

Kingspan Quick Guide


to the 2006 Building Regulations Approved Document
Part L2 Conservation of Fuel and Power (England & Wales)



What Part L2
Means for You

Approved Building Regulations Part L2 Summaries

L2A - New Build Summary

- Whole building energy / CO₂ modelling is the only route to compliance by using SBEM or approved software
- Actual buildings must have 23.5 to 28% lower CO₂ emission rate compared to a notional building based on the 2002 regulations
- U-Values used in practice could be backstop value (0.25 roof / 0.35 walls) because there is little CO₂ benefit for using reduced values
- Rooflights will need to be triple skin to achieve 2.2 U-Value. Trade off not allowed
- Key routes to cost effective compliance likely to be:
 - Low air infiltration
 - Lighting controls such as photoelectric dimming and occupancy light switching
 - Optimisation of building services
- Prove compliance with the help of Kingspan  Technical Services

L2B - Refurbishment Summary

- Submission of Building Notice or full plans to local authority is now mandatory for most refurbishment work.
- Full replacement of roofs and/or walls requires U-Values of 0.25 for roofs and 0.35 for walls.
- Renovation of existing roofs / walls requires U-Values of 0.25 / 0.35 respectively subject to technical feasibility & payback less than 15 years.
- Extensions under L2B require roof and wall U-Values of 0.2 and 0.3 respectively (large extensions come under L2A)
- Consequential improvements to whole building are required in situations of material change of use, material alterations, changes to building services and extensions. These take the form of cost effective energy efficiency improvements up to 10% of the original project value.

The Aims of Part L2

The main aim of the new Part L2 of the Building Regulations is to reduce CO₂ emissions to meet UK and EU targets and to help comply with the European Energy Performance of Buildings Directive (EPBD).

L2A Compliance for Non-Domestic New Build - Five Steps to Compliance

Step 1 Achieving an Acceptable Building CO₂ Emission Rate (BER)

The actual CO₂ Building Emission Rate must not be greater than the Target Emission Rate calculated

Calculating the Target Emission Rate (TER)

$$TER = C_{\text{notional}} \times (1 - \text{required improvement factor}) \times (1 - \text{LZC benchmark})$$

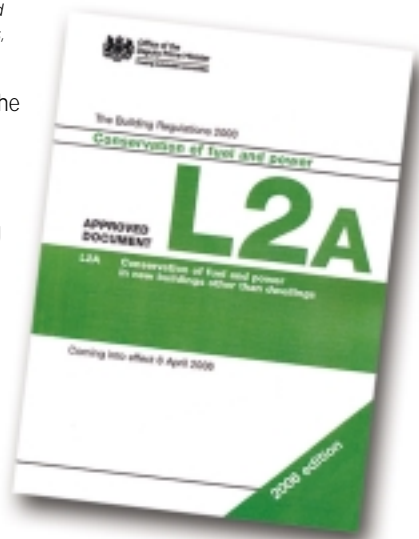
C_{notional} = CO₂ emission from a notional building of the same size, shape, activity areas and classes of building services as the actual building

Building Services Strategy	Improvement Factor	LZC* Benchmark	TER %
Heated & naturally ventilated	15%	10%	0.765
Heated & mechanically ventilated	15%	10%	0.720
Air conditioned	20%	10%	0.720

Note: Both the TER and BER are calculated using either the Simplified Building Energy Model (SBEM) software provided by the DCLG or an approved alternative

**LZC - Low and Zero Carbon Energy Sources, e.g. small scale and micro Combined Heat and Power Units (CHP), photovoltaic panels, building mounted wind generators.*

Compliance is achieved if the design achieves the target carbon dioxide emission rate (TER) compared to a notional building based on the 2002 regulations. In the case of naturally ventilated buildings the target is a 23.5% saving whilst in the case of air conditioned or mechanically ventilated buildings the target saving is 28%. The use of LZC technologies is encouraged but not mandatory.



Step 2 Design Flexibility Limitations

The design limits for individual building elements and services which are set out in the approved document should be incorporated within the building envelope.

The table below shows the area weighted average U-Values for all elements and U-Values for individual elements. Whilst lower standards are allowable for individual elements the average area weighted U-Value must not exceed the limits as set out below. No trade off is allowed between elements of different types.

Element	Area Weighted U-Values (W/m ² K)	Individual Elements U-Values (W/m ² K)
Wall	0.35	0.70
Floor	0.25	0.70
Roof	0.25	0.35
Windows & Rooflights	2.20	3.30
Personnel Doors	2.20	3.00
Vehicle/Large Doors	1.50	4.00
High usage Doors	6.00	6.00
Roof/Smoke Ventilators	6.00	6.00

Thermal bridging should be taken into account and air leakage not to exceed 10m³/hr/m² at 50 Pa.

