



Part L 2014

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SAP & SBEM Calculations | Building Service Design (M&E) | Code for Sustainable Homes | BREEAM Calculations

Thermal Modelling | Energy Feasibility | Energy Performance Certificates | Display Energy Certificates



Who we are

- Offices in P/Dock & Carmarthen
- Client Base - West Wales
- 7 members of staff.



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What we do

- Mechanical & Electrical Consulting Engineers / REVIT / BIM
- SAP Accredited Assessors / SBEM Accredited Assessors
- LZC Energy feasibility studies
- Code For Sustainable Homes Accredited Assessors
- Dynamic Thermal Simulation Modelling
- CSH / BREEAM Calculations & Advice
- Domestic / Commercial / Display EPC'S
- RHI Metering reports
- Air Conditioning inspection reports



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To review & discuss the main changes to Approved documents;

- **Part L1A – New dwellings**
- **Part L2A – New buildings other than dwellings**

and the practical implications.....



Criteria for compliance

Criteria 1 – DER v TER Co2 calculation

Criteria 2 – Limits on design flexibility

Criteria 3 – Limits on overheating due to solar & other gains

Criteria 4 – Dwelling construction & performance consistent with DER

Criteria 5 – Providing energy efficient operation of dwelling





Part L1A – New dwellings

Background

Building regulations were devolved to Wales on 31st December 2011.

In 2012 Welsh government consulted upon a **40%** reduction in greenhouse gas emissions compared to 2010.

They want to simplify the process

On 31st July 2014 it comes into effect.





Part L1A New Dwellings

Main changes

- 1 The document is in a new style format – easy read !
- 2 To deliver an **8%** reduction in CO2 emissions compared to 2010 levels.
- 3 Mandatory backstop U Values have been significantly tightened.
- 4 A new elemental specification – A “recipe” to compliance.
- 5 Energy feasibility study to be carried out for alternative technologies.
- 6 Limiting the effect of solar gain & other gains is given greater prominence.





Part L1A – New dwellings

Criterion 1 – Changes - CO2 emissions

The DER must be no greater than the TER.

2006 – **20%** improvement on 2002 level

2010 – **25%** improvement on 2006 level

2014 – 8% improvement on 2010 level

Regulation 25B “Nearly zero-energy requirements for new buildings” will not come into force until 2019 at the earliest.

so how can we achieve it....

An overall
52% reduction
in CO2





Part L1A – New dwellings

Criterion 1 – CO2 emissions

We have been achieving 8% improvement since Nov 2010
to satisfy the code.

In fact, because of the generous weighting associated with Energy credits under CfSH, and the difficulty, especially for individual self-builders to achieve some of the more corporate credits, we have encouraged improvement far beyond the mandatory levels in order to more easily achieve the overall score of 57 points needed for the level 3 compliance.





Part L1A – New dwellings

Criterion 1 - The elemental specification – The recipe!

Opening areas (windows and doors)	Same as actual dwelling up to a maximum proportion of 25% of total floor area
External Walls	0.18 W/m ² K
Party Walls	0.0 W/m ² K
Floor	0.13 W/m ² K
Roof	0.13 W/m ² K
Windows, roof windows, glazed roof lights and glazed doors	1.4 W/m ² K G – value = 0.63
Opaque doors	1.0 W/m ² K
Semi glazed doors	1.2 W/m ² K
Air tightness	5.0 m ³ /h.m ² at 50Pa
Linear thermal transmittance	Standardised Psi values – SAP Appendix R, except use of $\gamma=0.05$ W/m ² K if the default value of $\gamma=0.15$ W/m ² K is used in the actual building
Ventilation type	Natural (with extract fans)
Air conditioning	None





Part L1A – New dwellings

Element or System	Element Recipe Values
Fuel Type	Gas
Heating system	Boilers with radiators 89.5% efficient (SEDBUK 2009)
Controls	Time and temperature control Weather Compensation
Hot Water Storage system (if specified)	Stored hot water from boiler Thermostat controlled, Separate time control for space and water heating
HWC Loss Factor	Declared loss factor equal or better than $0.85 \times (0.2 + 0.051 V^{2/3})$ kWh/day
Secondary Space Heating	None
Low Energy Lighting	100% Low Energy Lighting





