

Building Control Guidance Note	Subject	CONSERVATION OF FUEL AND POWER 2013.						24
		Guide 6 – APPROVED DOCUMENT L2B Conservation of fuel and power – Work in existing buildings other than dwellings.						
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From **1st October 2010** there have been changes to the Building Regulations that cover the Conservation of Fuel and Power in buildings.

Energy performance relating to works and extensions in existing buildings is based on a revised elemental approach in which insulation and efficiency thresholds are set for individual parts of the building envelope and services. However there are certain circumstances where for larger extensions this approach is not acceptable and they have to be treated as if they are a new build, this will be explained later on in this guidance.

Both AD L2B and AD L1B follow the same pattern in that they provide guidance on the standards to be achieved for 'Thermal Elements' (walls, floors and roofs), 'Controlled Fittings' (windows, doors and similar fittings) and 'Controlled Services' (heating, hot water, ventilation systems and lighting), or changing a buildings energy status.

In the case of large buildings building over 1,000 m² is extended, or where a fixed building service is installed for the first time, or the installed capacity of an existing fixed building service is increased - it may be necessary to undertake works to the building as a whole (including the existing parts). These are referred to as 'Consequential Improvements' (explained in detail below).

Reference should be made to the other guides in this series for the requirements that apply to the following:

- Exemptions from controls / non-notifiable works.
- Repair and/or replacement of 'Thermal Elements'
- Change to a buildings energy status

Summary of Changes:

Changes in Legal Requirements.

1. Exemption from the energy efficiency provisions of extensions consisting of a conservatory or porch has now been amended to grant exemption only where the existing walls, windows, or doors are retained or replaced if removed and where the buildings heating system is NOT extended into the conservatory or porch,
2. The list of work in Schedule 2B (work that need not be notified to building control) is amended to include the installation of thermal insulation in a roof space or loft space where this is the only work carried out and the work is not carried out to comply with any requirement in the Building Regulations.

Changes in Technical Guidance.

1. Generally guidance is based upon an elemental approach to demonstrate compliance, with additional guidance that provides greater flexibility. The main technical changes comprise a general strengthening of energy efficiency standards that are considered reasonable for work on thermal elements, controlled fittings and controlled services in existing dwellings.
2. Amended guidance is given for historic and traditional buildings which may have an exemption from energy efficiency requirements or where special considerations apply.
3. Amended guidance is given where an extension is a conservatory or porch that is not exempt from the energy efficiency requirements.
4. Renovation of a thermal element guidance is amended
5. Guidance is provided for swimming pool basins (walls and floors) in existing buildings.

The requirements of Building Regulation Part L Conservation of Fuel and Power:

Schedule 1 – Part L Conservation of fuel and power

L1. Reasonable provision shall be made for the conservation of fuel and power in buildings by:

- (a) limiting heat gains and losses—
 - (i) through thermal elements and other parts of the building fabric; and
 - (ii) from pipes, ducts and vessels used for space heating, space cooling and hot water services;
- (b) providing fixed building services which—
 - (i) are energy efficient;
 - (ii) have effective controls; and
 - (iii) are commissioned by testing and adjusting as necessary to ensure they use no more fuel and power than is reasonable in the circumstances; and
- (c) providing to the owner sufficient information about the building, the fixed building services and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances.

GUIDANCE RELATING TO BUILDING WORK.

Extensions.

Important to remember - Consequential improvements will be required to the existing buildings if it has a 'total useful floor area' more than 1000m².

Large Extensions.

Important to remember- If your extension has a total useful floor area greater than 100m² and greater than 25% of the 'total useful floor area' of the existing building; then the works are to be treated as a new building and must fully comply with ADL2A (not this guidance). However consequential improvements as explained above will still apply in accordance with ADL2B.

'Total useful floor area' – total area of all enclosed spaces measured to the internal face of the external walls. The area of sloping surfaces e.g. stairs, galleries, raked auditoria / terraces to be taken as plan area. Include all areas occupied by partition walls/columns chimneybreasts and internal structural of party walls. Exclude non-enclosed areas e.g. open floors/covered ways and balconies.

Other Extensions - Fabric Standards.

Controlled Fittings (Windows/doors/roof windows/ roof lights).

Curtain walling is also to be considered as a Controlled Fitting.

Controlled Fittings must be 'Suitably draught-sealed' and their 'Thermal performances to must comply with table 3 below:

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Table 3 – Standards for controlled fittings.

Fitting	Standard for new fittings in extensions.
Window, roof window and glazed roof lights ⁽¹⁾	U-value = 1.8 W/m2.K for whole unit
Alternative option for windows in buildings that are essentially domestic in character e.g. student accommodation/ nursing homes or similar. ⁽²⁾	Window energy rating⁽³⁾ - Band C
Plastic Rooflights. ⁽⁴⁾	U-value = 1.8 W/m2.K
Curtain Walling.	See paragraph next page
Pedestrian doors where the doors have more than 50% of their internal face area glazed.	U-value = 1.8 W/m2.K for whole unit
High usage entrance doors for people.	U-value = 3.5 W/m2.K
Vehicle access and similar large doors.	U-value = 1.5 W/m2.K
Other doors.	U-value = 1.8 W/m2.K
Roof ventilators (including smoke extract ventilators.)	U-value = 3.5 W/m2.K

NOTES

- 1) Display windows are not required to meet the standard given in this table.
- 2) For example, student accommodation, care home and similar uses where occupancy levels and internal gains are essentially domestic in character.
- 3) Window energy rating is further clarified in ADL1B
- 4) The relevant rooflight u-value for checking against these limits is that based on the developed area of the rooflight, not the area of the roof aperture.

