwelling sketches, architectural drawings or dwelling specifications as follows: • Wattage for each lamp type • Efficacy figures are optional and are defaulted in DEAP based on lamp type where not available. Efficacy and Wattage for specific lamps is available from the EU energy rating certificate for light bulbs. Wattage is usually printed on lamp packaging and on the lamps themselves.

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.

DEAP software tab: "Energy Requirements"	
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:

Property address:

MPRN

Assessor name / BER reg. no.

Survey Date:

Number of occupants adults children

Dwelling Type
- detached house
- semi detached house
- end of terrace
- mid terrace
- ground floor apartment
- mid floor apartment
- top-floor apartment
- basement apartment
- maisonette

Pick dwelling type that is closest to actual dwelling type

Age: Dwelling	Age: Extension 1	Age:Extension 2
pre 1900	pre 1900	pre 1900
1900 - 1929	1900 - 1929	1900 - 1929
1930 - 1949	1930 - 1949	1930 - 1949
1950 - 1966	1950 - 1966	1950 - 1966
1967 - 1977	1967 - 1977	1967 - 1977
1978 - 1982	1978 - 1982	1978 - 1982
1983 - 1993	1983 - 1993	1983 - 1993
1994 - 1999	1994 - 1999	1994 - 1999
2000 - 2004	2000 - 2004	2000 - 2004
2005 onwards	2005 onwards	2005 onwards
	no extension 1	no extension 2

number of stories

Type of Rating
- new-final dwelling
- existing dwelling

Purpose of Rating
- new: owner occupation
- sale
- private letting
- social housing letting
- grant support
- major renovation
- other

Wall construction Main Wall*
- stone — wall thickness (mm)
- solid brick — is wall semi exposed?
- cavity
- solid concrete
- hollow block
- timber frame
- other/unknown

Wall Insulation: as built, cavity fill, external; bead, EPS, min fibre, internal; dense

insulation thickness if observable(mm)

Roof Construction: Main Dwelling*
- pitched - insulation btw joists
- pitched - insulation in rafters
- flat - insulation integral
- room in roof
- no heat loss roof
- other

Roof insulation: thickness (mm); fibre, warmcell, EPS, unknown, dense

Ground Floor Construction: Main Dwelling*
- solid
- no heat loss ground floor
- suspended: sealed, unsealed
- above unheated basement
- heated basement
- other

Floor Insulation — **Type of insulation (if any)**: thickness (mm) (only if any observed); EPS, min fibre, none, unknown, dense

Wall construction Wall Type 2*
- no wall type 2 — wall thickness (mm)
- stone — is wall semi exposed?
- solid brick
- cavity
- solid concrete
- hollow block
- timber frame
- other/unknown

Wall Insulation: as built, cavity fill, external, internal; bead, EPS, min fibre, dense

insulation thickness if observable(mm)

Roof Construction: Roof Type 2*
- no heat loss roof type 2
- pitched - insulation btw joists
- pitched - insulation in rafters
- flat - insulation integral
- room in roof
- other

Roof insulation: thickness (mm); fibre, warmcell, EPS, unknown, dense

Ground Floor Construction: Floor Type 2*
- no heat loss extension floor type 2
- solid
- suspended: sealed, unsealed
- above unheated basement
- other

Floor Insulation — **Type of insulation (if any)**: thickness (mm) (only if any observed); EPS, min fibre, none, unknown, dense

Wall construction Wall Type 3*
- no wall type 3 — wall thickness (mm)
- stone — is wall semi exposed?
- solid brick
- cavity
- solid concrete
- hollow block
- timber frame
- other/unknown

Wall Insulation: as built, cavity fill, external, internal; bead, EPS, min fibre, dense

insulation thickness if observable(mm)

Roof Construction: Roof Type 3*
- no heat loss roof type 3
- pitched - insulation btw joists
- pitched - insulation in rafters
- flat - insulation integral
- room in roof
- other

Roof insulation: thickness (mm); fibre, warmcell, EPS, unknown, dense

Ground Floor Construction: Floor Type 3*
- no heat loss extension floor type 3
- solid
- suspended: sealed, unsealed
- above unheated basement
- other

Floor Insulation — **Type of insulation (if any)**: thickness (mm) (only if any observed); EPS, min fibre, none, unknown, dense

