DEAP

From RVR

Contents

DEAP

DEAP (Dwelling Energy Assessment Procedure) is the method by which all houses are assessed before being sold or rented. Once a DEAP assessment has been carried out, then a BER(Building Energy Rating) cert is issued.

There is no mimimum BER for a house, the BER chart is an information tool to the homeowner. A DEAP assessment requires inputs of many aspects of a house's construction and the equipment installed.

The following will explain the information required when carrying out an assessment.

Ventilation

The ventilation air change rate, expressed in terms of air changes per hour (ac/h), is the rate at which outside air enters or leaves a building.

Factors that affect the ventillation rate

- Openings
  - Passive vents, fans, chimneys, open flues.
- Air Infiltration

    - Percentage of draught stripping on windows and doors, etc.

- Dwelling Design
    - Features that are considered at the design stage of the dwelling; such as number of sheltered sides, existance of a draught lobby

- Type of Ventilation System
    - Whether a natural or mechanical ventillation system is used. An efficient mechanical air ventillation system can improve the air quality and comfort in the dwelling.

RVR's DeeFly unit is tested by SAP Appendix Q tested the below efficiency figures can be used in a DEAP assessment and can result in an improved energy assessment.

Exhaust terminal configuration	Fan speed setting	Specific fan power (W/l/s)	Heat exchange efficiency (%)	Energy Saving Trust Best Practice Performance Compliant
Kitchen + 2 additional wet rooms	90m^3/hr	1.00	85	Yes
Kitchen + 3 additional wet rooms	90m^3/hr	0.78	85	Yes
Kitchen + 4 additional wet rooms	120m^3/hr	0.86	85	Yes
Kitchen + 5 additional wet rooms	135m^3/hr	0.99	85	Yes
Kitchen + 6 additional wet rooms	150m^3/hr	1.14	85	No
Kitchen + 7 additional wet rooms	165m^3/hr	1.26	82	No

SAP Appendix Q Results forDee Fly

- Result of an air pressure test
    - A pressurisation test (also called a permeability test) of a dwelling is carried out by installing a fan in the doorway of the principal entrance to the dwelling, sealing all fans, flues, chimneys, vents etc. and determining the air flow rate required to maintain an excess pressure of 50 Pascals (Pa) above outdoor air pressure.

The ventilation loss is calculated by inputting all of these factors into the DEAP software.

Building Elements

The building envelope is the interface between the interior of the building and the outdoor environment. In most buildings, the envelope, along with the outdoor weather, is the primary determinant of the amount of energy used to heat, cool and ventilate the building.

A U-value (or thermal transmittance) is a measure of the rate at which heat is lost through a wall, roof, floor, door or window. As it is a measure of heat loss then the lower the U-value the better. U-values are measured in Watts / (meter2 * Kelvin) or as is more commonly written W/m2K.

Specifiers:U values Click on this link for a further discussion on U values.

DEAP calculates all of the information entered in the “Building Elements” section and produces a heat loss rate expressed as an Overall Heat Loss value.

Thermal Bridging

A bridged layer is one where the principal material of the layer is penetrated by another material of different thermal conductivity. This is considered to have created a “thermal bridge” or “short-circuit” through the material.

To avoid excessive heat loss and local condensation problems, provision should be made to limit thermal bridging, e.g. around windows, doors and other wall openings, at junctions between elements and at other locations. Any thermal bridge should not pose a risk of condensation and any excessive increase in heat loss associated with thermal bridging should be taken account of in the calculation of the average U-value.

A default thermal bridging factor of 0.15 W/m2K is given, an improved figure of 0.11W/m2K may be used if the house meets current building regulations or a figure of 0.08W/m2K if an engineer or architect signs off on the measures taken to improve the thermal bridging in the house.

Water Heating

The demand for domestic hot water (DHW) is derived from the floor area of the dwelling and is calculated in the DEAP software. The energy required to produce that amount of hot water is then calculated, taking account of losses in heating, storage and distribution. Consequent heat gains to the dwelling from storage cylinders and distribution pipe work is also estimated, so that it can be taken into account in the calculation of space heating requirements.

A distinction is made between instantaneous water heating, which heats water when it is required, and water heating that relies on storage of hot water in a cylinder, tank or thermal store. ‘Primary’ and ‘cylinder’ losses are not used in the calculation for instantaneous heaters. A distinction is made between instantaneous water heating, which heats water when it is required, and water heating that relies on storage of hot water in a cylinder, tank or thermal store. ‘Primary’ and ‘cylinder’ losses are not used in the calculation for instantaneous heaters.

Hot Water Distribution Losses

Single-point heaters, which are located at the point of use and serve only one outlet, do not have distribution losses. Gas multipoint water heaters and instantaneous combi boilers are also instantaneous types but, as they normally serve several outlets, they are assumed to have distribution losses.

Hot Water Storage Losses

Stored hot water systems can either be served by supplementary electric water heating or obtain heat from a boiler, room heater, solar heater or heat pump through a primary circuit. In either case, water storage losses are incurred to an extent that depends on how well the water storage is insulated.

Primary Circuit Losses

For boiler systems with separate hot water storage, primary losses are incurred in transferring heat from the boiler to the storage.

Solar Water Heating

A solar water collector coupled with solar water storage reduces the fuel needed for hot water production. The solar system can heat the lower part of a multi heat source cylinder or as a separate solar cylinder.