Step 3 Limiting the Effects of Solar Gain in Summer

Buildings not served by air conditioning should limit solar gains and internal temperature rise by limiting perimeter solar and casual gains to 35W/m² or the total number of hours above 28°C.

Buildings served by air conditioning should make reasonable provision for the control of excessive solar gain demonstrated by meeting the Target Emission Rate (TER).

Step 4 Construction Quality and Commissioning

Building control will require a final BER calculation of the 'as built' construction incorporating any changes to the building performance specifications, air and ductwork leakage measurements and also of the commissioned air testing result.

All new buildings will be required to pass an airtightness test. Remedial measures will have to be taken if the building fails where upon a re-test will be required to pass the required standard.

Commissioning of the building services should be carried out to the recognised commissioning codes.

Step 5 Providing Information

The building owners (and users) should be provided with a log book of the required maintenance for the building services, enabling the building to function efficiently and meet compliance.

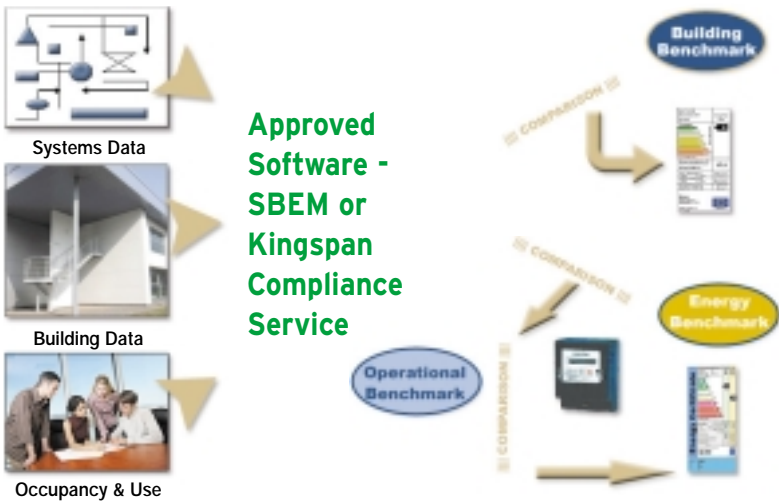
How Do I Achieve the Most Cost Effective Compliance?

The new Part L2A for England & Wales covers non-domestic new build – all previous compliance options are withdrawn – now the only way to achieve compliance is to use a software package – SBEM (Simplified Building Energy Model) or approved alternative such as the approved software used by Kingspan **enviro^{care}** Technical Services.

Approved Software Inputs

The whole building methodology requires inputs of the following parameters:

- Detailed thermal characteristics of envelope – including geometry, elements and junction details.
- Design value for airtightness
- Heating installation details
- Air conditioning details
- Ventilation – i.e. Naturally or mechanically ventilated
- Fixed lighting
- Occupancy type



Approved Software Outputs

Based on 2400m² industrial shed with 250m² office indicative calculations demonstrate that the following CO₂ savings can be achieved compared to the 2002 notional building.

- | | |
|---------------------------------|------------------------------------|
| • Air leakage 10 to 5% | 12% saving |
| • Metering & alarms | 7% saving |
| • Photoelectric dimming | 10% saving @ 10% rooflights |
| • Glazing areas 15% to 7.5% | 2% saving |
| • Occupancy light switching | 3% saving |
| • Boiler efficiency 81 to 91% | 6% saving |
| • Roof U-Value 0.25 to 0.20 | 2% saving |
| • Wall U-Value 0.35 to 0.25 | 2% saving |
| • Low PSI values can give up to | 8% saving |

Tips on Compliance from



The following general advice gives a strong indication of the areas where the most beneficial savings can be achieved.

- Designing for **low air permeability** will be a very important element of cost effective compliance. The maximum allowable value is $10\text{m}^3/\text{hour}/\text{m}^2$ – experience has shown that buildings clad in Kingspan panels have achieved air infiltration rates as low as $1.3\text{m}^3/\text{hour}/\text{m}^2$. Designing to an air permeability of $5\text{m}^3/\text{hour}/\text{m}^2$ could make a significant contribution to achieving the TER.
- Designing to **reduce electricity consumption** can play a key role in achieving compliance. The use of photoelectric dimming and occupancy light switching can achieve significant savings. Optimisation of lighting controls in conjunction with rooflight / glazing areas is critical.
- Use of **efficient building services**, particularly in respect of high boiler efficiencies can make a key contribution to achieving the TER.
- The use of **energy metering** with out of range of alarms is beneficial.
- The use of **thermally efficient junction details** is likely to play a key role in compliance. Kingspan details have been designed with thermal efficiency in mind and can be used to improve the TER compared to the notional building. Kingspan details will become formally certified as ‘accredited details’ following the accreditation methodology announcement expected shortly by Department of Communities and Local Government (DCLG).

