Building regulations and compliance

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Introduction

When ventilation meets building regulation

Theme: Informing Regulations

Talk theme: Building regulations and compliance

Heating, ventilating and air conditioning systems are all defined as fixed building services and work on them is controlled under the building regulations. There is a growing realisation that ventilation really is critical to the health of building occupants and that inadequate ventilation can, in extremis, have fatal consequences. This presentation will outline what the building regulations cover, key issues relating to ventilation and how changes to the building control system coming into effect now in the aftermath of the Building Safety Act could and should influence work on buildings that affects energy efficiency and ventilation.

I think that, in a nutshell, is it. I am working on the assumption that this needs to be a high level piece that makes the audience aware of the scope of building regulations and flags the importance of ventilation requirements and that when work to improve energy performance is undertaken under one part of the regulations then ventilation still needs to be considered, even if the works are not primarily about ventilation.

Building Regulations

Building Regulations are devolved in the UK – this is how they work in England:

Building Act 1984 – the primary powers to regulate building work in England and Wales

but the Act was substantially amended by the Building Safety Act 2022, the response to Grenfell Tower

The Building Act enables the Secretary of State to make building regulations

So we have the Building Regulations 2010 – also amended a number of times since 2010.

Schedule 1 of the Regulations sets out the functional requirements of the Regulations in a series of parts – A – S

Heating, ventilating and air conditioning systems are all defined as fixed building services and work on them is controlled under the building regulations.

Meaning of building work

3.—(1) In these Regulations "building work" means—

(a) the erection or extension of a building;

(b) the provision or extension of a controlled service or fitting in or in connection with a building;

(c) the material alteration of a building, or a controlled service or fitting, as mentioned in paragraph (2);

(d) work required by regulation 6 (requirements relating to material change of use);

(e) the insertion of insulating material into the cavity wall of a building;

(f) work involving the underpinning of a building;

(g) work required by regulation 22 (requirements relating to a change of energy status);

(h) work required by regulation 23 (requirements relating to thermal elements);

(i) work required by regulation 28 (consequential improvements to energy performance).

Building Regulations 2010

Ventilation

What are the requirements?

Part F – what does it require?

Requirement F1(1). There shall be adequate means of ventilation provided for people in the building.

Intention

In the Secretary of State's view, requirement F1(1) is met if the dwelling is provided with a means of ventilation which:

a. extracts water vapour and indoor air pollutants from areas where they are produced in significant quantities (e.g. kitchens, utility rooms and bathrooms) before they spread through the building – by following guidance for extract ventilation in paragraphs 1.18 to 1.23.

b. supplies a minimum level of outdoor air for occupants' health – by following guidance for whole dwelling ventilation in paragraphs 1.24 to 1.26.

c. rapidly dilutes indoor air pollutants and water vapour when necessary in habitable rooms – by following guidance for purge ventilation in paragraphs 1.27 -1.32.

d. minimises the ingress of external air pollutants.

e. provides all of the following as far as reasonably practicable:

