



Application of DEAP to Part L

Sean Armstrong, Technical Adviser,
Building Standards, DEHLG





Outline

- Part L legislation
- BER legislation
- DEAP application for Part L
- DEAP application for BER
- How to check DEAP for Part L





Legislation-Part L

- Building (Part L amendment) Regulations 2008 SI 259 under Building Control Act 1990
 - L1 A building shall be designed and constructed so as to ensure that the energy performance of the building is such as to limit the amount of energy required for the operation of the building and the amount of CO2 emissions associated with this energy use insofar as is reasonably practicable.
 - L3 For new dwellings, the requirements of L1 shall be met by: (a) providing that the energy performance is such as to limit the calculated primary energy consumption and related CO2 emissions insofar as is reasonably practicable, when both energy consumption and CO2 emissions are calculated using the Dwelling Energy Assessment Procedure (DEAP) published by Sustainable Energy Ireland;





Legislation –BER Certificate

- EUROPEAN COMMUNITIES (ENERGY PERFORMANCE OF BUILDINGS) REGULATIONS 2006 SI no. 666 of 2006
 - **BER assessment of a building**
 - 15. (1) The assessment of the energy performance of a building under these Regulations shall be carried out by a BER assessor.
 - (2) The BER assessment of a building shall be carried out using procedures, including calculation method and software, approved by the issuing authority and including a survey of the building where required by direction of the issuing authority. (SEI)
- **The calculation method and software is DEAP**





DEAP function

- DEAP performs 2 functions:
 1. Under SI 259 DEAP Checks compliance with Part L
 2. Under SI 666 DEAP Produces BER certificate

This presentation focuses on the requirement of DEAP to check compliance against Part L





When is a DEAP calculation required

- In order to capture non compliances early in construction process with Part L Circular Letter: BC 4/2009 advises:
 - It is considered that best practice from an enforcement point of view would be for BCAs to ask for the DEAP calculations at an early stage in the construction process.
 - At this point, if the dwelling is non-compliant in any way, alternatives can be agreed with and undertaken by the builder/developer.
 - If there is a material deviation from the building originally specified, the builder/developer should then submit a replacement DEAP Report





How does DEAP check compliance with Part L

- For houses designed to Building Regulations 2005 it is required that the Carbon Dioxide Emission Rate (CDER) is less than the Maximum Permitted Carbon Dioxide Emission Rate (MPCDER) calculated in DEAP.
- For houses designed to Building Regulations 2008 it is required that the Energy Performance Coefficient (EPC) is less than the Maximum Permitted Energy Performance Coefficient (MPEPC) and that the Carbon Performance Coefficient (CPC) is less than the Maximum Permitted Carbon Performance Coefficient (MPCPC).
 - The MPEPC and MPCPC are set at .6 and .69 respectively to ensure actual house uses 40% less energy than 2005 reference house





What other Parts of Part L does DEAP check

- For 2005 regulations
 - DEAP also checks
 - U value using overall heat loss method
 - Elemental U values
 - Thermal Bridging
 - Window U values





What other Parts of Part L does DEAP check

- For 2007 regulations
 - DEAP checks
 - Elemental U values
 - Thermal Bridging
 - Window U values
 - Renewable requirement
 - Airtightness





How does a Building Control Officer check for these items in DEAP

- BCA should request for new dwellings from the builder:
 - .Xml file for DEAP
or
 - Detailed Report in Word document format from DEAP





How to check

- If the .xml file is requested the BCA can review this in the DEAP software and will be able to see the following screen shots.



Part L 2005

Overall Heat Loss Method

Results

Results: Building Regulation Part L Conformance

Conformity under overall heat loss method

Average U-Value requirement	
Uavg [W/m ² K]	0.623
Ulim [W/m ² K]	0.861
Maximum elemental U-Values [W/m ² K]	
Roofs	0
Walls	0.41
Floors	0

Conformity under elemental heat loss method

Maximum elemental U-Values [W/m ² K]	
Roofs	0
Walls	0.41
Floors	0

Percentage of opening areas [%] 0.14

Average U-Value of openings 1.69

For calculation of MPCDER
As specified in TGD L 2006. Relevant for new-build

Do Renewable resources meet the main space heating need? No

Do renewable resources meet the main water heating need? No

MPCDER [kg CO₂ /m²/yr]

CDER	29.8
MPCDER	27.63

Under Technical Guidance Document (TGD) L to the Building Regulations 2005, DEAP is the method used to show that an acceptable CO₂ emission rate has been achieved for a dwelling to comply with Regulation L2(a). TGD L Section 1.1 requires that the CDER shall not exceed the MPCDER.

