

Domestic Green Deal Advice Training

Regulations and Building Physics
Energy Efficient Lighting



General Regulations



General regulations

- All fundable measures through Green Deal will still be subject to relevant
 - Building regulations
 - Planning restrictions
 - Listed building consent
 - Any other building compliance guide



General regulations

Building Regulations

What

- Building Regulations set standards for the design and construction of buildings, to ensure the safety and health for people in or about those buildings. They also include requirements to ensure that fuel and power is conserved, and facilities are provided for people, including those with disabilities to access and move around inside buildings.



General regulations

Building Regulations

the fourteen technical "**Parts**" of the Building Regulations' requirements are

- Part A (Structural safety)
- Part B (Fire safety)
- Part C (Resistance to contaminants and moisture)
- Part D (Toxic Substances)
- Part E (Resistance to sound)
- Part F (Ventilation)
- Part G (Sanitation, Hot Water Safety and Water Efficiency)
- Part H (Drainage and waste disposal)
- Part J (Heat producing appliances)
- Part K (Protection from falling)
- Part L (Conservation of fuel and power)**
- Part M (Access to and Use of Buildings)
- Part N (Glazing safety)
- Part P (Electrical Safety)



General regulations

Part L

- Part L concerns its self with the Conservation of fuel and power containing the following
 - Approved Document L1A: New dwellings
 - **Approved Document L1B Existing dwellings**
 - Approved Document L2A: New buildings other than dwellings
 - Approved Document L2B Existing buildings other than dwellings



General regulations

Approved Document L1B Existing dwellings

What is in it

Part L1B contains the required standards of controlled services and fittings and building elements in order to meet building regulations compliance concerned with Conservation of fuel and power for existing dwellings.

It references other documents for example

Domestic building service compliance guides containing specific content on how to comply with the regulation, available from CLG planning portal



General regulations

Planning restrictions

- Planning seeks to guide the way our towns, cities and countryside develop. This includes the use of land & buildings, the appearance of buildings, landscaping considerations, highway access and the impact that the development will have on the general environment

- Built within the planning regulation documents are specific restriction which must be adhered to and followed when installing particular measures

e.g.

Solar panels (PV or solar thermal)

Which are covered under Permitted development laws, but when in conservation areas permission is needed prior to the installation.



General regulations

Listed building consent

English Heritage is the Government's statutory adviser on the historic environment., their principal powers and responsibilities are set out in the National Heritage Act (1983).

- Listed Building Consent is administered by your local authority
- If the application involves a Grade I or Grade II* listed building, demolition, or is particularly complicated, the case will be forwarded to English Heritage for expert advice. This is also the case for certain categories of work to Grade II listed buildings.
- Listed status covers a whole building, inside and out. Common works requiring consent might include the replacement of windows or doors, knocking down internal walls, painting over brickwork or altering fireplaces
- Carrying out unauthorised works to a listed building is a criminal offence and individuals can be prosecuted.



General regulations

Housing Health and Safety Rating System (HHSRS)

- This HHSRS does not set out minimum standards. It is concerned with avoiding or, at the very least, minimising potential *hazards*.
- The Act provides local authorities with new duties and powers to tackle poor housing conditions.
- The idea behind the Act is that local authorities will give priority to dealing with the greatest risks to health and safety in *dwellings*



General Building Physics



General building physics

- Building physics is the application of the scientific principles, to the building elements and services.
- Building physicists (designers, architects, engineers) bring a fundamental understanding of physics to improving the design of building fabrics and surrounding spaces in respect of
 - **Thermal mass**
 - **Thermal comfort**
 - **Efficiency and responsiveness of heating systems**
- All three factors combined will effect the energy usage of the building.



General building physics

Thermal mass

- Thermal mass is a term that describes the ability of a material to store heat;
- something many construction materials can do to a greater or lesser extent. But, to be useful in the built environment, they must also be able to absorb and release heat at a rate roughly in step with a building's daily heating and cooling cycle.
- E.g.
 - Concrete and masonry products do this well and, being dense materials, can also store a lot of heat.
 - Timber absorbs heat too slowly to offer much effective thermal mass,
 - steel conducts heat too rapidly to be in synch with a natural heat flows over the day.



General building physics

Thermal comfort

The six factors affecting thermal comfort are both environmental and personal. These factors may be independent of each other, but together contribute to a persons thermal comfort.

Environmental factors:

- Air temperature
- Radiant temperature
- Air velocity
- Humidity

Personal factors:

- Clothing Insulation
- Metabolic heat



General building physics

Efficiency and responsiveness of heating systems

Efficiency - what

The ability to get the maximum usable energy out of the available fuel source.

For the household, fuel cost is directly related to the efficiency.

•e.g.

- Condensing oil boiler
- Condensing Gas boiler

Responsiveness of heating systems

How quickly the heating system response to heating demand.

•e.g.

- From a cold start how quickly will the heating system bring the building to desired temperature.



