

Building Fabric

Introduction

Heating and cooling buildings is a significant part of a company's total energy use and for many buildings, 'space heating' will be their single largest energy requirement. The amount of energy required to heat or cool a workplace to a given temperature will be largely determined by the amount of heat lost or gained:

- Through the walls, roof and floor
- Through openings and leaks in the structure causing cold draughts.

Any business seeking to reduce energy costs should therefore consider ways of improving the thermal properties of their building stock first, prior to investigating how to improve heating or cooling systems.

The financial case for upgrading building fabric:

Improving the building fabric will not only save money on energy bills, it could also:

- Increase the property's value
- Improve working conditions through a reduction in cold draughts, solar glare or noise, which can lead to increased staff moral and productivity
- Reduce capital expenditure on building services plant as a well insulated building will require a smaller heating plant.

Some measures for improving the building fabric will be too expensive to justify as stand alone projects, but should be considered whenever any refurbishment work is required as this can make such projects extremely cost effective, e.g. when replacing a roofing structure additional insulation can be incorporated at little extra cost.

Opportunities for savings

Good housekeeping

- Blinds and curtains should be drawn at the end of the working day when the heating is on to reduce heat lost through the windows, and during the summer to minimize the solar gains when the building is unoccupied
- Opening of doors and windows should be kept to a minimum when the heating (or air conditioning) systems are on, instead adjust the system controls to meet the internal needs for example by turning heating provision down

Glazing:

Heat loss (per square metre of area) is much higher for windows than any other building element, and is largely influenced by the:

- Number of panes of glass (i.e. single, double or triple)
- Specification of the glass, or combination of glasses used
- Type of gas used to fill the space within double and triple glazed systems
- Design of the frame.

Use internal blinds to reduce heat gains, but try not to block all the light from entering the room. A good working environment can be achieved by tilting blinds to allow sunlight to be reflected onto the ceiling providing indirect daylight into the room.

Fit draught-proofing around poorly fitting window frames, and fill any holes in the frame. *If it is possible to slide a 1p coin into the gap between the fixed and opening parts of a window frame, fitting draught-proofing will be cost effective.*

When replacing windows, Building Regulations require double glazing (as a minimum) be installed (unless the building is listed). Also consider using high performance glass to filter out some heat elements of sunlight, whilst still letting appropriate daylight into the building.

If windows are not being replaced, a range of stick-on plastic films are available to reduce the heat gained from direct sunlight.

Doors

Doors can give rise to high heat losses particularly if they are poorly insulated or draughty.

- Fit draught-proofing around poorly fitting doors
- Fit automatic closers (available from most DIY stores), especially to outside doors
- If a door requires replacing consider purchasing an insulated door.

In industrial buildings, large goods stores can allow large volumes of cold, fresh air into the building. Goods stores with regular vehicular access can be a particular problem, consider:

- Plastic strip curtains, if already fitted check them regularly for signs of damage including missing strips and replace them when excessive draughts can be felt in the building
- Installing fast acting (rapid roll) doors, making sure a good seal is established between the wall and the frame of these doors (both to newly installed or existing ones)
- Vehicle entrance lobbies with two motorised doors can be improved by providing:
 - Clear operating instructions
 - An interlock to turn off the heating when the door is open
 - An audible alarm which triggers after the door has been open for a preset time

In all cases, it is sensible to provide separate personnel access alongside goods stores for Health and Safety, as well as energy efficiency reasons.

Building insulation:

Building Regulations now require a minimum level of insulation for all new build and refurbishment projects, but it may be cost effective to exceed these levels of insulation in appropriate circumstances e.g. exposed site, expanse of north facing wall. Improvement options include:

Structural element	Typical Retrofit insulation techniques
Roofs Pitched with loft space Pitched without loft space	<ul style="list-style-type: none"> • Mineral wool quilt, to a minimum depth of 200mm • Internal or external spray • Internal “factory liner” panels • Suspended ceiling (with insulation above)
Flat	<ul style="list-style-type: none"> • Ballasted “upside down” insulation panels • Suspended ceiling (with insulation above)
Walls Cavity brick or block Solid brick or block	<ul style="list-style-type: none"> • Injection of various insulation types • External cladding • Internal lining
Industrial panel	<ul style="list-style-type: none"> • Internal “factory liner” panels

Table 1: Retrofit Building Insulation Techniques

Improving the insulation of existing floor structures can be difficult, but under-slab and edge insulation should be considered whenever a new solid floor is being cast.

Maintenance

- Draught-proofing and door closers should be inspected regularly, if damage is affecting their performance they should be repaired or replaced
- Building defects such as damp penetration and cracked glazing panes will increase energy costs, and should be repaired as soon as possible.