Wall construction Wall Type 4*
- no wall type 4 — wall thickness (mm)
- stone — is wall semi exposed?
- solid brick
- cavity
- solid concrete
- hollow block
- timber frame
- other/unknown

Wall Insulation: as built, cavity fill, external, internal; bead, EPS, min fibre, dense

insulation thickness if observable(mm)

Roof Construction: Roof Type 4*
- no heat loss roof type 4
- pitched - insulation btw joists
- pitched - insulation in rafters
- flat - insulation integral
- room in roof
- other

Roof insulation: thickness (mm); fibre, warmcell, EPS, unknown, dense

Heat Loss Upper Floors (Floor Type 4)*
- no heat loss upper floor
- partially heated below
- exposed, semi exposed

Floor Insulation — **Type of insulation (if any)**: thickness (mm) (only if any observed); EPS, min fibre, none, unknown, dense

**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.*

DEAP Survey Form page 2

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															
First / Next Floor															
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	Lighting design known (yes/no)? If yes, keep Wattage /Lumens proof on file.
		F type#1	F type#2	F type#3		

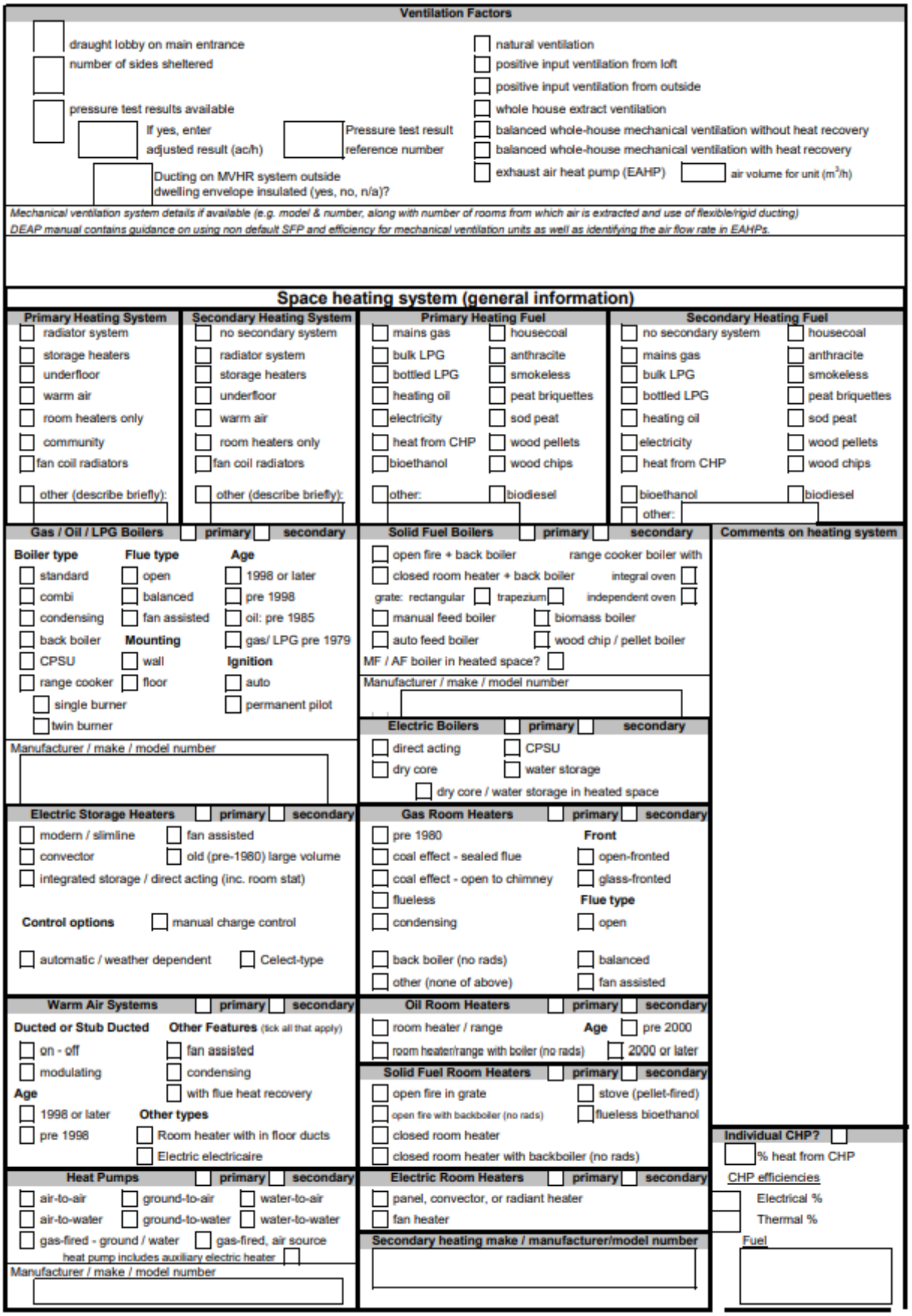
Thermal mass	light	med	heavy
external wall	☐	☐	☐
floor	☐	☐	☐
separating walls	☐	☐	☐
internal walls	☐	☐	☐
Overall thermal mass			

