Achieving airtight buildings

By definition, buildings that aren’t airtight will leak. The consequences range from complaints of draughts and discomfort, to the inability of heating systems to provide a stable temperature level. Of course, these buildings also waste energy.

The issue of a lack of airtightness is impossible to dodge at a time when climate change is being blamed for everything from storms to melting permafrost. The reality is that government is taking energy wastage and associated CO2 emissions seriously, with big implications for the construction industry.

The DETR’s intention is that existing building stock will also be subject to tougher regulation. This can include mandatory standards and regulations in Summer 2001. The DETR plans to announce new regulations for non-domestic buildings.

By definition, buildings that aren’t airtight will leak. The consequences range from complaints of draughts and discomfort, to the inability of heating systems to provide a stable temperature level. Of course, these buildings also waste energy.

The issue of a lack of airtightness is impossible to dodge at a time when climate change is being blamed for everything from storms to melting permafrost. The reality is that government is taking energy wastage and associated CO2 emissions seriously, with big implications for the construction industry.

The DETR’s intention is that existing building stock will also be subject to tougher regulation. This can include mandatory standards and regulations in Summer 2001. The DETR plans to announce new regulations for non-domestic buildings.

By definition, buildings that aren’t airtight will leak. The consequences range from complaints of draughts and discomfort, to the inability of heating systems to provide a stable temperature level. Of course, these buildings also waste energy.

The issue of a lack of airtightness is impossible to dodge at a time when climate change is being blamed for everything from storms to melting permafrost. The reality is that government is taking energy wastage and associated CO2 emissions seriously, with big implications for the construction industry.

The DETR’s intention is that existing building stock will also be subject to tougher regulation. This can include mandatory standards and regulations in Summer 2001. The DETR plans to announce new regulations for non-domestic buildings.

By definition, buildings that aren’t airtight will leak. The consequences range from complaints of draughts and discomfort, to the inability of heating systems to provide a stable temperature level. Of course, these buildings also waste energy.

The issue of a lack of airtightness is impossible to dodge at a time when climate change is being blamed for everything from storms to melting permafrost. The reality is that government is taking energy wastage and associated CO2 emissions seriously, with big implications for the construction industry.

The DETR’s intention is that existing building stock will also be subject to tougher regulation. This can include mandatory standards and regulations in Summer 2001. The DETR plans to announce new regulations for non-domestic buildings.

By definition, buildings that aren’t airtight will leak. The consequences range from complaints of draughts and discomfort, to the inability of heating systems to provide a stable temperature level. Of course, these buildings also waste energy.

The issue of a lack of airtightness is impossible to dodge at a time when climate change is being blamed for everything from storms to melting permafrost. The reality is that government is taking energy wastage and associated CO2 emissions seriously, with big implications for the construction industry.

The DETR’s intention is that existing building stock will also be subject to tougher regulation. This can include mandatory standards and regulations in Summer 2001. The DETR plans to announce new regulations for non-domestic buildings.

By definition, buildings that aren’t airtight will leak. The consequences range from complaints of draughts and discomfort, to the inability of heating systems to provide a stable temperature level. Of course, these buildings also waste energy.

The issue of a lack of airtightness is impossible to dodge at a time when climate change is being blamed for everything from storms to melting permafrost. The reality is that government is taking energy wastage and associated CO2 emissions seriously, with big implications for the construction industry.

The DETR’s intention is that existing building stock will also be subject to tougher regulation. This can include mandatory standards and regulations in Summer 2001. The DETR plans to announce new regulations for non-domestic buildings.

By definition, buildings that aren’t airtight will leak. The consequences range from complaints of draughts and discomfort, to the inability of heating systems to provide a stable temperature level. Of course, these buildings also waste energy.

The issue of a lack of airtightness is impossible to dodge at a time when climate change is being blamed for everything from storms to melting permafrost. The reality is that government is taking energy wastage and associated CO2 emissions seriously, with big implications for the construction industry.

The DETR’s intention is that existing building stock will also be subject to tougher regulation. This can include mandatory standards and regulations in Summer 2001. The DETR plans to announce new regulations for non-domestic buildings.

By definition, buildings that aren’t airtight will leak. The consequences range from complaints of draughts and discomfort, to the inability of heating systems to provide a stable temperature level. Of course, these buildings also waste energy.

The issue of a lack of airtightness is impossible to dodge at a time when climate change is being blamed for everything from storms to melting permafrost. The reality is that government is taking energy wastage and associated CO2 emissions seriously, with big implications for the construction industry.

The DETR’s intention is that existing building stock will also be subject to tougher regulation. This can include mandatory standards and regulations in Summer 2001. The DETR plans to announce new regulations for non-domestic buildings.

By definition, buildings that aren’t airtight will leak. The consequences range from complaints of draughts and discomfort, to the inability of heating systems to provide a stable temperature level. Of course, these buildings also waste energy.

The issue of a lack of airtightness is impossible to dodge at a time when climate change is being blamed for everything from storms to melting permafrost. The reality is that government is taking energy wastage and associated CO2 emissions seriously, with big implications for the construction industry.

