

Guide to:
Approved Document L1A and L2A
For England and Wales

NEWBUILD

Conservation of
fuel and power
APPROVED DOCUMENT

L1A

Conservation of
fuel and power
APPROVED DOCUMENT

APPROVED DOCUMENT

L2A



Talk to the SIG360 team at the start of your project for a 360° view of cost-effective and energy efficient home building.



Understanding Part L 2013

The updated details of Part L 2013 have now been released for England and Wales, including new Approved Documents L1A & L2A. The Approved Documents set out guidelines for conservation of fuel and power in the new buildings and are due to be implemented from April 6th 2014.

The aim is to achieve a minimum 6% aggregated reduction over Part L 2010 for domestic dwellings, and 9% aggregated reduction for non-domestic buildings. The 2010 regulations will continue to apply to construction commencing prior to 6th April 2014.

The release of the new Approved Documents has, for a long time, been seen as a key step in the Government's pursuit of its carbon neutral target for all new English homes by 2016.

The Approved Documents for Wales are set to take effect on July 31st 2014, with the 2010 approved Part L documents continuing to apply to work started before 31st July 2014. Similarly, the 2010 regulations will be applied to work which is subject to a building notice, full plans application or having initial notice submitted before 31st July 2014.

The Part L 2014 Approved Document for Wales has been strengthened to deliver 8% carbon dioxide savings across the new homes and 20% to non-domestic constructions.



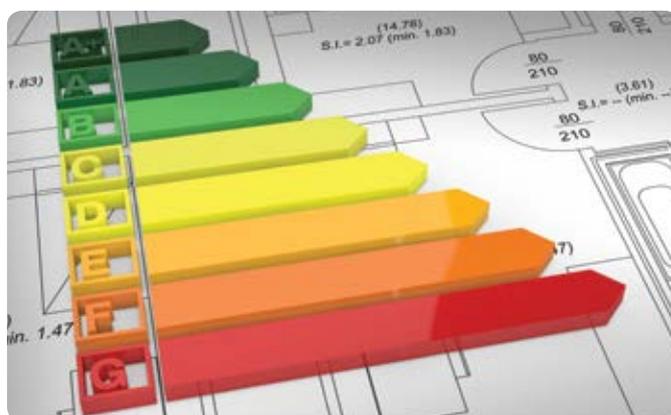
Main Changes in 2013

Part L1A

- Improved Fabric Efficiency target in addition to the carbon dioxide target
- The Target Fabric Energy Efficiency (TFEE) is being introduced for new dwellings. This ensures developers must take a 'Fabric First' approach to new homes, and not compensate for achieving only the minimum backstop U-values by installing low carbon or renewable systems
- The introduction of the 'Elemental Recipe' which is detailed within the 'Notional Dwelling Specification'. If the Notional Dwelling Specification is adopted in its entirety then it will be sufficient for the dwelling to comply with the Target Fabric Energy Efficiency and carbon emission requirements of Part L 1A. The Elemental Recipe is going to be the same for both England and Wales, which means the Target Emission Rate shown on SAP will be the same regardless of country
- Thermal Bridging – The building fabric should be constructed so that there are no reasonable avoidable thermal bridges in the insulation layers caused by gaps within the various elements. SAP2012 has introduced 19 new junctions in Appendix K. Most of them are detailed in a room in roof or at various junctions with external or party walls. Of the 42 junctions in Appendix K1, 25 do not have Approved Design Detail psi values. This means more heat losses, thus potentially making it harder to pass the SAP. Individual psi values will need to be calculated to improve the TER/TFEE
- An option for multiple dwelling compliance has been included for buildings incorporating multiple dwellings, or terraces. This allows some dwellings that would not comply, to pass as part of a block of dwellings via a simple floor area weighted approach, taking into account other dwellings that they are attached to, that have gone further than the standard required
- To demonstrate compliance the as designed SAP should be reported to the building control body or approved inspector prior to work commencing on site
- As part of Regulation (25a) builders are to have documentation demonstrating that they have considered the technical, environmental and economic viability of high efficiency alternative systems i.e. renewable, cogeneration, district heating and heat pumps. The analysis should state whether high-efficiency alternative systems have or have not been included in the design
- The major difference between the respective Welsh and English Part L 2013 is that the Welsh have chosen not to introduce a Fabric Energy Efficiency target and outcome (TFEE and DFEE) and instead have chosen to tighten the area weighted limiting backstops for the fabric elements. Wales will still have to meet the Target Emission Rate