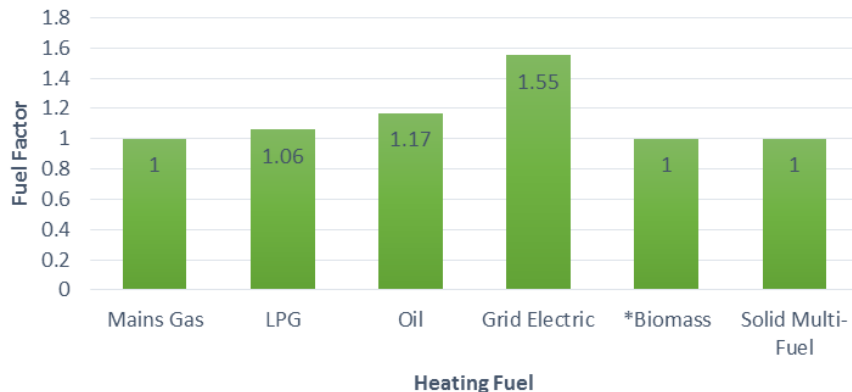
Part L1A – New dwellings

So what happens if we don't have mains Gas?

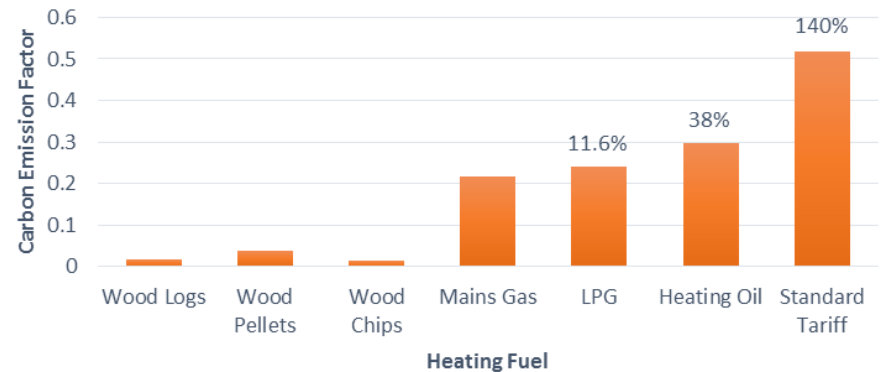
Fuel Factors

The fuel factors have remained similar to 2010 and therefore the penalties for using fuels other than mains gas will remain similar for 2014.

Fuel Factors



Carbon Emission Factor (kg CO2 per kWh)





Part L1A – New dwellings

Criterion 2 – Limits on design flexibility - Improved backstop U Values

Worst acceptable fabric performance values	Part L 2006	Part L 2010	Part L 2014	% + on 2010
Roof	0.25	0.20	0.15	25%
Wall	0.35	0.30	0.21	30%
Floor	0.25	0.25	0.18	28%
Windows, roof windows, glazed roof lights, curtain walling & pedestrian doors	2.2	2.00	1.6	20%
Air Permeability	10.00	10.00	10.00	0%

“To encourage the reduction of heat demand and discourage the excessive use of renewable energy solutions”.





Part L1A – New dwellings

Thermal Element options

Element	Insulation	U Value	Recipe	Worst backstop
Roof - Flat	400mm wool	0.13	0.11	0.15
Roof - sloping	100mm + 70mm PIR	0.15	0.11	0.15
	150mm + 60mm PIR	0.13		
Wall - Block	85mm PIR	0.21	0.18	0.21
	100mm PIR	0.18		
Wall – Timber frame	120mm PIR	0.21	0.18	0.21
	140mm wool + 30mm PIR	0.18		
Floor - solid	100mm PIR	0.17	0.15	0.18
	140mm PIR	0.13		





Part L 1A – New dwelling

What about Low and Zero Carbon Technologies ?

“The building regulations are technology neutral and do not mandate the installation of high efficiency alternative systems or other LZC systems. However new dwellings often feature such systems to satisfy planning policy Wales conditions.”

Regulation 25A – Consideration of high efficiency alternative systems for new buildings.

Before works starts an analysis that considers and takes into account the technical, environmental and economic feasibility of using high efficiency alternative systems is required.