DEFINITIONS:

'display windows' – area of glazing, including doors – intended for display of products and services. They must be at an access level, positioned at the buildings external perimeter and immediately adjacent to a pedestrian thoroughfare. No permanent workspace must be within one glazing height of the perimeter. *NOTE – glazing that extends more than 3metres above access level is not to be considered as part of the display window and must therefore fully comply with 'controlled services requirements'* (unless it is necessary for display purposes or in replacing existing the existing is higher than 3 metres or for building work involving changes to the façade there is a planning requirement for greater display window heights to fit in with surrounding buildings or to maintain the character of the existing building façade).

Display windows will be found in buildings in Planning Use classes A1, A2, A3, and D2.

Table 1 Planning Use Classes	
Class	Use
A1	Shops: including retail-warehouse, undertakers, showrooms, post offices, hairdressers, shops for sale of cold food for consumption off premises
A2	Financial and professional services: banks, building societies, estate and employment agencies, betting offices
A3	Food and drink: restaurants, pubs, wine bars, shops for sale of hot food for consumption off premises
D2	Assembly and leisure: cinemas, concert halls, bingo halls, casinos, sports and leisure uses

'high usage entrance doors' - doors subject to high volume usage, fitted with automatic opening and closing controls and having a draught lobby fitted.

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The u-value for roof windows and roof lights are based on having assessed the roof light in a vertical plane. If a particular unit has been assessed in a other plane the u-value standards should be adjusted using BR 443 e.g. replacement plastic rooflight standard is 1.8 **W/m2.K assessed vertically – if used horizontally from BR443 allows an adjustment of 0.3 W/m2.K which gives a u-value of $1.8 \times 0.3 = 2.1 \text{ W/m2.K}$**

Note - for certain buildings with high internal gains - a lower 'U' value may be an appropriate way of reducing overall CO2 emissions – therefore relaxed standards can be applied but N.L.T 2.7 W/M²k.

Curtain walling 'U' value overall u-value to be no greater than 1.8 W/m2.K or a limiting u-value of $0.8 + \{(1.2 + (\text{FOL} \times 0.5)) \times \text{GF}\}$ Where FOL is fraction of opening lights and GF is the glazed fraction e.g. curtain walling 60% glazed and 40% opaque with 50% opening lights, the u-value is 'u' value standard required = $0.8 + (1.2 + 0.5 \times 0.5) \times 0.6 = 1.7 \text{ W/m2.K}$

If you intend to use metal windows you must supply U-value calculations and the windows should be thermally broke to prevent condensation problems.

Area of windows and roof lights.

Area of windows and roof lights in extension are not to exceed the values below unless a greater proportion of glazing is present in the part of the building to which the extension is attached. In such cases limit the extension's glazing proportions to no greater than the proportion that exists in the part of the building in which it is attached.

Table 2 – Opening areas in extensions.

Building Type	Windows and personnel doors as % of exposed wall.	Rooflights as % of area of roof.
Residential buildings where people temporarily or permanently reside.	30	20
Places of assembly, offices and shops.	40	20
Industrial and storage buildings.	15	20
Vehicle access doors and display windows and similar glazing.	As required	N/A
Smoke vents.	N/A	As required

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Provision of newly constructed and replacement Thermal Elements.

Newly constructed and replacement thermal elements are to comply with the standards as set out below:

Table 4 – Standards for Thermal Elements W/m²k

Element. ⁽¹⁾	Standards for new thermal elements.
Wall	0.28⁽²⁾
Pitched roof – insulation at ceiling level	0.16
Pitched roof – insulation at rafter level	0.18
Flat roof or roof with integral insulation	0.18
Floors ⁽³⁾	0.22 ⁽⁴⁾
Swimming Pool Basin	0.25⁽⁵⁾

NOTES

- (1) Roof includes the roof parts of dormer windows and wall includes wall parts of dormer windows.
- (2) A lesser provision may be appropriate where meeting a standard would result in a reduction of more than 5% in the internal floor area of the room bounded by the wall.
- (3) The 'U' value of the floor of an extension can be calculated using exposed perimeter and floor area of the whole enlarged building.
- (4) A lesser provision may be appropriate where meeting such a standard would create significant problems in relation to adjoining floor levels.
- (5) See note on swimming pools in this guide.

Curtain walling is also to be considered as a Controlled Fitting.

Continuity of Insulation

Ensure you design to avoid thermal cold bridging at joints / openings and sealing must be provided to prevent unwanted air leakage through the new elements. For larger projects you must submit a report from a suitably qualified person confirming appropriate design details / building techniques have been adopted and that the work has been carried out in a way to achieve reasonable conformity.