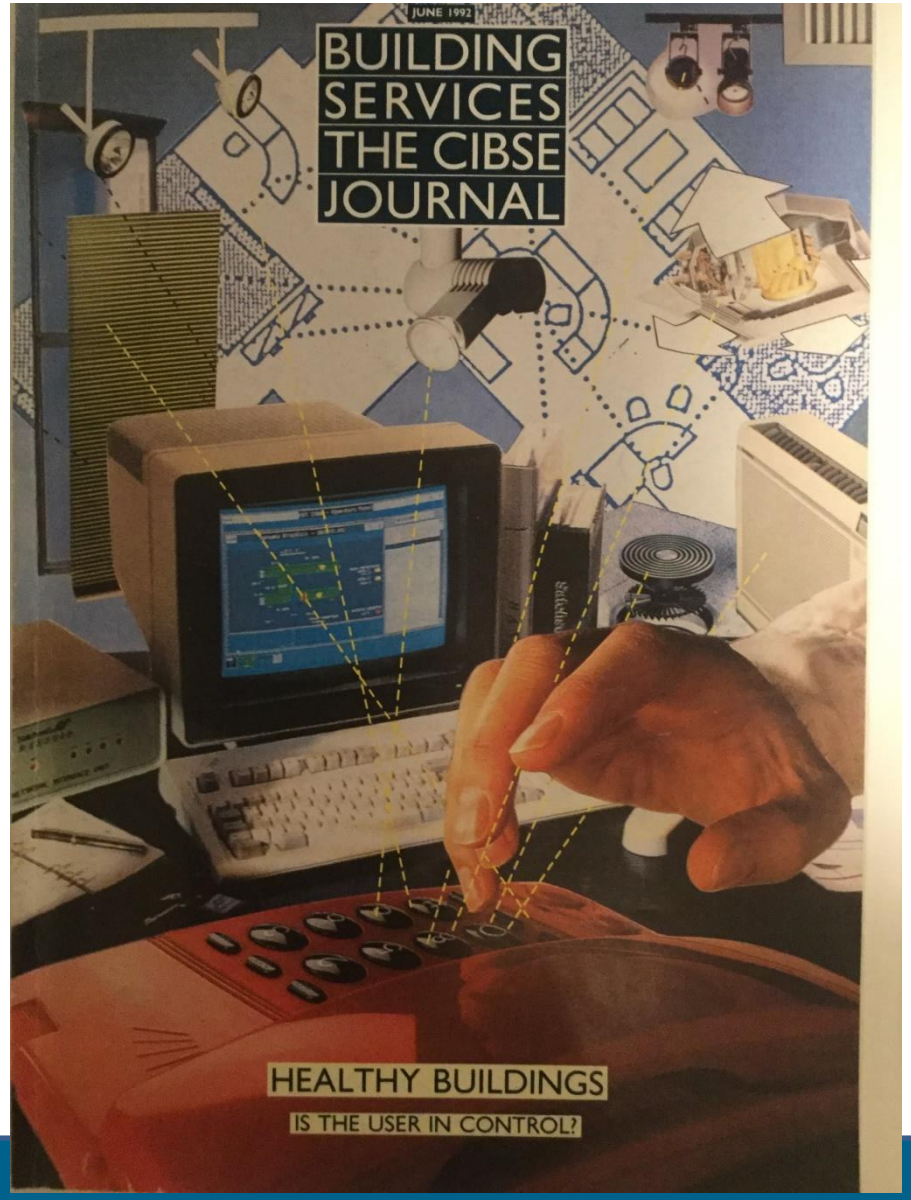
- i. low levels of noise, by following guidance in paragraphs 1.5 to 1.7;
- ii. is easy to maintain, by following guidance in paragraph 1.9;
- iii. protection from rain;
- iv. protection from cold draughts;
- v. does not significantly risk occupants' health.