LZC's require better planning.





Part L 1A – New dwelling

Criterion 3 – Limiting overheating due to solar and other gains

“In order to comply with the building regulations, reasonable provision should be made to limit overheating in new dwellings from solar and other heat gains during the summer months”.

We are building lightweight, well insulated structures which have limited thermal mass and no ability to absorb heat energy during the summer months – They get hot!

Appendix P of SAP 2012 provides a procedure to check whether there is a risk of overheating in dwellings from solar gains.

“The domestic services compliance guide” provides guidance on limiting the heat losses from circulation pipes.





Part L 1A – New dwelling

Worked examples – End terrace

	Appendix R Elemental Recipe	End Terrace Relaxed fabric + Triple Glazing
Ext. Walls (W/m ² K)	0.18	0.21
Party Walls (W/m ² K)	0	0
Floor (W/m ² K)	0.13	0.18
Roof (W/m ² K)	0.13	0.13
Windows (W/m ² K)	1.4 (g=0.63)	0.9 (g=0.57)
Door (W/m ² K)	1	1.4
Air tightness (m ³ /hr.m ²)	5	7
Gas boiler	89.5% (SEDBUK)	89.5% (SEDBUK)
Services		-
TER (kgCO ₂ /m ² .yr)	18.76	18.76
DER (kgCO ₂ /m ² .yr)	18.76	18.75





Part L 1A – New dwelling

Worked examples – Detached

	Appendix R Elemental Recipe	Detached Relaxed Fabric	Detached Relaxed Fabric + Triple Glazing
Ext. Walls (W/m ² K)	0.18	0.21	0.21
Party Walls (W/m ² K)	0	0	0
Floor (W/m ² K)	0.13	0.18	0.18
Roof (W/m ² K)	0.13	0.15	0.15
Windows (W/m ² K)	1.4	1.6	0.9
Door (W/m ² K)	1	1.4	1
Air tightness (m ³ /hr.m ²)	5	7	6
Thermal Bridging	APP R	APP R	APP R
Gas boiler	89.5% (SEDBUK)	89.5% (SEDBUK)	89.5% (SEDBUK)
TER (kgCO ₂ /m ² .yr)	17.07	17.07	17.07
DER (kgCO ₂ /m ² .yr)	17.07	18.95	17.05



Part L 1A – New dwelling

Worked examples – Detached

	Appendix R Elemental Recipe	Detached Relaxed Fabric + Y = 0.15	Detached
Ext. Walls (W/m ² K)	0.18	0.21	0.21
Party Walls (W/m ² K)	0	0	0
Floor (W/m ² K)	0.13	0.18	0.18
Roof (W/m ² K)	0.13	0.15	0.15
Windows (W/m ² K)	1.4	1.6	1.6
Door (W/m ² K)	1	1.4	1.4
Air tightness (m ³ /hr.m ²)	5	7	7
Thermal Bridging	APP R	Y = 0.15	Y = 0.15
Gas boiler	89.5% (SEDBUK)	89.5% (SEDBUK)	89.5% (SEDBUK)
			1.23 kWp PV
TER (kgCO ₂ /m ² .yr)	17.07	17.21	17.21
DER (kgCO ₂ /m ² .yr)	17.07	21.65	17.2





Part L 1A – New dwelling

Air testing

As 2010, you don't need to air test but you would be foolish not to!

Thermal bridging

As 2010, you can use the default values or the improved values through calculation (lots of points) providing you can demonstrate compliance to BCB.

Secondary heat source

A secondary heat source is not included in the TER.

If used you need to input the actual efficiency into SAP.

If not used and you have a chimney or flue installed and ;

You have conveniently installed a gas point – 20% gas fire or worse nothing, then a multifuel 37% must be used !





Part L 1A – New dwelling

Summary

The code Energy credits are being swallowed up by Part L - Good thing

- 1 The document is in a new style format – they want to get building again.
- 2 To deliver an **8%** reduction in CO2 – Already doing so
- 3 **Mandatory backstop U Values have been significantly tightened - BIG**
- 4 A new elemental specification – A “recipe” to compliance.
- 5 Energy feasibility study to be carried out for alternative technologies.
- 6 Limiting the effect of solar gain & other gains is given greater prominence.