Suitable guidance to follow:

- (a) Adopt design details published in Accredited Construction Details website.
- (b) Cladding systems – MCRMA Technical Note.

BRE IP 1/06 and BR 497 gives guidance to demonstrate that proposed details deliver an appropriate performance level against surface condensation.

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Examples of Continuity of Insulation and Airtightness.

All gaps between elements must be sealed to reduce unwanted air leakage, e.g. follow robust detail sealing as described below:

- *Ensure wall, floor and roof insulation is continuously linked or overlapped to avoid creation of cold bridges. Watch your detailing where roof and floor structures abutt external walls and ensure all residual gaps are insulated.*
- *Provide vapour control barriers on the warm side of any insulation – this can include insulated ground floor construction (follow appropriate manufacturer’s detailing requirements).*
- *Ensure all lintels are insulated and that walls are not constructed out of differing thermally performing materials.*
- *Use joist hangers to support timbers or seal all junctions of structural timbers/ steel etc where built into an external wall with mastic sealant.*
- *Mastic seal all junctions of doors / windows and walls and under the edges of skirting boards / architraves.*
- *Seal around all services penetrations through the external structure, seal all junctions of walls / ceilings with ducting and close off the tops of all vertical ducts e.g. s.v.p boxings.*
- *It is important that all gaps have the appropriate sealant and or gap fillers provided suitable for the gap size and degree of movement anticipated.*
- *For drylining ensure continuous ribbons of adhesive are provided to fix dry lining at perimeters of external walls, openings, around services e.g. socket outlets etc. **The sealing of dry lining on dabs is very important, as it is a key area of air leakage.***
- *Use sealing tapes to junctions of roof sheets / wall cladding – with particular attention being given to the interface with differing construction elements.*

IMPORTANT NOTE – Ensure adequate precautions are taken to prevent condensation in the replaced or altered construction elements.

Swimming Pool Basins.

Where a swimming pool is being provided in a building, the U-value of the basin (walls and floor) should be not worse than **0.25 W/m².K** as calculated according to BS EN ISO 13370.

Material Change of Use / Retained Thermal Elements and Renovation of Thermal Elements.

Reference should be made to Guide 1 of this series for guidance on these important energy efficiency provisions to existing buildings and changes of use.

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Work on Controlled Services and Fittings.

(Heating, Hot water services, Mechanical Ventilation, and Air Conditioning systems, Fixed internal and external lighting and Renewable Energy Systems).

Where ***‘fixed building services’*** are to be provided (including replacement) or extended – you must ensure that they meet enhanced minimum standards of energy efficiency.

‘Fixed Building Services’ means: any part of, or any controls associated with:

- (a) Fixed internal or external lighting systems, but not emergency escape lighting or specialist process lighting: or
- (b) Fixed systems for heating, hot water service, air conditioning and Air Handling Mechanical cooling or ventilation).

(c) Any combination of systems of the kinds referred to in paragraph (a) or (b).

Refer to Guide 3 for exemptions of some minor works to Controlled services or fittings.

New ‘Fixed Building Services’.

1. Must have efficiencies as indicated in the Non-Domestic Building Services Compliance Guide some of which is extracted below for the different types of service provision below (reference should be made to the actual document for full details)

Evidence must be provided that the efficiency claimed is achievable in the form of certified test data.

For central plant i.e. boilers / chillers and main air handling plant – must have efficiency no worse than the plant being replaced. If changing the services fuel type a calculation must be carried out to ensure that an existing low carbon component is not being replaced with a lesser provision: **and**

2. New HVAC systems must have appropriate controls to achieve reasonable standards of energy efficiency – for example:
 - (a) Fixed building services systems to be sub-divided into separate control zones corresponding to each area of the building that has significantly different solar exposure, occupancy periods, or type of use.
 - (b) Each separate control zone should be capable of independent switching and control set-point.
 - (c) Service provisions should respond to the requirements of the space it serves. If both heating and cooling are provided they should be controlled so they do not operate simultaneously.
 - (d) Central plant serving zone-based systems should operate as and when required - (default condition MUST BE OFF).
 - (e) Additional controls and efficiency criteria are listed under the individual types of services as set out in the Non-Domestic Building Services Compliance Guide.
3. Provide new lighting systems with appropriate controls to achieve reasonable standards of energy efficiency.
4. Demonstrate the services have been effectively commissioned.
5. Demonstrate that reasonable provision of energy meters has been made for the effective monitoring of the plant performance.

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6. Demonstrate that the relevant information has been recorded in a new logbook or incorporated into an update of the existing one.
7. If a renewable energy generator such as a wind turbine or photovoltaic array is being replaced, the new system should have an electrical output that is not less than the original installation.
8. When replacing a heating appliance give consideration to connecting to any existing local heat networks. If the work involves pipe work changes, consideration should be given to providing capped off connection to facilitate subsequent connection to a planned local heat network.

Heating and Hot Systems.