Room by Room record (use more than 1 row for a room if required)

OPENING DATA											ROOM DATA					
Room	Opening	opening dimensions (W x H or m^2)	Glazing details	Frame	Gap	over shading	direction	Wall / roof type	No. of openable windows/ doors?	No. of windows/ doors with draught-stripping	Chimney or Flueless	Open Flues	Fans / vents	Rads with or w/o TRVs?	Number of fixed lights	What type of fixed lights? Use more than 1 row if needed.
TOTALS																

** Gross areas have to be converted to net heat loss areas when entered into DEAP program by subtracting door and window areas from each wall type*

DEAP Survey Form page 3



Ventilation Factors

- draught lobby on main entrance
- number of sides sheltered
- pressure test results available
  - If yes, enter adjusted result (ac/h)
  - Pressure test result reference number
  - Ducting on MVHR system outside dwelling envelope insulated (yes, no, n/a)?
- natural ventilation
- positive input ventilation from loft
- positive input ventilation from outside
- whole house extract ventilation
- balanced whole-house mechanical ventilation without heat recovery
- balanced whole-house mechanical ventilation with heat recovery
- exhaust air heat pump (EAHP) — air volume for unit (m^3/h)

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 as well as identifying the air flow rate in EAHPs.

Space heating system (general information)

Primary Heating System	Secondary Heating System	Primary Heating Fuel	Secondary Heating Fuel
radiator system	no secondary system	mains gas	no secondary system
storage heaters	radiator system	bulk LPG	mains gas
underfloor	storage heaters	bottled LPG	bulk LPG
warm air	underfloor	heating oil	bottled LPG
room heaters only	warm air	electricity	heating oil
community	room heaters only	heat from CHP	electricity
fan coil radiators	fan coil radiators	bioethanol	heat from CHP
other (describe briefly):	other (describe briefly):	other:	bioethanol
			other:

		housecoal	housecoal
		anthracite	anthracite
		smokeless	smokeless
		peat briquettes	peat briquettes
		sod peat	sod peat
		wood pellets	wood pellets
		wood chips	wood chips
		biodiesel	biodiesel

Gas / Oil / LPG Boilers ☐ primary ☐ secondary

Boiler type
- standard
- combi
- condensing
- back boiler
- CPSU
- range cooker
  - single burner
  - twin burner

Flue type
- open
- balanced
- fan assisted

Mounting
- wall
- floor

Age
- 1998 or later
- pre 1998
- oil: pre 1985
- gas/ LPG pre 1979

Ignition
- auto
- permanent pilot

Manufacturer / make / model number

Solid Fuel Boilers ☐ primary ☐ secondary
- open fire + back boiler
- closed room heater + back boiler
- range cooker boiler with
  - integral oven
  - independent oven
- grate: rectangular ☐ trapezium ☐
- manual feed boiler
- auto feed boiler
- biomass boiler
- wood chip / pellet boiler
- MF / AF boiler in heated space?

Manufacturer / make / model number

Electric Boilers ☐ primary ☐ secondary
- direct acting
- dry core
- CPSU
- water storage
- dry core / water storage in heated space

Comments on heating system

Electric Storage Heaters ☐ primary ☐ secondary
- modern / slimline
- convector
- integrated storage / direct acting (inc. room stat)
- fan assisted
- old (pre-1980) large volume

Control options
- manual charge control
- automatic / weather dependent
- Celect-type

Gas Room Heaters ☐ primary ☐ secondary
- pre 1980
- coal effect - sealed flue
- coal effect - open to chimney
- flueless
- condensing

Front
- open-fronted
- glass-fronted

Flue type
- open
- balanced
- fan assisted

- back boiler (no rads)
- other (none of above)