The Headlines

- **Significantly better U-value performance for all new buildings**
- **Increased insulation thickness and wider construction footprints**
- **The need to embrace innovative products and systems to aid compliance**
- **Much earlier involvement of specialists for the necessary technical input**
- **Mandatory 'Design Stage' and 'As Built' SAP/SBEM calculations**
- **Additional calculation and information required for SAP calculations**
- **Greater complexity with thermal bridges.**
- **Additional emphasis on quality of construction and on-site guidance**
- **More stringent on-site testing and checking regulation**



New Build Part AD L1A England

5 Steps to Compliance Criteria

1. Calculating the CO2 emissions – The Requirements

> **The Dwelling Carbon Dioxide Emissions Rate (DER) must not exceed the Target Carbon Dioxide Emission Rate (TER), and the Dwelling Fabric Energy Efficiency (DFEE) must not exceed the Target Fabric Energy Efficiency (TFEE)**

The DER and TER (both in kg/m²/yr) are calculated as part of Standard Assessment Procedure (SAP 2012) energy rating calculation. The DER is calculated for the dwelling as proposed and the TER is calculated for a notional dwelling of the same shape and size as the one proposed, with the specification of building fabric, services and heating.

> The Fabric Energy Efficiency Standard

The Fabric Energy Efficiency (FEE) methodology considers the space heating and cooling demand of a dwelling and the FEE achieved is affected by:

- Building fabric U-values
- Thermal bridging
- Air permeability
- Thermal mass
- Features which affect lighting and solar gains.

The TFEE is calculated by determining the FEE of a notional dwelling of the same size and shape of the actual building, using the summary in Table 4 of Approved Document Part L1A (ADL1A) and set out in the SAP 2012 Appendix R.

> Consideration of high-efficiency alternative system for new buildings

The person undertaking the work must carry out an analysis that considers and takes into account the technical, environmental and economic feasibility of using high-efficiency alternative systems in the dwelling design. The following must be considered:

- Decentralised energy supply systems based on energy from renewable sources
- Cogeneration
- District or block heating or cooling
- Heat Pumps

The heat pumps should state whether high-efficiency alternative systems have or have not been included in the design, although there is no requirement that high-efficiency systems are to be used.

SAP 2012

The version of the Standard Assessment Procedure (SAP) energy rating referred to in Approved Document L1A is SAP 2012. This differs from the previous version (SAP 2009) in several ways:

- **Weather data has been extended to allow calculations using regional weather**
- **An allowance for height above sea level is incorporated into external temperature data**
- **Carbon dioxide emissions factors have been updated**
- **Fuel prices and primary energy factors have been revised**

2. Limits on design flexibility

The thermal performance of the building fabric and the boiler efficiency, hot water and lighting must be within the stated design limits.

The following is a table of the limiting U values for the building fabric (IE Fabric should be no worse than)

Limiting U Values Building Fabric	
Part L1A Dwellings	W/m ² K
Wall	0.30
Roof - Insulated at rafter	0.20
Roof - Insulated at ceiling	0.20
Flat Roof	0.20
Floor	0.25
Swimming Pool Basin	0.25
Windows	2.00

Limiting U-values are the minimum requirements to be achieved in dwellings (ADL1A)

The limiting U-values are set at worst acceptable scenarios.

- U-values calculated using methods and conventions set out in BR 443 Conventions for U-value calculations
- To satisfy the TER and TFEE, the building fabric will need to be considerably better than the stated limiting U-values

- SAP 2012 determines the TER by calculating the emissions from a notional dwelling of the size and shape of the actual dwelling. A new “elemental recipe” has been introduced to show compliance for the TER and TFEE. see table 1. This option may not be the most cost effective solution and unnecessary for compliance, SIG360 have looked at alternative solution that is more flexible to the developer’s needs