DEAP can also be used to show compliance with Regulation L2(b), through use of either the Overall Heat Loss or Elemental Heat Loss method from TGD L Sections 1.2.2 and 1.2.3.

However, DEAP cannot be directly applied to show conformity with other provisions for dwellings in TGD L, including thermal bridging (1.2.4), air infiltration (1.2.5), heating controls (1.3) and insulation of plumbing and ducting services (3.4). Please refer to TGD L for further guidance on other such requirements.

Name: Part L notice 3
Number: 2004

Openings

CDER=29.8
MPCDER=27.63



Part L 2007

SEI-DEAP
Sustainable Energy Ireland
Dwelling Energy Assessment Procedure (DEAP) Not logged in

Results
Building Regulation Part L 2008 Conformance

Conformity with maximum avg U-Value requirements
Average elemental U-Values [W/m²K]

Pitched roof insulated on slope	0.000	✓
Pitched roof insulated on ceiling	0.150	✓
Flat roof	0.000	✓
Floors with no underfloor heat	0.200	✓
Floors with underfloor heat	0.000	✓
Walls	0.250	✓
Percentage of opening areas [%]	25	✓
Average u-value of openings	1.776	✓

Conformity with maximum U-Value requirements
Maximum elemental U-Values [W/m²K]

Roofs	0.150	✓
Walls	0.250	✓
Floors	0.200	✓
External doors/windows/rooflights	3.000	✓

Conformity with renewable energy technologies requirement - individual schemes

	Total contribution kWh/yr	Part L renewable contribution kWh/yr
Solar water heating system	1268.83	10.07
Heat pump as main space heating system	0	0
Heat pump as secondary space heating system	0	0
Heat pump as main water heating system	0	0
Wood/Biomass heater as main space heating system	0	0
Wood/Biomass heater as secondary heating system	0	0
Wood/Biomass heater as main water heating system	0	0
Solar	0	0
Not Entered	0	0
Not Entered	0	0
Total thermal	1268.83	10.07

Name: TGD L 2008 Example
Number: 10009

start SEI-DEAP Document1 - ... EN 14:34

Conformity with elemental U values

Part L 2008 Contd.

SEI-DEAP
 Sustainable Energy Ireland
Dwelling Energy Assessment Procedure (DEAP) Not logged in

Results

Percentage of opening area: 40 ✓
 Average u-value of openings: 1.776 ✓

Conformity with renewable energy technologies requirement - individual schemes

	Total contribution kWh/y	Part L renewable contribution kWh/yr/y
Solar water heating system	1268.83	10.07
Heat pump as main space heating system	0	0
Heat pump as secondary space heating system	0	0
Heat pump as main water heating system	0	0
Wood/Biomass heater as main space heating system	0	0
Wood/Biomass heater as secondary heating system	0	0
Wood/Biomass heater as main water heating system	0	0
Solar	0	0
Not Entered	0	0
Not Entered	0	0
Total thermal	1268.83	10.07
Total electrical	0	0
Total thermal equivalent	1268.83	10.07
Does CHP meet renewables requirement for TGD L 2008	No	✓

Conformity with primary energy use and CO2 emissions limitation requirements

Performance coefficient	
CPC	0.58
MPCPC	0.69 ✓
EPC	0.619
MPEPC	0.6 ✗


Conformity with renewables

Conformity with MPCPC and MPEPC

EPC=.62 MPEPC=.6
 CPC=.58, MPCPC=.69

start SEI-DEAP Compliance Removable Di... EN 14:39





Items that can be checked on Detailed DEAP report

- Airtightness should be $\leq 10 \text{m}^3/\text{hr m}^2$. This is represented as .05 ach in DEAP report.
- Elemental U values are available
- Thermal bridging factor is available. .08 for ACDs, .15 default
- Type of insulation jacket-factory insulated
- Efficiency of boiler