DEAP requires input of the following information in order to calculcate the contribution of the solar system. Compliance with the building regulations is also determined using this information. The following information is entered:

- Detail on the collectors:
  - Manufacturer's name and model name
  - Aperature area of the collectors
  - Zero-loss collector efficiency,
  - Collector heat loss coefficient - a1 factor
- Information on site conditions:
  - Solar radiation
  - Shading
- Information on the system:
  - Is the solar water heating pump solar powered?
  - If the cylinder is heated by a boiler is there a thermostat on the cylinder
  - Is the solar storage within a combined cylinder
  - Dedicated solar volume of the cylinder

The following table shows the efficiencies and aperature areas of RVR's solar panels.

Manufacturer	Product	Type	Gross area	Aperture area	Zero Loss Collector Efficiency η_o	Solar heat loss Co-efficient a1 (W/m2 k)
Calpak	12VTN	Evacuated tube	2.14m^2	1.94m^2	0.56	0.729
Tisun	FM	Flat Plate	2.55m^2	2.36m^2	0.744	3.59
RVR Solar	20 HP	Heat Pipe	3.430	1.872	0.734	1.529
RVR Solar	30 HP	Heat Pipe	4.901	2.791	0.734	1.529

Lighting and Internal Gains

Internal gains from appliances, cooking and from the occupants of the dwelling (metabolic gains) are calculated within the DEAP software based on the total floor area of the dwelling.

Lighting electricity consumption is calculated based on the percentage of low energy fixed lighting outlets.

Heat gains from lighting are calculated and added to the other gains. Heat loss to the cold water network is calculated based on total floor area, and subtracted from the above gains.

Gains from ventilation system fans are also accounted for here. No useful gains are assumed from individual extractor fans.

Gains from heating system fans and pumps are accounted for later, in the heating system part of the procedure.

Net Space Heat Demand

The main elements involved in this section are:

- Required Internal Temperature
  - DEAP calculcated the temperatures required, the variable being the percentage living space which has been previously entered into the dimensions tab. As the main living area requires a temperature of 21oC compared to 18oC, thus a larger living area requires more energy.

- Internal Heat Capacity
  - The thermal mass category of the building is calculcated according to the building materials used in the construction of the dwelling, a calculation needs to be carried out to determine if the building is thermally massive or thermally light.
  - A timber frame building will usually be thermally light and a masonry building will be thermally massive. This will determine if the building will heat quickly or slowly and if the building can hold heat.

- Solar Gains and Heat Use
  - Heat gains from glazing plus internal heat gains are multiplied by a utilisation factor to determine the useful heat gains.

Distrubution System Losses and Gains

Up to this section the perfect heating sysem is calculcated. For a BER Assessment to more accurately determine the heating requirements of a dwelling, the Actual Heating System must be considered taking into account;

-
  - Imperfect control,
  - Takes time to respond to heat demand,
  - Has a limited heat capacity output.

- Temperature adjustment - by using a boiler with Optium start an improved factor of -0.15 can be used which improves the energy rating

- Heating system control category - By using time and temperature controls, as can be found in our Honeywell control range, an improved factor of 3 can be used

- Heating system responsiveness category - This is determined if the building uses underfloor or radiators for heating. Radiators have a quick responsiveness and underfloor has a slow responsiveness.

- Pumps and fans

The eletricity consumption and heat gains from pumps and fans is calculcated in DEAP when the number of each is entered.

- Heat Emiter

The heat loss by using underfloor on the ground floor is taken into account here based on data entered in the building elements section.

Energy Requirements

It is assumed that the dwelling has heating systems capable of heating the entire dwelling. Calculations are on the basis of a main heating system and secondary heaters.

Space Heating

- The efficiency of the main and secondary heating system must be entered. The efficiency of RVR boilers can be found on the HARP database. Click on the following link to open the SEI HARP database.

http://www.sei.ie/Your_Building/BER/BER_Assessors/Technical/HARP_Database/Boiler_Search_Page/

- Efficiency Adjustment factor

The efficiency of the boiler can be adjusted should the boiler be installed with either a load or weather compensator or underfloor heating. Should these factors not apply a factor of 1 is used. RVR boilers have these features as optional extras.

- Information on the effiency of the secondary heating system is also entered.

Water Heating

Data on the efficiency of the water heating system needs to be entered. This will usually be the same data as entered for the boiler, as the boiler will provide both hot water and central heating.

Fuel Data

- Data on the type of fuel used for the main, secondary and water heating is entered here.
- Renewable and energy saving technologies

Data on photovoltaic, microgeneration and other eletrical or thermal generating equipment is entered here. This is important if the building is using eletrical energy to comply with the Building Regulations Part L.

Assessment of internal temperature in summer

Mush of the data for this tab has already been entered in the previous tabs, on heat loss, glazing heat gains etc. The assessor must enter the effective air change. This is determined on the basis that cross ventillation is possible or not and the number of stories in the dwelling.

Results

Information on the delivered energy, primary energy and CO2 emissions is presented in this tab, summarising the data previously inputted.

The results tab for buildings built under the current 2008 building regulations is a useful tool as it demonstrates compliance with the U-values specified in the regulations, whether the renewable requirement of 10kWh/m2/yr of thermal energy has been achieved or the eletrical requirement of 4kWh/m2/yr.

It also demonstrates that the mimimum requirements for the CPC (Carbon Perfrmance Co-efficient) and EPC (Energy Performance Co-efficient) are complied with, as per the Part L of the Building Regulations 2008.

The building must not emit more than 0.69 of the carbon of the reference building and must use 0.6 of the energy of the reference building.