Summary of concurrent notional dwelling specification		
Key Features	Elemental Recipe	SIG360
Opening areas	Same as actual up to 25% of floor area	Same as actual up to 25% of floor area
External Walls (W/m ² K)	0.18	0.25
Floor (W/m ² K)	0.13	0.15
Warm Pitched Roof (W/m ² K)	0.13	0.13
Cold Pitched Roof (W/m ² K)	0.13	0.11
Window (W/m ² K)	1.40	1.40
Doors (W/m ² K)	1.00	1.00
Air tightness (m ³ /h.m ² at 50Pa)	5.00	5.00
Thermal bridging	Standard psi values - see SAP Appendix R, except use of $\gamma=0.05\text{W/m}^2\text{K}$ if the default value of $\gamma=0.15\text{W/m}^2\text{K}$ is used in the actual dwelling	Accredited Construction Appendix R & APA Construction Details
Ventilation type	Natural (with extract fans)	Natural (with extract fans)
Heating System	Mains Gas, SEDBULK 2009 89.5% efficient	Mains Gas, SEDBULK 2009 90% efficient
	Radiators	Radiators
	Fan flue	Fan flue
Controls	Time & Temperature zone control	Time & Temperature zone control
	Weather Compensator	Weather Compensator
Primary pipework	Fully Insulated	Fully Insulated
Low Energy Lighting	100% Low Energy lighting	100% Low Energy lighting
Thermal Mass Parameter	Medium	Medium

Table 1: This is based on 3 bed detached house using SAP 2012 Elmhurst beta software. Please note that this software was designed and continuously updated for changes until it's release on the 6th of April 2014.

Low thermal bridging, air tightness and attention to quality of build are essential



3. Limiting the effects of solar gains in the summer

- Solar gains are beneficial in the winter but may cause overheating in the summer. The effects of solar gain in the summer can be limited by windows size, orientation, solar protection and high thermal capacity
- SAP 2012 Appendix P contains a procedure enabling designers to check whether solar gains are excessive. Reasonable provision is achieved if the SAP assessment indicates the dwelling does not have high risk of high internal temperatures
- The building regulations do not specify a minimum daylight requirement. As a general guide, if the area of glazing is less than 20% of the total floor area, some parts of the dwelling may experience poor level of daylight, resulting in an increase of electric lighting

4. Building's performance to be consistent with DER and DFEE rate

- A final calculation of the DER and DFEE rate is required to take account of any changes in specification from 'As Designed' to 'As Built' ensuring Building Regulations have been adhered to
- Air tightness – Three dwellings or 50% of the dwellings of each type must be tested for the 'As Built' requirements.
- Thermal Bridging – Four methods are offered to determine the Y-value, achieving a more accurate thermal bridging detail
 - 1) Adopt a Government approved ACD scheme (with onsite checks and verification) ensuring accuracy and quality of detail. This requires measured and calculated linear thermal bridges for all individual building junctions. By using this method, buildability and quality is assured which allows the calculated values to be entered directly into SAP/SBEM without any penalty.

2) The thermal bridging value is calculated by a suitably qualified person by measuring the length of each junction, multiplying this by the appropriate psi value, and using the sum total to produce the Y-value.

3) Adopt a conservative Y-value of 0.15 W/mk for dwellings.

4) Use of the linear thermal transmittance values 'default' column in SAP 2012 Table K1. Both 3 & 4 are "unaccredited" routes;

- Party Walls

Part L1A Dwellings	W/m ² K
Filled Cavity with edge sealing	0.00
Partial Filled Cavity with edge sealing	0.20
Unfilled Cavity with edge sealing	0.50

5. Providing information for the building owner

Information detailing how to use the building efficiently is to be provided to the building owner to facilitate reductions in energy consumption.

- Improved quality of information, operating and maintenance instructions on usage of all systems including heating and water systems
- Data used to calculate the TER, DER, TFEF and DFEE should be included
- Improvement Recommendations report which will be completed at the same time as the Energy Performance Certificate. This will indicate any further measures to achieve even higher standards, and include cost effective insulation improvements



New Build Part AD L1A Wales

5 Steps to Compliance Criteria

The majority of updates within the Welsh Part L1A Guide are similar to what has been announced for the approved Part L documents for England.

Wales have a same approach to England for Part L compliance which is the 5 steps to compliance:

1. Achieving the TER – Dwelling Emission Rate (DER) ≤ Target Emission Rate (TER)

The new Target Emissions Rate is being calculated with an ‘elemental recipe for a gas heated dwelling based on a set fabric and service specification. This specification must be followed exactly if you chose to use the ‘Elemental Recipe’.