Appliance efficiency and controls must comply with the provisions in the Non-Domestic Building Services Compliance Guide for the particular appliance type and distribution system. Checklists tools are provided in the guide and completed checklists must be provided on application submission.

Cooling Plant.

Where practical and cost effective to do so try and reduce the cooling requirements by improving solar control and by using more efficient lighting provisions.

Appliance efficiency and controls must comply with the provisions in the Non-Domestic Building Services Compliance Guide for the particular appliance type and distribution system. Checklists tools are provided in the guide and completed checklists must be submitted on application submission.

Air Handling Plant.

Appliance efficiency and controls must comply with the provisions in the Non-Domestic Building Services Compliance Guide for the particular appliance type & distribution system.

Systems must be capable of achieving a specific fan power at 25% of design flow rate, which is N.M.T that achieved at 100% design flow rate.

To aid commissioning / future flexibility variable speed fans are required for fans rated over 1100watts and which form part of the environmental control systems.

To reduce air leakage ventilation ductwork is to be constructed to be reasonably air tight and in compliance with HVCA DW144.

Insulation of Pipes, Vessels and Ducts.

Adequate provisions are to be made for insulating hot and chilled water pipework and storage vessels, refrigerant pipework and ventilation ductwork to conserve energy and maintain the temperature of the heating or cooling services, in accordance with the Non -Domestic Building Services Compliance Guide.

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Lighting.

Fixed Internal Lighting, including Display Lighting.

Note – where the area covered by the new lighting system is less than 100m² the work must in its self comply with these standards, but there is no requirement to notify Building Control (see Guide 24 (2)).

Emergency escape lighting and specialist process lighting (i.e. specialist task lighting within a space) are not subject to these requirements.

General Lighting Efficacy in Office, Industrial and Storage Areas in all Building types.

For these provisions - 'office' means areas of desk-based tasks, including classrooms, seminar rooms, and conference rooms, including those in schools.

Lighting to have an average efficacy not less than **55 luminaire-lumens per circuit watt** (averaged out over the whole area of these space types in the building - to allow for design flexibility to vary the light output ratio of the luminaires and the lamps luminous efficacy).

Average luminaire-lumens/circuit-watt is calculated by:

(Lamp-lumens x LOR) summed for all the luminaries in the relevant areas of the building, divided by the total (circuit watts x control factor) for all the luminaries where;

- (a) Lamp-lumens = sum of average initial (100 hour) lumen output of all the lamps in the luminaire; and
- (b) LOR – light output ratio of the luminaire, which means the ratio of the total light output of a luminaire under stated practical conditions to that of the lamp or lamps contained in the luminaire under reference conditions.
- (c) Control factor = the factor applicable when automatic controls substantially reduce the luminaries power consumption when electric light is not required (see commentary below) – which includes values of the control factor for use in the above formula. Control factors allow greater flexibility and encourage better controls.

General Lighting Efficacy in all Other Types of Space.

Lighting to have an average initial (100 hour) lamp plus ballast efficacy not less than **55 lamp-lumens per circuit Watt.**

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Lighting Controls For General Lighting in All Types of Space.

Controls to be provided so that unnecessary lighting can be switched off when rooms are not occupied or there is an adequate daylight level. Always risk assess the use of automatically switched lighting. Recommendations for lighting are indicated in the table below:

Local switches to be provided in easily accessible positions within each working area or at the boundaries between working areas and general circulation routes that are operated by deliberate action of the occupants (**'occupant control'**), either manually or remotely.

Occupant control can be supplemented by automatic systems that switch off, when they sense no occupants or dim or switch lighting off when sufficient daylight is detected.

Definitions of lit spaces.

'daylit space' – means any space:

- (a) within 6m of a window wall, provided that the glazing area is at least 20% of the internal area of the window wall.
- (b) Below rooflights and similar provided that the glazing area is at least 10% of the floor area. The normal light transmittance of the glazing should be minimum 70%, or, if the light transmittance is reduced below 70%, the glazing area could be increased proportionately.

Owned space' – means any space such as a small 1 – 2 person room who control the lighting e.g. a cellular office or consulting room:

Temporary Owned space' – means a space where people are expected to operate the lighting controls while they are there e.g. a hotel room or meeting room:

Shared space' – means a multi-occupied area, e.g. open plan office or factory production space:

Occasionally visited space' – means a space where people generally stay for a relative short period of time when they visit the space e.g. a storeroom or toilet:

Unowned space' – means a space where individual users require lighting but are not expected to operate the lighting controls, e.g. a corridor or atrium.

Managed space' – means a space where lighting is under the control of a responsible person e.g. a hotel lounge, restaurant or shop.

Forms of Lighting Control.

Local manual switching – means, in local or flexible manual switching, The distance on plan from any local switch to any luminaire it controls to be N.M.T 6 metres, or twice the height of the light fitting above the floor if this is greater. Where a space is a **'daylit space'** served by side windows, the perimeter row of lights are to be separately switched.

Photoelectric control – control that switches or dims lighting in response to the amount of the incoming daylighting.

Presence detection – control that switches lighting on when someone enters a space, and switches it off, after the space becomes unoccupied.

Absence detection – control that switches lighting off or dims it after the space becomes unoccupied, but where switching is done manually.