General building physics

Efficiency and responsiveness of heating systems - **Controls**

–both the efficiency and responsiveness will also depend upon the controls use in conjunction with the heating appliance.

e.g.

Room thermostats

TRVs

Programmer

Boiler energy management system



Energy Efficient Lighting



Energy efficient lighting

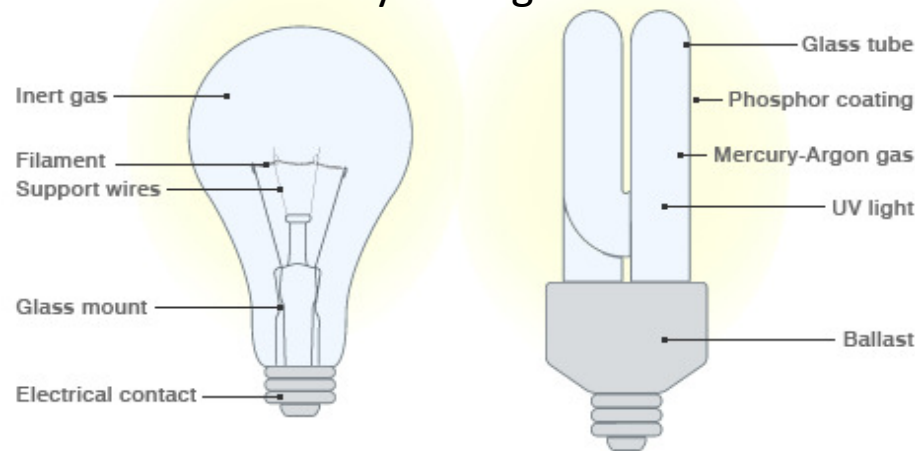
- Lighting accounts for **8%** of a typical household's energy bills and cutting your lighting bill is one of the easiest ways to save energy and money in the home
- Advice will have to be given to the customer on there lighting
- If you replace a traditional light bulb with a compact fluorescent bulb of the same brightness you will typically save around £3 per year, or £55 over the life of the bulb.
- If you replace a 50W halogen down lighter with a 6W LED you will typically save around £4 per year, or £70 by the time you have to replace the bulb
- 95% of the energy used in a traditional light bulb is lost as heat. So swapping to energy saving bulbs makes a lot of sense.



Energy efficient lighting

Traditional light bulbs

Known as tungsten filament or GLS (General Lighting Service) bulbs, traditional light bulbs are extremely inefficient. Only about 5% of the electricity they use is converted into visible light. The tungsten filament bulb was invented about 100 years ago



Compact fluorescents

A gas inside a glass tube is charged up so that it glows. This causes a coating on the inside of the glass tube to 'fluoresce', giving off the white light that we want. CFLs use about 20% to 25% of the electricity that an equivalent GLS lamp will use.



Energy efficient lighting

Features of LED & non-LED Light Bulbs Compared

| Features | Incandescent bulbs | CFL (Fluorescent) bulbs | LED bulbs |
|--|--------------------|-------------------------|--------------|
| Watts per bulb | 60 | 14 | 6 |
| Life span of each bulb | 1200 hours | 10,000 hours | 60,000 hours |
| Amount of electricity used in 60,000 hours | 3,600 KWh | 840 KWh | 360 KWh |
| Cost of electricity @£0.20 for each KWh | £720 | £168 | £72 |
| Number of bulbs required over 60,000 hours | 50 | 6 | 1 |
| Cost of each bulb | £1.25 | £2.98 | £15.98 |
| Bulb expense for 60,000 hours | £62.50 | £17.88 | £15.98 |
| Total lighting cost for 60,000 hours (cost of electricity + bulb expense for 60,000 hours) | £782.50 | £185.88 | £87.98 |



Energy efficient lighting

LED Light Bulbs Cost Comparison

The following data assumes you will be using approximately 30 light bulbs around your home at any point in time.

| Features | Incandescent bulbs | CFL (florescent bulbs) | LED bulbs |
|--|--------------------|------------------------|-----------|
| Cost of 30 bulbs | £37.50 | £89.40 | £479.40 |
| Number of bulbs that you would require for 60000 hours | 50 | 6 | 1 |
| Bulb costs for 60,000 hours for 30 bulbs of each | £1875 | £536.40 | £479.40 |
| Electricity costs for 60,000 hours | £21000 | £5040 | £2160 |
| Total lighting cost of 30 bulbs for 60,000 hours | £23,475 | £5,576.40 | £2,639.40 |

Thus, if you replace your incandescent or CFL bulb with an **LED bulb**, you could save a significant amount of money - running into the thousands of pounds - on electricity consumption and cost of bulbs over the lifetime of the bulbs. Using LED light bulbs will dramatically reduce your lighting costs and you will reap the environmental benefits of using **energy efficient lighting**.



Energy efficient lighting

Controls

Presence detectors to control lighting can be a way of reducing energy by way of only having the light on when needed

- Externally
- Garages
- Walk in wardrobes
- Under the stairs
- Basements
- Lofts



Places that are infrequently used will benefit the most



Any Questions