Not using the ‘Elemental Recipe’, developers will have the flexibility to change from this to allow improvements elsewhere and reducing fabric in some elements. A person must provide an ‘As Designed’ SAP assessment no later than a day before the work starts. The following must be submitted to local authority a day before work commences:

- The target CO2 emissions rate for the building
- The calculated CO2 emissions rate for the building as designed
- A list of specifications to which the building is to be constructed.

2. Limits on design flexibility – fabric standards and system efficiencies

3. Limiting the effects of solar gains in summer

4. Building performance consistent with DER – Quality of construction & commissioning

5. Provisions for energy efficient operation of the dwelling – Providing information / O&M instructions

The thermal performance of the building fabric has been lowered. This means you’ll require higher levels of insulation to ensure you meet these enhanced targets.

Limiting U Values Building Fabric		
Part L1A Dwellings	(2010) W/m ² K	(2014) W/m ² K
Wall	0.30	0.21
Roof	0.20	0.15
Floor	0.25	0.18
Party Walls	0.50	0.20
Windows	2.00	1.60
Air Permeability	m ³ /h.m ² at 50 Pa	m ³ /h.m ² at 50 Pa



The Zero Carbon Hub has consistently encouraged the focus on fabric first as essential basic principle of zero carbon

New Build L2A England

Insulation is still the most cost effective way of improving the performance of a building

5 Steps to Compliance Criteria

1. Calculating the CO2 emissions – The Requirements

> **The Building Carbon Dioxide Emissions Rate (BER) must not exceed the Target Carbon Dioxide Emissions Rate (TER)**

The BER & TER must be calculated for the building as proposed by an accredited model using the National Calculation Methodology (NCM), using Simplified Building Energy Model (SBEM).

The target is set to achieve an aggregate 9% improvement compared to 2010 standards. To set the target, four notional building types have been defined:

- Buildings that are side-lit through vertical windows (offices, halls of residence etc.) heated only
- Cogeneration (combined heat & power or combined heat & mechanical energy)
- District heating, especially if some or all of the energy is from renewable sources
- Heat pumps (air, ground or water source)

> **Consideration of high-efficiency alternative systems for new buildings**

The person undertaking the work must carry out an analysis that considers and takes into account the technical, environmental and economic feasibility of using high-efficiency alternative systems in the dwelling design. The following must be considered;

- Decentralised energy supply systems based on energy from renewable sources
- Cogeneration
- District or block heating or cooling
- Heat Pumps

The analysis should state whether high-efficiency alternative systems have or have not been included in the building design.

> **Special Considerations**

Special considerations apply to certain classes of non-exempt buildings. These buildings included:

- Non-exempt buildings with low energy demand
- Modular and portable buildings with a planned service life of more than two years (at one or more sites)

- Shell and core developments If a building offered to the market for sale/let as a shell for specific fit-out work by the incoming occupier, the developer should demonstrate an 'As Designed' TER/BER submission how the building shell as offered could meet the energy efficiency requirements

2. Limits on Design Flexibility

Building regulations require that reasonable provision be made to limit heat gains and losses through the fabric of the building. Thermal performance of the building fabric, boiler efficiency, hot water and lighting must be within the stated design limits.

The following is a table of the limiting U-values for the building fabric (IE Fabris to no worse than):

Limiting U Values Building Fabric	
Part L2A	W/m ² K
Wall	0.35
Roof - Insulated at rafter	0.25
Roof - Insulated at ceiling	0.25
Flat Roof	0.25
Floor	0.25
Swimming Pool Basin	0.25
Windows	2.20
Vehicle access and similar large doors	1.5
High – usage entrance large doors	3.5
Roof ventilators	3.5
Air Permeability	10.0m ³ /h.m ² at 50 Pa

For dwellings with openings greater than 25% of total floor area, it will be harder to pass.