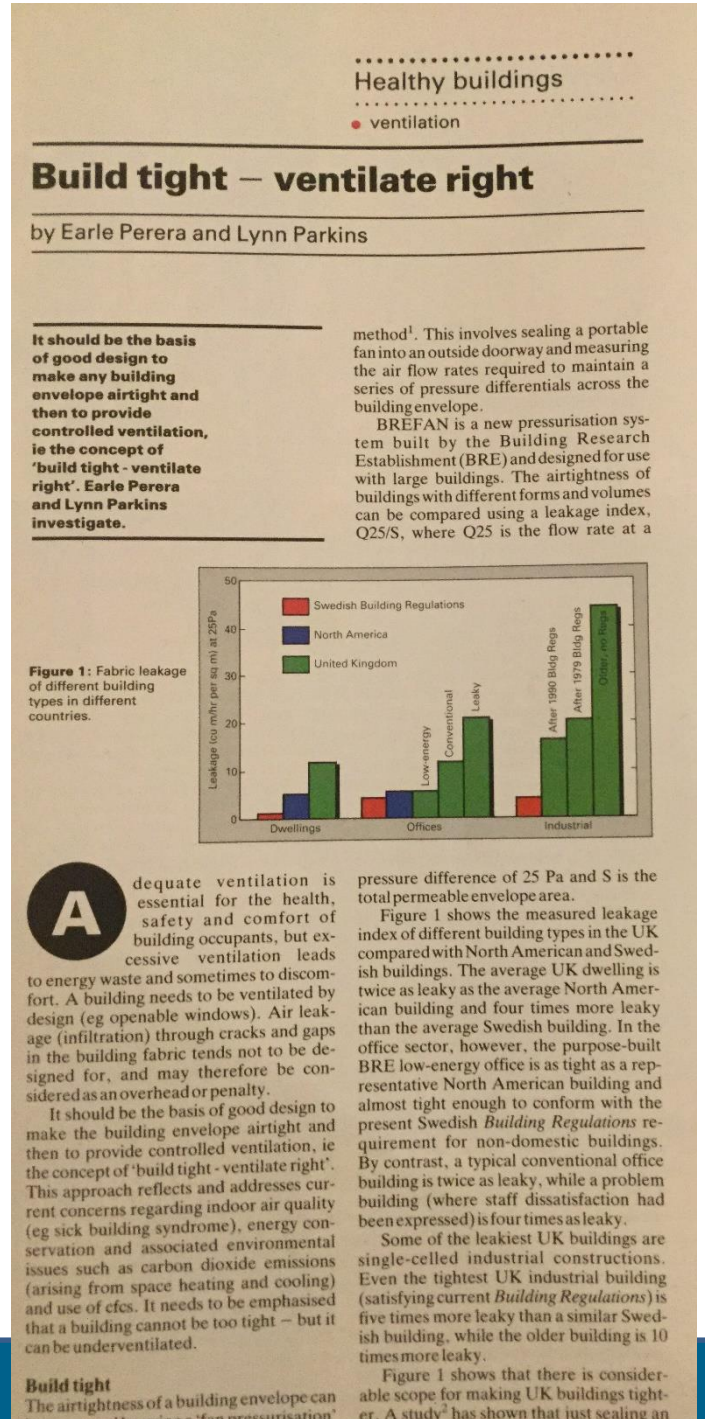
Build tight, ventilate right

Dr Earle Perera and Lynn Parkins,

BRE, 1992

Contained a series of pieces on healthy buildings, including the seminal article on the need for more airtight buildings, with adequate ventilation.





Healthy buildings

ventilation

Build tight – ventilate right

by Earle Perera and Lynn Parkins

It should be the basis of good design to make any building envelope airtight and then to provide controlled ventilation, ie the concept of 'build tight - ventilate right'. Earle Perera and Lynn Parkins investigate.

Figure 1: Fabric leakage of different building types in different countries.

Adequate ventilation is essential for the health, safety and comfort of building occupants, but excessive ventilation leads to energy waste and sometimes to discomfort. A building needs to be ventilated by design (eg openable windows). Air leakage (infiltration) through cracks and gaps in the building fabric tends not to be designed for, and may therefore be considered as an overhead or penalty.

It should be the basis of good design to make the building envelope airtight and then to provide controlled ventilation, ie the concept of 'build tight - ventilate right'. This approach reflects and addresses current concerns regarding indoor air quality (eg sick building syndrome), energy conservation and associated environmental issues such as carbon dioxide emissions (arising from space heating and cooling) and use of cfcs. It needs to be emphasised that a building cannot be too tight – but it can be underventilated.

Build tight

The airtightness of a building envelope can

method[1]. This involves sealing a portable fan into an outside doorway and measuring the air flow rates required to maintain a series of pressure differentials across the building envelope.

BREFAN is a new pressurisation system built by the Building Research Establishment (BRE) and designed for use with large buildings. The airtightness of buildings with different forms and volumes can be compared using a leakage index, Q25/S, where Q25 is the flow rate at a pressure difference of 25 Pa and S is the total permeable envelope area.

Figure 1 shows the measured leakage index of different building types in the UK compared with North American and Swedish buildings. The average UK dwelling is twice as leaky as the average North American building and four times more leaky than the average Swedish building. In the office sector, however, the purpose-built BRE low-energy office is as tight as a representative North American building and almost tight enough to conform with the present Swedish *Building Regulations* requirement for non-domestic buildings. By contrast, a typical conventional office building is twice as leaky, while a problem building (where staff dissatisfaction had been expressed) is four times as leaky.

Some of the leakiest UK buildings are single-celled industrial constructions. Even the tightest UK industrial building (satisfying current *Building Regulations*) is five times more leaky than a similar Swedish building, while the older building is 10 times more leaky.

Figure 1 shows that there is considerable scope for making UK buildings tight-

This argued for buildings to be designed to be as airtight as practicable whilst incorporating a planned and adequate ventilation strategy, so balancing ventilation and airtightness.

Fine in theory, this has proved a more challenging ride over the past 30 years in practice!

COVID-19 demonstrated that we are not very good at delivering and operating buildings that have reasonable provision for ventilation.

The challenge of chronic outcomes

Its easier to grapple with things that clearly, obviously and immediately, even shockingly, have tragic outcomes:

- We clearly do not want buildings that fall down, or burn down.
- We don’t want acute building safety problems.

But what about chronic problems?

- What about problems where people become ill and develop life shortening illness?
- What about problems that cause long term health effects?
- What about problems that impair the development of young people?
- Do we really think that they don’t matter?

Thank you for listening

Any questions?

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Further reading

HM Government

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/901517/Manual_to_building_regs_-_July_2020.pdf

Manual to the
Building Regulations

A code of practice for use in England