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Recommended controls for general and display lighting.

Space Classification	Control Type.
Owned	Manual by door
Shared	Flexible manual switching, e.g. local pull cords or wireless transmitter
Temporarily owned	Local manual switching
Occasionally visited	Local manual switching
Unowned	Time switching
Managed	a. Time switches; or b. Centralised manual

Table below gives control factors for such enhanced controls – used as part the luminaire efficacy calculation above.

When installed in appropriate locations, such enhanced control systems will deliver an energy benefit that can be traded against other aspects of the lighting system using factors listed.

Luminaire Control Factors for use in new and existing buildings.

Control Function.	Control Factor.
(a) The luminaire is in a daylit space and its light output is controlled by photoelectric switching or dimming control, with or without manual override.	0.90
(b) The luminaire is in a space that is likely to be unoccupied for a significant proportion of working hours and where a sensor switches off the lighting in the absence of occupants but switching on is done manually, except where this would be unsafe.	0.90
(c) Circumstances (a) and (b) combined	0.85
(d) None of the above.	1.00

Alternatively to the above - follow BRE Digest 498.

Recommended minimum standards for metering of general and display lighting.

	Standard
Metering for general or display lighting.	a. KWH meters on dedicated lighting circuits in the electrical distribution; or b. Local power meter coupled to or integral in the lighting controllers of lighting or building management system; or c. A lighting management system or in an exportable file format (this could involve logging the hours run and the dimming level, and relating this to the installed load.)

Display Lighting in All Types of Space.

Display Lighting – average initial efficacy not less than **22 lamp-lumens per circuit Watt.**

Note: this does not apply to the normal lighting necessary for general building use (previous requirements apply).

Display Lighting Controls.

Connect display lighting to dedicated circuits that can be switched off when the display lighting might not be required. E.g. timer switches to turn display lighting off outside of open hours (except for displays to be viewed from outside through display windows).

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Energy Meters.

Aim is to enable building occupiers to assign at least 90% of the estimated annual energy consumption of each fuel to the various end-use categories (heating, lighting etc.)

Reasonable provision in existing buildings is to install energy metering systems in the building services provided as part of the building works in accordance with recommendations in CIBSE TM39.

In addition to this:

- (a) Meters should be provided to enable performance of any renewable energy system provided as part of the works to be separately monitored: and
- (b) in buildings with a total useful floor area of more than 1000m², the metering system should enable automatic meter reading and data collection.
- (c) The metering provisions should be designed so as to facilitate the benchmarking of energy performance as set out in TM46 – Energy Benchmarks (CIBSE).

Commissioning and Providing Information.

On completion all fixed building services should be properly commissioned with all parts and controls working adequately – Regulation 44 requires that the installer provides a notice to building control (within 5 days of commissioning completion) confirming that the fixed building services have been commissioned in accordance with the CIBSE Commissioning Code M on Commissioning Management and for ductwork air leakage testing, this should be tested in accordance with Heating & Ventilation Contractor's Association guide DW/143 – A Practical Guide to Ductwork Leakage Testing. (Note for schemes covered by competent person's schemes this can be 30 days max)

Requirement only applies to the work that was actually carried out e.g. if it was a window replacement scheme there is no obligation to provided details of the heating system.

The commissioning notice should include a declaration signed by a suitably qualified person confirming that:

- (a) a commissioning plan has been followed so that every system has been inspected and commissioned in an appropriate sequence and to reasonable standard.
- (b) The results of tests confirm that the performance is reasonably in accordance with the proposed building designs, including written commentaries where excursions are proposed to be accepted.

Commissioning specialists:

HVCA Systems - Membership of the Commissioning Specialists Association or the Commissioning group of the HVCA

Lighting Control Systems – persons accredited under the Lighting Industry Commissioning Scheme.

Ductwork leakage testing - Membership of the HVCA specialist ductwork group or the Association of Ductwork Contractors and Allied Services. Testing to be carried out in accordance with the procedures set out in Heating & Ventilation Contractor's Association guide - DW/143.

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Providing Information.

On completion of the works, you must ensure contractors provides the owner with sufficient information about the building, the fixed building services and their maintenance requirements is that the building can be operated to achieve the intended fuel and power conservation provisions (e.g. provide a Building Log-Book).

Building Log-Book.

Provide a building log-book in accordance with CIBSIE TM31 Building Log-book Toolkit or amend any existing log books that may exist (provided its format is compatible with the TM31 format).

If you decide to use a different form of log-book, then the information contained and formatting must be equivalent to TM31.

A simple summary format suitable for day to day use must also be provided and it can cross reference to other documents e.g. Operation & Maintenance Manuals / Health & Safety files etc.

It should provide details of:

- (a) Any newly provided renovated or upgraded thermal elements or controlled fittings.
- (b) Any newly provided, fixed building services, their method of operation and maintenance.
- (c) Any newly installed energy meters, and
- (d) Any details that collectively enable the energy consumption of the building and building services comprising the works to be monitored and controlled.

Option for Design Flexibility.