Questions

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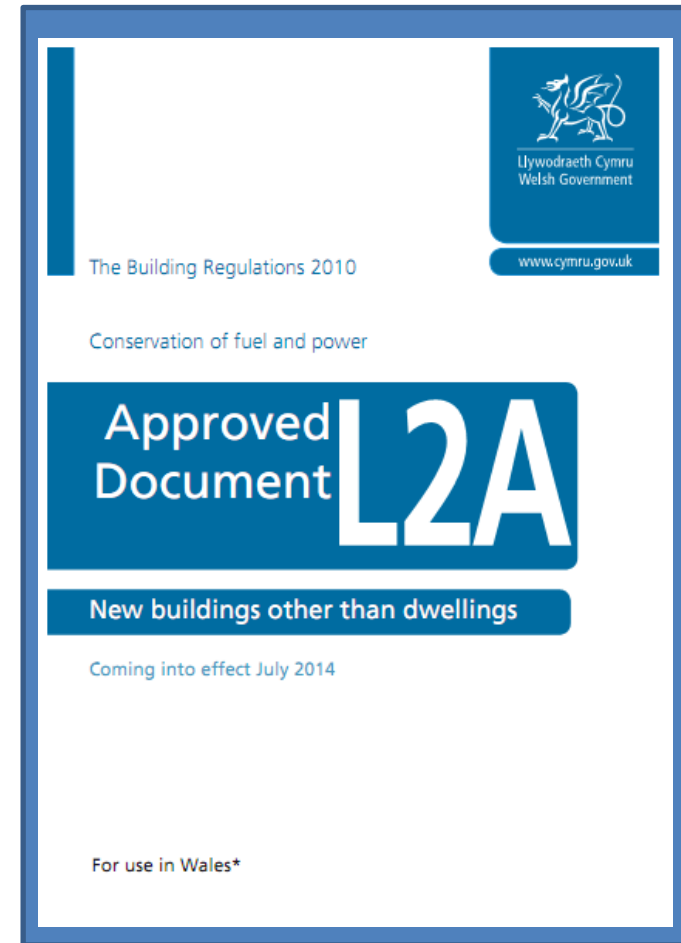
Part L2A – New Non domestic

Background

Building regulations were
Devolved to Wales on 31st December
2011.

In 2012 Welsh Government consulted
upon a reduction in greenhouse
gas emissions compared to 2010.

On 31st July 2014 they come into effect.





Part L2A New Non domestic

Main changes

1. The document is in a new style format – easy read !
2. To deliver an **20%** reduction in CO2 emissions compared to 2010 levels. (England 9%)
3. The building must pass a new “**Target Primary Energy Consumption Rate**” (TPEC) – Energy efficiency rating.
4. A new elemental specification – A “recipe” to compliance.
5. Energy feasibility study to be carried out for alternative technologies.





Part L2A – New Non domestic

Criterion 1 – Changes

The DER must be no greater than the TER.

2006 – **28%** improvement on 2002 level

2010 – **25%** improvement on 2006 level

2014 – 20% improvement on 2010 level

An overall
65% reduction
in CO₂



Regulation 25B “Nearly zero-energy requirements for new buildings” will not come into force until 2019 at the earliest.





Part L2A – New Non domestic

Criterion 1 – BPEC – Energy efficiency rating

The new Building Primary Energy Consumption must be no greater than the Target Energy Consumption – kWh/m²/year

Why? – To encourage energy efficiency and to reduce Green bolt on technologies. – Biomass.





Part L2A – New Non domestic

Criterion 1 – BPEC – Energy efficiency rating

The Primary Energy factor takes into account the energy required to produce the fuel – it's the true energy value.!

Primary Energy Factors

Biomass Pellets = 1.26 kWh / kWh

Nat Gas = 1.22 kWh / kWh

Building energy requirements x PEF = BPEC





Part L2A – New Non domestic

Criterion 1 – The elemental specification – the recipe

The notional building now includes PV – 5.3% of floor area.





Part L2A – New Non domestic

What about renewables ?

- 2010 - Notional building used the same LZC as actual building.
- 2014 - Notional building now uses Gas boiler or Oil boiler if no gas available irrespective of the heat source in the actual building.