Warm Air Systems ☐ primary ☐ secondary

Ducted or Stub Ducted
- on - off
- modulating

Other Features (tick all that apply)
- fan assisted
- condensing
- with flue heat recovery

Age
- 1998 or later
- pre 1998

Other types
- Room heater with in floor ducts
- Electric electricaire

Oil Room Heaters ☐ primary ☐ secondary
- room heater / range
- room heater/range with boiler (no rads)

Age
- pre 2000
- 2000 or later

Solid Fuel Room Heaters ☐ primary ☐ secondary
- open fire in grate
- open fire with backboiler (no rads)
- closed room heater
- closed room heater with backboiler (no rads)
- stove (pellet-fired)
- flueless bioethanol

Individual CHP? ☐
- % heat from CHP

CHP efficiencies
- Electrical %
- Thermal %

Fuel

Heat Pumps ☐ primary ☐ secondary
- air-to-air
- air-to-water
- gas-fired - ground / water
- ground-to-air
- ground-to-water
- gas-fired, air source
- water-to-air
- water-to-water

heat pump includes auxiliary electric heater ☐

Manufacturer / make / model number

Electric Room Heaters ☐ primary ☐ secondary
- panel, convector, or radiant heater
- fan heater

Secondary heating make / manufacturer/model number

DEAP Survey Form page 4

Heating system (Domestic Hot Water)

Primary Hot Water System

☐ 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 ☐ cylinder ☐ combi ☐ CPSU ☐ thermal store

☐ no access **Insulation:** ☐ no insulation primary pipework insulated ☐ **Controls:**
☐ capacity (litres) ☐ lagging jacket ☐ insulation thickness (mm) cylinder thermostat ☐
or dimensions ☐ factory fitted independent timer ☐
Cylinder volume/dimensions does not include insulation thickness storage is outdoors ☐

Supplementary Summer Hot Water

☐ 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*

Solar Water Heating System ☐ Yes ☐ No

☐ evacuated tube ☐ flat plate, glazed ☐ Flat plate unglazed
☐ solar collector area (m^2) ☐ area is "gross" area
☐ area is "aperture area
oversHading: ☐ very little (<20%) ☐ modest (20-60%)
☐ significant (61-80%) ☐ heavy (>80%)

dedicated solar storage volume (litres) ☐
contained within combined cylinder ☐
contained within separate cylinder ☐
orientation ☐ tilt ° ☐
Solar panel make and model: ☐

Comments on water heating system

Showers and baths

☐ Bath in dwelling (y/n)? ☐ Is water use target (hot and cold) 125 l/p/d (y/n)?

Shower #	Is flow rate known? (y/n)	Shower type: Electric/ Unvented/ Vented/ Vented+pump	Flow restrictor? (y/n)	Flow rate (if known)?	WWHR efficiency and utilisation factor	
1						
2						
3						
4						
5						

Heating system (Controls)

Heating Controls (tick all that apply)

☐ no controls
☐ 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

Underfloor heating (UFH)

☐ in insulated timber floor ☐ whole house UFH
☐ in screed ☐ Partial UFH including living area
☐ in concrete ☐ Partial UFH not including living area

Pumps

☐ How many central heating pumps for space heating?
Central heating pump(s) outdoors ☐
☐ How many oil boiler fuel pumps?
Oil fuel pump(s) outdoors ☐
☐ How many gas boiler flue fans?

Comments on Heating Controls

Group Heating

Distribution Loss Factor and charge method

☐ pre 1991 full flow mid-high temp: not pre-insulated
☐ pre 1991 full flow low temp: pre-insulated
☐ 1991 or later variable flow mid temp: pre-insulated
☐ 1991 or later variable flow low temp: pre-insulated
See DEAP C1.1 for dist. loss factor derivation method

consumption charged: flat rate ☐ linked to use ☐

Heating system #1

☐ efficiency %
☐ proportion of group heating %
Fuel type of heating system ☐
Make and model of heating system ☐

Heating system #2

☐ efficiency %
☐ proportion of group heating %
Fuel type of heating system ☐
Make and model of heating system ☐

CHP / Waste Heat

☐ % heat from CHP (or power station)
☐ power station
☐ CHP
CHP efficiencies
☐ Electrical %
☐ Thermal %
Fuel ☐

Any other comments or details on assessment including items observed which affect the rating but not shown elsewhere on survey form/sketches.