When constructing an extension you could use an average U value across the extension's thermal envelope that is the same as if the prescribed U values had been used for each individual element. This means that a better value in the walls can be used to trade off against a worse U value in the roof.

Area weighted U-value of all the extensions elements is to be no greater than that of an extension of the same size / shape that complies with the new U-value standards and glazing area restrictions.

Calculation formula –

$\{(U1 \times A1) + (U2 \times A2) + (U3 \times A3) + \dots \text{etc}\}$ divided by $\{A1 + A2 + A3 + \dots \text{etc}\}$

U = U-value of element of the same construction (but no worse than the limits in Table 3 below).

A = internal area of the element.

A further alternative is to use Simplified Building Energy Model (SBEM) calculation tool or other approved simulation programme; to show that the building and extensions calculated CO2 emissions is no greater than for the building plus a notional extension complying with the new thermal standards. Table 3 minimum standards must however be complied with.

Where the building is over 1000m² - the building used for calculation of both the actual and notional extension should incorporate any improvements required by 'Consequential Improvement'.

Where additional upgrades are proposed in the actual building to compensate for lower performance of the extension – all upgrades must be no worse than the limits in Table 5 (b).

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IMPORTANT PROCEDURAL ISSUES FOR FIT-OUT WORKS / LARGE EXTENSIONS / MODULAR BUILDINGS.

- 1) For the first fit-out works such as shell and core buildings, office buildings or business parks the guidance in ADL2A should be followed. , Any subsequent fit-out works must comply with ADL2B requirements.
- 2) Large extensions (i.e. extensions having a '*total useful floor area*' greater than 100M²: and greater than 25% of the '*total useful floor area*' of the building) – should be treated as new build and comply with ADL2A.

'Total useful floor area' – total area of all enclosed spaces measured to the internal face of the external walls. The area of sloping surfaces e.g. stairs, galleries, raked auditoria / terraces to be taken as plan area. Include all areas occupied by partition walls/columns chimneybreasts and internal structural of party walls. Exclude non-enclosed areas e.g. open floors/covered ways and balconies.

Consequential improvements would still apply to buildings over 1000M² total useful floor area.

- 3) Modular and portable buildings where the work involves the construction using sub-assemblies obtained from centrally held stock or from a disassembly or relocation of buildings at other premises must comply with ADL2A (New Build) and Regulation 28 (consequential works) e.g. School extension of pre-fabricated portable buildings.

Note

- Erecting a separate unit on a site with an existing building(s) is not extending that existing building, but the creation of a new building unless the new unit is permanently linked to the existing building.
- Where work involves a building that either before work or after work is completed contains one or more dwellings - ADL1B applies to each dwelling (dwellings are defined as self-contained units {Rooms for residential purposes are **NOT** dwellings and ADL2b applies})

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CONSEQUENTIAL IMPROVEMENTS.

Where a existing building has a *'total useful floor area'* over 1000m² and you intend to carry out any of the following building works:-

- (a) Building an extension.
- (b) the initial provisions of any *'fixed building services'*. (other than renewable energy generator)
- (c) an increase to the installed capacity of any *'fixed building services'*. (other than a renewable energy generator).

You must bring the existing as well as the new building into compliance with Part L, unless you can prove that such works to the existing building are not technically, functionally or economically feasible. Such supporting evidence must be prepared by a suitably qualified person and provided on application submission (see further notes below).

NOTE – the principal new works must comply with the energy efficiency requirements.

'Total useful floor area' – total area of all enclosed spaces measured to the internal face of the external walls. The area of sloping surfaces e.g. stairs, galleries, raked auditoria / terraces to be taken as plan area. Include all areas occupied by partition walls/columns chimneybreasts and internal structural of party walls. Exclude areas that are not enclosed e.g. open floors/covered ways and balconies.

'Fixed Building Services' means: any part of, or any controls associated with:

- (a) Fixed internal or external lighting systems, but not emergency escape lighting or specialist process lighting; or
- (b) Fixed systems for heating, hot water service, air conditioning or mechanical ventilation.

'Not economically feasible' – Measures would be considered not to be economically feasible, if there is not a Simple 15 year payback on the cost of the thermal improvement works through energy savings – unless there are other unusual circumstances e.g. say the building only has a life span under 15 years – then reasonable provisions would be to achieve a simple payback on the life of the building.

Consequential Improvements on extending a building.

New free standing buildings erected on an existing site e.g. a new classroom block at a school site are to be considered new builds and must therefore comply with ADL1A.

For extensions one way to comply with the requirements for consequential improvements would be to adopt some of the examples of measures indicated below:

10% rule - to be reasonable there is a rule where the consequential improvements provisions can be restricted to a value is N.L.T 10% of value of *'principle works'* e.g. the cost of the extension (*'principle works'* – works necessary to achieve clients purposes in extending the building and/or increasing the installed capacity of any fixed building services.)

Values of principal works and consequential improvements must be established using current prices and must be provided in a report signed by a suitably qualified person on application submission i.e. Chartered Quantity Surveyor.

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Examples of practical and economically feasible consequential improvements.