The DETR’s intention is that existing building stock will also be subject to tougher regulation. This can include mandatory standards and regulations in Summer 2001. The DETR plans to announce new regulations for non-domestic buildings.

By definition, buildings that aren’t airtight will leak. The consequences range from complaints of draughts and discomfort, to the inability of heating systems to provide a stable temperature level. Of course, these buildings also waste energy.

The issue of a lack of airtightness is impossible to dodge at a time when climate change is being blamed for everything from storms to melting permafrost. The reality is that government is taking energy wastage and associated CO2 emissions seriously, with big implications for the construction industry.

The DETR’s intention is that existing building stock will also be subject to tougher regulation. This can include mandatory standards and regulations in Summer 2001. The DETR plans to announce new regulations for non-domestic buildings.

By definition, buildings that aren’t airtight will leak. The consequences range from complaints of draughts and discomfort, to the inability of heating systems to provide a stable temperature level. Of course, these buildings also waste energy.

The issue of a lack of airtightness is impossible to dodge at a time when climate change is being blamed for everything from storms to melting permafrost. The reality is that government is taking energy wastage and associated CO2 emissions seriously, with big implications for the construction industry.

The DETR’s intention is that existing building stock will also be subject to tougher regulation. This can include mandatory standards and regulations in Summer 2001. The DETR plans to announce new regulations for non-domestic buildings.

By definition, buildings that aren’t airtight will leak. The consequences range from complaints of draughts and discomfort, to the inability of heating systems to provide a stable temperature level. Of course, these buildings also waste energy.

The issue of a lack of airtightness is impossible to dodge at a time when climate change is being blamed for everything from storms to melting permafrost. The reality is that government is taking energy wastage and associated CO2 emissions seriously, with big implications for the construction industry.

The DETR’s intention is that existing building stock will also be subject to tougher regulation. This can include mandatory standards and regulations in Summer 2001. The DETR plans to announce new regulations for non-domestic buildings.
Alternatively, infrared thermography can be employed. The blue area highlights the area of heat loss from the floor in the previous photograph.

In airtightness at the drawing-up stage can you adequately deal with the concept of air barrier continuity? Also, pay attention to sealing details at critical elements by specifying the right seal or sealant.

The main air leakage problems in buildings occur typically at the junctions of the wall/window/door interfaces or wall/roof and any service penetrations. The wall/roof interface can be a large source of air infiltration. Co-ordination of trades and the needs of specialists have to be tackled during specification. Designers should identify all the problem areas and spell out responsibility for finishing off in the contract documents.

It takes practice to learn how to spot the potential problems and specify appropriate details. BRE has worked alongside architects to review drawings and suggest problem areas and solutions. Based on its experience, BRE has recently published a guidance booklet, "Airtightness in commercial and public buildings" (replacing BR 265). The booklet sets out the principles of providing an effective airtightness layer and presents examples of relevant details.

Building and testing

Once the building has been designed with airtightness in mind and there are adequately detailed drawings available, the job of constructing it to the airtightness specification is down to the main contractor and sub-contractors. For this to be successful all of the workforce need to be aware of the issue from the outset. Any subcontractors arriving on the site also need to be aware of airtightness in the same way they would deal with safety issues.

Inspection during construction is essential. BRE has found that talking to and working with contractors is the only way to ensure that the construction team understands airtightness and how it can be incorporated. Currently the only real way to be confident that the building meets an airtightness specification is to carry out a pressure test.

If on first testing the building fails, the proposal states: "The major sources of air leakage should be identified using the techniques described in CIBSE TM42." In effect, an air leakage audit will be needed to identify the problem air leakage paths.

This is carried out while running the pressurisation fans and using either smoke tracers or infrared thermography. It is wise to plan ahead for this, as time and money will be saved by carrying it out while the equipment is still on site. After that, any leaks can be identified and remediation and sealing techniques can be implemented before the test is repeated.

The Part L proposal continues: "Reasonable provision will be taken to include remedial action and re-testing until the leakage standard is achieved." An interim measure proposed for the first 18 months after full implementation of the Part L will allow either 75% improvement in the test shortfall, or to within 15% of the standard.

However, the improvement to the 75% option was criticised by the industry participants at the BSI summit for potentially encouraging under-performance at the first test.

Contractual responsibilities

What do you need to do as a client or procurer of a building, an architect, or a contractor? A new BRE leaflet provides example specifications and responses. Nevertheless, when a building has an airtightness specification written into the contract, it has implications for all concerned.

Services engineers, for instance, know that they can size their heating/cooling systems to cater for the fact that the building should be airtight, but if the building doesn’t measure up, the lack of heating capacity will be blamed upon the m&e engineers.

The contractor has the responsibility of constructing the building and for it to be pressure tested on completion. More contractors are becoming aware of the responsibility put on them by such contracts, and some are declining them.

When a building fails to meet its airtightness specification after several attempts, it becomes a major contractual problem to identify who is at fault. This does not arise when you have a design and build contract. A shared responsibility of the designers, main and sub-contractors can be the only logical solution.

Brian Webb is a senior scientist and heads the Airtightness Technical Consultancy Service at the BRE.