What does word document report show

Dwelling Details Report Page 1 of 16

Property Details					
Dwelling type	House	Type of BER Rating	New Dwelling - Provisional	Has a rating been previously submitted	No
Address line 1	Example House	Year of construction	2009	BER Number	Your Ref.
Address line 2	2008 TGD L	Date of assessment	24/01/2009	MPRN No.	12345678901
Address line 3		Date of Plans	11/07/2008	Is MPRN shared with another dwelling?	No
County	Co. Dublin	Planning reference	1234	Shared BER Number	
Post code		Building Regulations	2008 TGD L		
Comment	This is an example 2008 house to be tested against regulations				
Owner name	DEHLG	Phone			
Address line 1	Custom House	Email			
Address line 2					
Address line 3					
County	Co. Dublin				
Post code					
Assessor name	Sean Armstrong				
Assessor reg. no.	1234				
Developer name					
Development name					

Planning Reference & Relevant TGD L



12/03/2009

Dwelling Details Report

Page 3 of 16

Ventilation Details

	Number	Air change rate [ach]
Chimneys	0	0
Open Flues	0	0
Fans & Vents	3	30
Gas Fires	0	0

Is there a draft lobby on main entrance	No
Draft lobby air change [ach]	0.05
Openings infiltration [ach]	

Has a permeability test been carried out? Yes

If Permeability Test is No:

Structure type	Timber or Steel Frame
Is there a suspended wooden ground floor?	No
Percentage windows/doors draughtstripped [%]	100

Infiltration rate due to structure [ach]	0.40
Intermediate infiltration rate	0.54
Number of sides sheltered	2
Adjusted infiltration rate	0.46

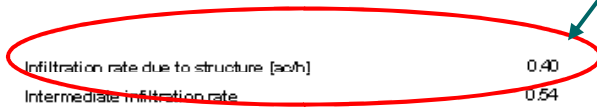
Ventilation method Natural ventilation

Effective air change rate [ach]	0.61
Ventilation heat loss [W/K]	64.00

Manufacturer and model name

Specific fan power [W/(l/s)]	0.00
Heat exchanger efficiency [%]	0.00
Electricity for ventilation fans [kWh/y]	0.00
Heat gains from ventilation fans [W]	0.00

Airtightness $\leq 10 \text{m}^3/\text{hr m}^2$
(divide by 20)



Example Report - Microsoft Word

File Edit View Insert Format Tools Table Window Help

75% Normal Arial 10

Dwelling Details Report

Page 4 of 16

Building Elements

Doors

Description	U-Value [W/m ² K]	Area [m ²]	Heat Loss	Number of doors
Front Door	3.00	1.85	5.55	1

Floors

Type

Description	U-Value [W/m ² K]	Area [m ²]	Heat Loss	Underfloor Heating
Ground Floor - Solid	0.20	63.00	12.60	False

Roofs

Type

Description	U-Value [W/m ² K]	Area [m ²]	Heat Loss	Insulation Thickness
Pitched Roof - Insulated on Ceiling	0.15	63.00	9.45	Unknown

Walls

Type

Description	U-Value [W/m ² K]	Area [m ²]	Heat Loss	Semi Exposed
300mm Cavity	0.25	85.80	21.45	No

Elemental U values

Draw AutoShapes

Page 4 Sec 4 4/16 At 0.7cm Ln 56 Col 1 REC TRK EXT OVR English (U.S)

start SEI-DEAP Removabl... Microsoft ... 2 Inter... Example ... EN Google 17:23



Example Report - Microsoft Word

File Edit View Insert Format Tools Table Window Help

75% Normal Arial 10 B I U

12/03/2009

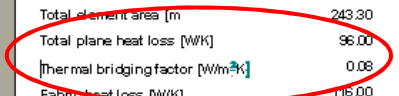
Dwelling Details Report

Page 6 of 16

Heat loss details

Total glazed area [m ²]	29.65	Glazing ratio	0.10
Total glazed heat loss [W/K]	47.20	Summer solar gain [W/m ²]	823.00
Total effective collecting area [m ²]	9.06		
Total element area [m ²]	243.30		
Total plane heat loss [W/K]	96.00		
Thermal bridging factor [W/m ² K]	0.08		
Fabric heat loss [W/K]	116.00		
Total heat loss [W/K]	180.00	Per m ²	1.43