- 1) Upgrading heating systems and / or cooling systems/air conditioning and / or air handling more than 15 years old by provision of new plant or improved controls.
- 2) Upgrading general lighting systems that have an average lamp efficiency of less than 40 lamp - lumens per circuit watt – and that serve areas greater than 100m²:by the provision of new luminaries or improved controls.
- 3) Installing energy metering in accordance with CIBSE TM 39.
- 4) Upgrading thermal elements having a 'U' value worse than table 5 (a) (see notes on 'Thermal Elements').
- 4) Replacing existing windows/ roof windows/roof lights (not 'display windows') or doors (excluding high usage entrance doors) that have a 'U' value worse than 3.3 w/m²:k - following the guidance below for 'Controlled Fittings' (definitions of 'display windows' and 'high usage entrance doors' is included in controlled fittings notes.)
- 5) Increasing on-site low and zero carbon (LZC) energy generating systems if the existing on-site systems provide less than 10% of on-site energy demand. Provided the increase would achieve a simple-payback of 7years or less.
- 6) Measures specified in the recommendations report produced in parallel with a valid EPC report.

Consequential Improvements on installing building services.

Where installing a fixed building service as the first installation, or as an installation which increases the installed capacity per unit area to an existing service - you are required to carryout consequential improvements to existing building as follows:

1. Improve the building fabrics thermal performance to those parts of the building served by the services installed (where economically feasible); **And**
2. Make consequential improvements to bring the existing as well as the new building into compliance with Part L, unless you can prove that such works to the existing building are not technically, functionally or economically feasible.

NOTE – the cost of the improvements required in (1) above – cannot be considered as contributing to the value of such consequential improvements in (2). This is to avoid higher CO2 emissions due to a higher level of servicing from the new building services conditioning the environment.

For the purposes of these Regulations - the '**installed capacity per unit area**' to an existing service is defined as the '*design output of distribution system output devices [thermal units] serving the space in question divided by the 'Total useful floor area' of the space*'.

Which means if you increase the boiler size to serve the extension, rather than to increase the existing buildings heating provision, consequential improvements (examples of which are listed previously above) must be carried out. But the requirements below would not have to be followed:

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Installed capacity per unit area of a heating system is increased.

Reasonable provisions to be followed where the *‘installed capacity per unit area of a heating system is increased’* are set out below: unless you can prove that such works are not technically, functionally or economically feasible. NOTE - You cannot use the 10% rule threshold .as described for other consequential improvements.

1. Thermal elements within the area serviced by the systems having a ‘U’-value worse than those in Table 5 (a) must be thermally upgraded as for **Renovation, Replacement and Retained Thermal Elements**.
2. Existing windows, roof light or roof windows and doors (not display windows / high usage entrance doors) within the area served and that have a ‘U’-value less than 3.3W/m2.K have to be replaced (see Controlled Services notes on the standards to be followed).

Installed capacity per unit area of a cooling system is increased.

Reasonable provisions to be followed where the installed capacity per unit area of a cooling system is increased are set out below: unless you can prove that such works are not technically, functionally or economically feasible. *You cannot use the 10% rule threshold .as described for other consequential improvements.*

1. Thermal elements within the area serviced by the systems having a ‘U’-value worse than those in Table 5 (a) must be thermally upgraded as for **Renovation, Replacement and Retained Thermal Elements; AND**
2. If the areas of existing windows / roof windows (not display windows) within the area served exceeds 40% of the façade area or the rooflights area exceeds 20% of the roof area and the design solar load exceeds 25W/m2, then the solar control provisions should be upgraded to meet at least one of the following criteria to reducing solar gain and thereby the cooling requirements which in turn reduces energy consumption:
 - a. the design solar load is no greater than 25W/m2
 - b. the design solar load is reduced by at least 20%
 - c. the effective g-value is no worse than 0.3 (CIBSE TM37 calculation).

AND

3. Any lighting system within the area served by the relevant fixed building service, which has an average lamp efficacy of less than 45 lamp-lumens per circuit watt, should be upgraded with new luminaries and / or controls as set out in the appropriate section below to reduce lighting loads, which in turn reduces heat generation and thereby reduces space-cooling demands. Guidance is provided in the Non-Domestic Building Services Compliance Guide.

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Buildings Exempt from the Energy Efficiency Requirements.

Historic Buildings / Listed Buildings.

AD L2B will have an impact on renovation and conservation works to historic buildings, as a result special considerations can be applied. Seek conservation officer advice in assessing the works and reference should be made to the English Heritage guidance note on regulations and historic buildings *Building Regulations and Historic Buildings*.

Buildings which are:

1. Listed in accordance with the Planning (Listed Buildings and Conservation Areas) Act 1990;
2. Buildings in 'Conservation Areas' designated in accordance with section 69 of that Act; or
3. Included in the schedule of monuments maintained under section 1 of the Ancient Monuments and Archaeological Areas Act 1979.