With particular reference to building fabric U-Values provisional calculations have indicated that for an industrial warehouse building with a small office attached.

- Changing roof U-Value from 0.25 to 0.20 results in approximately 2% carbon dioxide saving.
- Changing wall U-Value from 0.35 to 0.25 results in approximately 2% carbon dioxide saving.

It is clear that whilst decreasing building fabric U-Values has a positive effect towards achieving the TER it is making a relatively small contribution to achieving the overall target of 23.5% to 28%.

The table below indicates what thickness of insulated panel from Kingspan is likely to provide the most cost effective solution:

Limiting U-Value Standards (W/m ² K)		
Element	Area-weighted Average	Kingspan Insulated Panel Thickness
Wall	0.35	60-70mm*
Roof	0.25	80-90mm*

* depending on specific panel type

Calculations Required

At Design Stage	At Building Completion
Approved software produces schedule of key features <ul style="list-style-type: none">To assist building controlShow design is compliant	Approved software calculation repeated <ul style="list-style-type: none">To account for changes (eg. value engineering)Measured performance – e.g. air leakage testingGenerates asset rating.

The latest SBEM program and use guide can be downloaded from the following link:

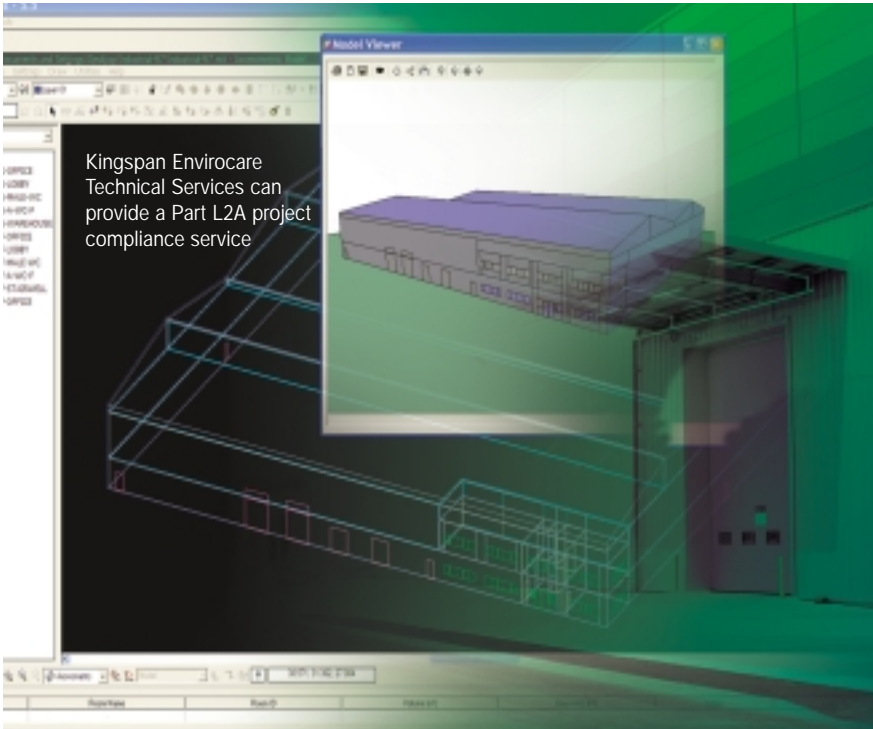
www.ncm.bre.co.uk

Kingspan L2A Compliance Service

For compliance service contact Kingspan **enviro**care Technical Services for further details:

Tel: 01352 716101

Email: technical@kingspanpanels.com



L2B Compliance for Refurbishment of Non-Domestic Buildings

L2B refers to existing buildings undergoing refurbishment that affects the energy profile of the building

Refurbishment of existing buildings now requires submission of a Building Notice or full plans to the local authority

1 Material Alterations

There are new complex rules relating to alterations to buildings, controlled services or fittings to ensure that alterations meet the appropriate performance criteria.