Good news for LZC technologies

(Providing you can pass the BPEC target !)





Part L2A – New Non domestic

Criterion 1 – The elemental specification – the recipe

Element	Side lit or unlit (Heating only)
Roof U-value (W/m ² .K)	0.18
Wall U-value (W/m ² .K)	0.26
Floor U-value (W/m ² .K)	0.22
Window U-value (W/m ² .K)	1.6 (10% FF)
G-Value (%)	40%
Light Transmittance (%)	71%
Roof light U-value (W/m ² .K)	N/A
G-Value (%)	N/A
Light Transmittance (%)	N/A
<i>Air-permeability (m³/m²/hour), note: GIA = Gross Internal .</i>	
GIA ≤ 250m ²	5
250m ² < GIA ≤ 3,500m ²	3
3,500m ² < GIA ≤ 10,000m ²	3
10,000m ² < GIA	3





Part L2A – New Non domestic

Criterion 1 – The elemental specification – the recipe

Lighting Efficacy (lm / circuit watt)	65
Occupancy control (Yes/No)	Yes
Daylight control (Yes/No)	Yes
Maintenance Factor	0.8
Constant illuminance control	No
Heating efficiency	91%
Central SFP (W/l/s)	1.8
Terminal Unit SFP (W/l/s)	0.3
Cooling (SEER / SSEER)	N/A
Cooling (mixed mode) (SSEER)	N/A
Heat recovery efficiency (%)	70%
Variable speed control	Yes
Demand control ventilation	Yes
Area of PV, % floor area	5.3%





Part L2A – New Non domestic

Criterion 2 – Limits on design flexibility – No change to backstop U Values

Worst acceptable fabric performance values	Part L 2010	Part L 2014	% + on 2010
Roof	0.25	0.25	0%
Wall	0.35	0.35	0%
Floor	0.25	0.25	0%
Windows, roof windows, glazed roof lights, curtain walling & pedestrian doors	2.2	2.2	0%
Air Permeability	10.00	10.00	0%

The BPEC Target will mean these values will need improving





Part L2A – New Non domestic

Element	Notional Building	Improve Chiller	Extra PV
Roof U-value (W/m ² .K)	0.18	0.18	0.25
Wall U-value (W/m ² .K)	0.26	0.35	0.35
Floor U-value (W/m ² .K)	0.22	0.22	0.25
Window U-value (W/m ² .K)	1.8 (10% FF)	1.8 (10% FF)	1.8 (10% FF)
G-Value (%)	40%	40%	55%
Chiller (SEER)	4.5	5.5	4.5
PV Array (kW(p))	8	8	11
TPEC (kWh/m ² .yr)	-	129.7	129.7
BPEC (kWh/m ² .yr)	-	127.3	132.8
TER (kgCO ₂ /m ² .yr)	-	22.6	22.6
BER (kgCO ₂ /m ² .yr)	-	22.1	22.0





Part L2A – New Non domestic

Element	Notional Building	Improve Air Permeability	Reduce PV
Roof U-value (W/m ² .K)	0.18	0.18	0.16
Wall U-value (W/m ² .K)	0.26	0.26	0.20
Floor U-value (W/m ² .K)	0.22	0.22	0.18
Air-permeability (m ³ /m ² /hour)	5	3	3
Lighting Efficacy (lm / cW)	65	55	60
PV Array (kW(p))	40	40	11
TPEC (kWh/m ² .yr)	-	119.1	119.1
BPEC (kWh/m ² .yr)	-	117.2	105.8
TER (kgCO ₂ /m ² .yr)	-	19.7	19.7
BER (kgCO ₂ /m ² .yr)	-	19.4	19.6





Part L2A – New Non domestic

Summary

1. The document is in a new style format – easy read !
2. To deliver an **20%** reduction in CO2 emissions compared to 2010 levels. (England 9%) – Already doing so if working with BREEAM.
3. The building must pass a new “**Target Primary Energy Consumption Rate**” (TPEC) – Energy efficiency rating. – To stop green bolt ons.
4. A new elemental specification – A “recipe” to compliance.
5. Energy feasibility study to be carried out for alternative technologies. – Probably already doing so on big projects





Questions Quiz

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