Thermal Bridging Factor



Draw AutoShapes

Page 5 Sec 4 5/16 REC TRK EXT OVR English (U.S)

start SEI-DEAP Removabl... Microsoft ... 2 Inter ... Example ... EN Google 17:27



Example Report - Microsoft Word

File Edit View Insert Format Tools Table Window Help

75% Normal Arial 10 B I U

1203/2009 Dwelling Details Report Page 7 of 16

Water heating

Are there distribution losses	Yes	I supplementary electric immersion used in summer	Yes
Are there storage losses	Yes	Is there a combi boiler	No
Is there a solar water heating system	Yes		
Standard number of occupants	3.59		
Daily hot water use [Litres/d]	121.00	Total hot water demand [kWh/yr]	2,583.00
Hot water energy reqs. at taps [kWh/yr]	2,195.00		
Distribution losses [kWh/yr]	387		
Water storage volume [Litres]	250	Temperature factor unadjusted	0.80
Is manufacturers declared loss factor available	No	Temperature factor multiplier	0.90
Manufacturer name and model			
Declared loss factor [kWh/d]		Hot water storage loss factor [kWh/d]	0.01
Insulation type	Factory Insulated	Volume factor	0.78
Insulation thickness [mm]	75		
Combi boiler Type			
Keep Hot facility	None		
Combi-boiler loss [kWh/yr]	0.00	Combi-boiler electricity consumption [kWh/yr]	0.00
Storage loss	462.00	Adjusted storage loss [kWh/yr]	222.00
Primary circuit loss type	Boiler with uninsulated primary pipework and with cylinder		
Primary circuit loss [kWh/yr]	610	Adjusted primary circuit loss [kWh/yr]	578
Output from main water heater [kWh/yr]	1,632.00	Heat gains from water heating system [W]	161.00
Annual Heat gains from water heating system [kWh/yr]	1,411.00	Output from supplementary heater [kWh/yr]	291.00

Type of insulating jacket

Draw AutoShapes

Page 7 Sec 6 7/16 REC TRK EXT OVR English (U.S)

start SEI-DEAP Removabl... Microsoft ... 2 Inter... Example ... EN Google 17:30

Example Report - Microsoft Word

File Edit View Insert Format Tools Table Window Help

75% Normal Arial 10

1203/2009 Dwelling Details Report Page 13 of 16

Energy Requirements : Individual

Efficiency of main heating system [%]	90.00		
Manufacturer name	Default		
Model name	Default		
Efficiency adjustment factor	1.00		
Adjusted efficiency of main heating system [%]	90.00		
Fraction of heat from secondary system	0.10		
Efficiency of secondary system [%]	72.00		
Energy required for main heating system [kWh/y]	5,066		
Energy required for secondary heating system [kWh/y]	709		
Efficiency of main water heating system [%]	90.00		
Manufacturer name	Default		
Model name	Default		
Efficiency adjustment factor	1.00		
Adjusted efficiency of main water heating system [%]	90.00		
Energy required for main water heater [kWh/y]	1,813		
Energy required for secondary water heater [kWh/y]	291		
		Primary energy conversion factor	CO2 emission factor
Main space heating system	Mains Gas	1.10	0.208
Secondary space heating system	Mains Gas	1.10	0.208
Main water heating system	Mains Gas	1.10	0.208
Supplementary water heating system	Electricity	2.70	0.643
Pumps, fans		2.70	0.643
Energy for lighting		2.70	0.643

Efficiency of boiler



Non compliance

- Where non compliances are found it is recommended in the first instance that this be advised to builder so as the design can be reviewed to achieve compliance.