The Fabric performance needs to be considerably better than the stated than the stated limited U Values

- The Non-Domestic Building Services Compliance guide sets out minimum efficiencies and controls for fixed services, including hot water, temperature control, space heating, lighting, low carbon methods, renewable energy systems and heat pumps
- Energy metres and sub-metres must be installed to account for 90% of the estimated annual energy consumption of each fuel to be assigned to the various end-use categories (lighting, heating etc.) Renewable systems to be separately metered. Buildings with a greater floor area of 1000m² must have automatic meter reading and data collection

3. Limiting effects of solar gains in the summer

The aim to limit solar gains during the summer is in order to reduce the need for air conditioning. For occupied spaces or spaces that are mechanical cooled the amount of solar gain for the period April to September should not exceed the following glazing system;

- For side-lit buildings the reference case is an east facing façade with full width glazing to a height of 1.0m having a framing factor of 10% and a solar energy transmittance value of 0.68 (g-value)
- For top-lit where the average zone is not greater than 6m in height, the reference case is a horizontal roof, 10% glazed from the inside and rooflights that have a framing factor of 25% of solar energy transmittance value of 0.46 (g-value)
- For top-lit where the average zone is greater than 6m in height, the reference case is a horizontal roof, 20% glazed from the inside and rooflights that have a framing factor of 15% of solar energy transmittance value of 0.46 (g-value)



4. Building performance consistent with the BER

The building fabric must include no reasonably avoidable thermal bridges in the insulation layers, and the 'As Built' BER, including the air pressure result, ductwork leakage rate and commissioned fan performance must not exceed the TER.

- To minimise thermal bridging the builder may use construction details from a quality-assured scheme or use details that have been calculated by a person with suitable expertise and experience following the guidance set out in BR497. Details that have been specifically modelled must be submitted and check with the Building Control Body (BCB). To use construction details with no specific calculation of the thermal bridge values will be penalised by 0.04W/mK or 50% must be used in the BER calculation
- BCB must be provided with a pressure test to confirm the air permeability standard has been achieved in accordance with the Measuring Air Permeability of Building Envelopes (2010)
- Ductwork leakage testing should be carried out where required by and in accordance with the procedures set in B&ES DW/143 and B&ES DW/144 on systems served by fans with a design flow rate greater than 1m³/s
- BCB requires a commissioning plan to be produced with the calculation of the TER/BER. It will outline the systems installed and the tests that will be carried out. Commissions are carried out by the person who installs the system following a relevant approved procedure. Sometimes it may be carried out by subcontractor or specialist firm

5. Providing information for the building owner

The owner of the building should be provided with sufficient information about the building, fixed services and their maintenance requirements so that the building can be operated efficiently to reduce the fuel consumption. The data used to calculate the TER & BER should be included within the log book.

Part L changes are effective from April 2014, except for:

- Site where an initial notice was issued to the building control before 6th April 2014, providing work commenced on site prior to the 6th of April 2015.

New Build L2A Wales

5 Steps to Compliance Criteria

The majority of updates within the Welsh Part L2A Guide are similar to what has been announced for the Approved Part L2A documents for England. There is a 20% improvement in carbon dioxide savings.

Wales have the same approach to England for Part L compliance which is the 5 steps to compliance:

1. Achieving the TER

Building Primary Energy Consumption (BPEC) is new target implemented to measure the delivered energy plus the energy used to produce the energy delivered to the building. It is calculated from the delivered energy using primary energy (conversion) factors. The TPEC and BPEC calculation is primarily a measure of the energy efficiency of fabric and the building services. With a primary energy target it is not possible to incorporate renewable technologies to compensate for lower performing fabric and services standards, both the TPEC and the TER need to be met, so the fabric needs to be properly considered alongside the carbon emissions target.

To comply with regulations the following must be adhered to:

- a) The BPEC must not be greater than the Target Primary Energy Consumption (TPEC)
- b) The Building Emission Rate (BER) must not be greater than the Target Emission Rate (TER)

A day before construction starts the following must be submitted to the local authority:

- a) The target CO₂ the target Co₂ emissions rate for the building
- b) The calculated CO₂ emissions rate for the building as designed
- c) A list of specifications to which the building is to be constructed
- d) The target primary energy consumption rate for the building
- e) The calculated primary energy consumption rate for the building as designed

2. Limits on design flexibility – Fabric standards and system efficiencies

The stated U-values for the main Building elements are expressed as area weighted values for all type of that element. These are unchanged from the Part L English regulations.

3. Limiting the effects of solar gains in summer

4. Building performance consistent with DER – Quality of construction & commissioning

5. Provisions for energy efficient operation of the dwelling – Providing information / O&M instructions



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