2 Material Change of Use

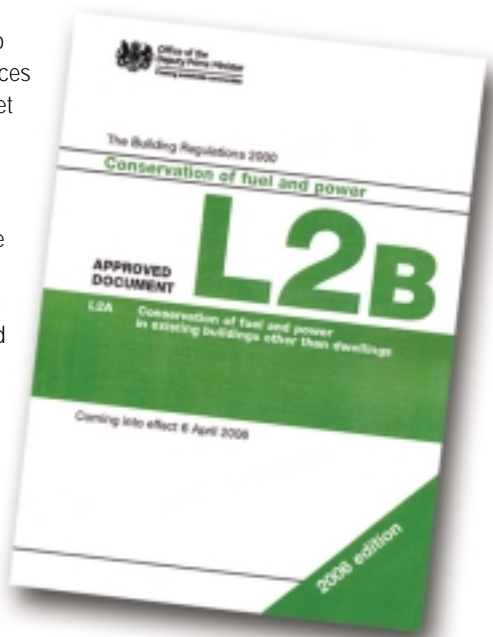
If a building changes its purpose or use from that for which it was originally designed for, this is classed as material change of use. Building services should be at the same standards as in extensions.

3 Extensions to Existing Buildings

Large extensions – where greater than 100m² and greater than 25% of the floor area of existing building the requirements for new build (L2A) must be followed.

For extensions where L2B applies

- Thermal element U-Value standards are 0.30 for walls and 0.20 for roofs.
- Rooflights to not exceed 20%
- Limits on window areas depending on building type.
- Trade-off between different elements is allowed.



4 Provision of New Thermal Elements

Standards for Thermal Elements (W/m²K)

Element	(a) Standard for New Elements in an Extension	(b) Standard for Replacement Elements in an Existing Building
Wall	0.30	0.35
Pitched Roof - Insulation at ceiling level	0.16	0.16
Pitched Roof - Insulation between rafters	0.20	0.20
Flat Roof or Roof with Integral Insulation	0.20	0.25
Floors	0.22	0.25

- (a) New extensions where Consequential Improvements are necessary to the whole building
 (b) Replacing roofs and walls where no Consequential Improvements are necessary

5 Upgrading Existing of Thermal Elements

Upgrading Retained Thermal Elements (W/m²K)

Element	(a) Threshold Value	(b) Improved Value
Cavity Wall	0.70	0.55
Other Wall Type	0.70	0.35
Floor	0.70	0.25
Pitched Roof - Insulation at ceiling level	0.35	0.16
Pitched Roof - Insulation between rafters	0.35	0.20
Flat Roof or Roof with Integral Insulation	0.35	0.25

Where a thermal element is being renovated its thermal performance should achieve column (b) unless not technically feasible or payback > 15 years. Alternatively it should be upgraded to the best standard that is technically feasible with payback < 15 years.

Where renovation works apply to less than 25% of the floor area 'reasonable provision could be to do nothing to improve energy performance'.

6 Consequential Improvements

FOR

- Extensions
- Material change of use
- Initial provision of building services
- Increase to installed capacity of any building service

Consequential improvements to the **WHOLE** building are required subject to it being technically, functionally and economically feasible. Cost is limited to 10% of the value of the principle works (with certain exceptions).

How Can Kingspan Help?



Kingspan Envirocare Technical Services
Tel: 01352 716101

The new Part L is only the start – perhaps an even more dramatic change to the commercial property market will take place with the implementation of EPBD (Energy performance of Buildings Directive).

The EPBD includes a requirement for building energy labelling including the determination of Operational Ratings for all buildings.

The Directive came into force in January 2006 and is aimed at improving building energy efficiency and is a cornerstone of the sustainable construction agenda.

Part L 2006 is a step to compliance with the Directive - an announcement is awaited from DCLG regarding implementation of building performance certification and labelling.



EPBD will lead to a new focus on long term energy performance of building fabric systems because any deterioration in performance will be detected and a drop in Operational Rating will undoubtedly affect the building's potential sale value and lettability - disclosure of the Operational Rating will be a legal requirement of the sale / let documentation.

Kingspan Insulated panels will play a key role because our 25 year thermal performance guarantee will help prevent deterioration in the Operational Rating. - this could help prevent future litigation as a result of deterioration in building energy performance.

Building fabric systems that cannot provide guaranteed long term thermal performance pose a significant risk to the designer, contractor and building owner.

The combination of Part L and EPBD is a recipe for dramatic change. Kingspan is at the forefront of finding solutions and there is no doubt that insulated panels will play an increasing role in the future in securing regulation compliance and offering long term, guaranteed energy saving performance.

Full copies of Approved Document L1A, 1B, 2A and 2B can be downloaded from:

www.planningportal.gov.uk/england/professionals/en/1115314110382

This Quick Guide to Part L2 of the 2006 Building Regulations has been produced to help identify and understand the key features, issues and requirements of the Approved Document Part L2 and how to comply. Refer to the Approved Document Part L2 for full details of the Building Regulations.