Are exempt having to comply with the energy efficiency requirements, ***but only where the works would unacceptability alter the character or appearance of the existing building.***

Historic and traditional building where special consideration may apply:

There are 3 further classes of building where special consideration in making reasonable provision for the conservation of fuel and power may apply:

1. Buildings which are of architectural and historical interest and are referred to as such in the Local Authorities development plan or local development framework;
2. Buildings which are of architectural and historical interest within national parks, areas of outstanding natural beauty, registered battlefields, registered historic parks and gardens, the curtilage of scheduled ancient monuments, and world heritage sites;
3. Buildings of traditional construction with permeable fabric that absorbs and readily allows the evaporation of moisture.

For these types the aim should be to improve energy efficiency as far as is reasonably practicable. The work should not prejudice the character of the host building or increase the risk of long-term deterioration of the building fabric or fittings.

Extensions to these buildings should however comply with the energy efficiency requirements – the only exemption is where there is a need to match the external appearance or character of the host building

Places of Worship.

Buildings which are used primary or solely as places of worship.

Places of worship - means those buildings or parts of a building that are used for formal worship, including adjoining spaces whose function is directly linked to that use.

Other parts of the building that are to be used separately, such as offices, catering facilities, day centres and meeting halls are not exempt.

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Temporary Buildings.

Temporary buildings with a planned time of use of 2 years or less, industrial sites, workshops and non-residential agricultural buildings with low energy demands.

Industrial Sites, Workshops and Non-Residential Agricultural Buildings with Low Energy Demand.

In this exemption category, the low energy demand relates only to the energy used by fixed heating or cooling systems (*Not the energy used by the process needs*). Examples of these types include – a) buildings or parts of buildings where the space is not generally heated, other than by process heat; or cooled; b) buildings or parts of buildings that requires heating or cooling only for short periods each year, such as during critical periods in the production cycle (e.g. plant germination, egg hatching) or in very severe weather conditions.

If these types of building fail to meet the low energy demand criterion, then they must comply with the energy efficiency requirements. Similarly, other buildings (e.g. some warehouse types) may have low energy demands but are not exempt because they do not meet the above requirements.

Non-Exempt Buildings with Low Energy Demand;

This are where :

- b) fixed building services are used to heat or cool only localised area rather than the entire enclosed volume of space concerned (e.g. Localised radiant heaters at a workstation in a generally unheated space); or
- c) fixed building services are used to heat spaces in the building to temperatures substantially lower than those normally provided for human comfort (e.g. to provide condensation or frost protection in a warehouse).

For these types of buildings it is not reasonable to ask for full compliance - therefore if an existing building with low levels of heating are to be extended or the fabric is to be renovated, the new building or renovated building envelope should be insulated to the degree which is reasonable in each particular case. (Agreed with Building Control).

If some general heating is provided(case b above) the external fabric must have minimum u-value of 0.7 W/m².K, in addition every fixed building service must meet the requirements of the Non-Domestic Building Services Compliance Guide.

If part of a low energy demand building is partitioned off and heated normally (e.g. heated office area off an unheated warehouse) the separated heated part of the building needs to meet the energy efficiency requirements.

If a building with low energy demands subsequently changes so the space is conditioned, then this is likely to involve the initial provision or an increase in the installed capacity of a fixed building service and as a result regulation 17D would require the building envelope to be upgraded and **consequential improvements** to be made.

Stand-Alone Buildings.

Stand alone buildings other than dwellings with a total useful floor area of ***less than 50m² are exempt the energy efficiency requirements.***

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Exempt Conservatories and Porches.

Conservatory is defined as having N.L.T three quarters of its roof area and N.L.T one half of its external wall area made of translucent material.

There have been some changes to the exemption rules for these types of extension, **they still remain exempt if :**

- They are constructed at ground level and the internal floor area does not exceed 30m²
- Safety Glazing complies with Approved Document N
- Where there are existing doors and windows between the conservatory and dwelling that these are retained or, if removed are replaced by walls, windows and doors that meet the energy efficiency requirements; and
- **This is the big change - Where the heating system is not extended into the conservatory or porch. So if you heat the conservatory or porch the exemption ceases to apply and a building regulation application will be required.**

Where conservatories are not exempt as a result of the above the following will have to be undertaken:

Non- Exempt Conservatories and Porches.

REQUIREMENTS:

- a. There is to be effective thermal separation between the dwelling and conservatory, i.e. walls, doors and windows to be insulated to at least the standard of the existing dwelling, doors and windows to be fully draught sealed.
- b. Provide independent temperature and on/off controls to any heating system (refer to previous controlled services notes for the system compliance requirements).
- c. Glazed elements to comply with the thermal performance set out in Table 3 in 'Controlled Fittings' above (however the limitations on total area of windows and doors set out in Table 2 do not apply).
- d. Thermal Elements must comply with the thermal performances as set out in Table 4 above discussed previously.

If a highly glazed extension is not thermally separated from the heated area of the building – it will be considered to be a conventional extension and must therefore fully comply with the regulations requirements.

IMPORTANT NOTE - Removing and not replacing any or all of the thermal separation between the heated part of the building and existing exempt extension, or extending the buildings heating system into the exempt extension means the exemption ceases. This constitutes a change to the buildings energy use and reasonable provisions would have to be taken as to the building energy efficiency as if it was a conventional extension and make you must make a Building Regulation application.

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