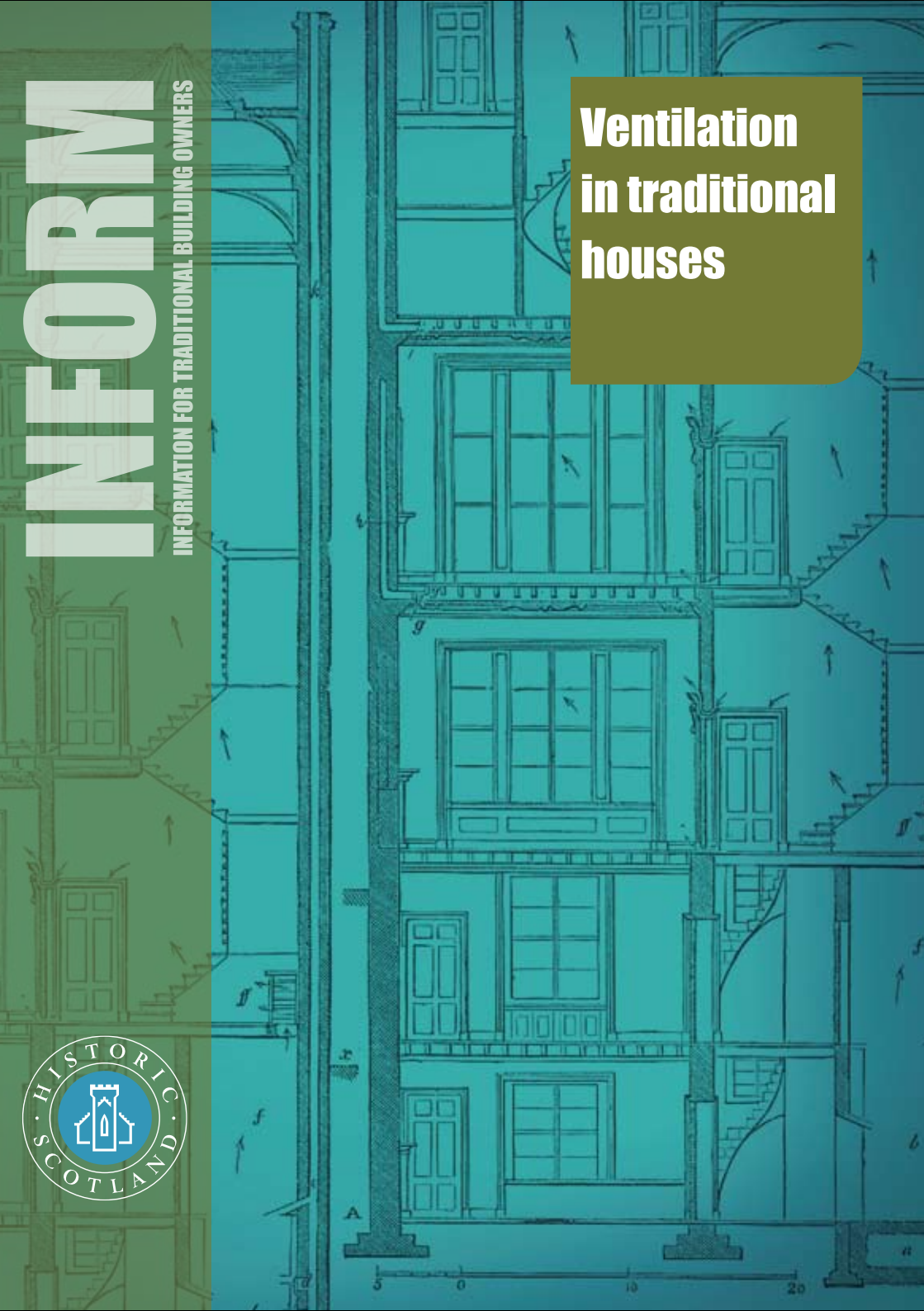
INFORM

INFORMATION FOR TRADITIONAL BUILDING OWNERS

Ventilation in traditional houses



HISTORIC SCOTLAND

Introduction

The proper ventilation of living and working spaces is an important consideration in any buildings design and function, both for the good health of its users and the correct performance of its component parts. While to some extent these principles apply to modern structures, they are crucial to the correct function of a traditionally built structure.

A traditionally built structure is normally made up of a fairly limited range of largely natural materials, that all transfer or disperse water, or water vapour, fairly easily through and around the structure. Maintaining this free movement of moisture in the air is an important aspect of maintaining your home. Failure to manage ventilation can contribute to a build up of damp in walls and joinery elements, often leading to outbreaks of insect attack and other forms of decay.

There is evidence to suggest that poor ventilation can aggravate respiratory diseases and reduce general quality of life of the occupants. This INFORM guide will consider ways to ensure such movement is maintained and consider the various components that make up an appropriate ventilation regime for a traditional structure.

Despite recent masonry work to the elevation, this sub floor vent ha

Sub floor ventilation

Many older buildings have timber floors on the ground floor, built on timber joists over the base of the house (often called the solum) with a void space between. The size of this space varies considerably, but normally joists sit at least a few inches off the ground or solum level. As this space is in close contact with the ground, a free moving air supply is required to ensure the humidity levels are kept low. This ventilation is normally achieved by iron grilles which are often set into the plinth or base course of the house. It is important that these air entry points are kept clear of any obstruction. In many repair projects, such important elements are neglected; rising ground levels, vegetation and even successive over-painting can obstruct these openings and lead to a lack of circulation, resulting in a build up of stagnant air.

ined blocked; note also the risen ground level.

Windows

Older windows are often considered draughty; however it is accepted by designers and building control that air changes in a building are essential. Even modern windows, made fully airtight, require a conscious breach of that air tightness in the form of trickle vents. Traditional windows, being less fully sealed, allow an element of trickle ventilation in themselves. A traditional sash window, which allows adjustable air openings at the top and bottom, is able to allow warm moist air (higher up in the room) to escape out the top, and cooler dryer air (from outside) to enter lower down. Adjustment of the sashes can be carried out to achieve the best balance for the prevailing conditions on the day. As a guide to humidity, a rough indicator is that if condensation forms on the window glass during the day, more ventilation is advisable. Invariably condensation forms during the night due to the greater temperature difference.

Chimneys and flues

Although many households do not use wood or coal burning fires for heating, fireplaces and associated flues remain an important element in moisture control and ventilation generally. Regardless of status, most hearths and flues should be kept open, and if not in use, the chimney capped with a well ventilated cowl. Working chimneys assist in drawing out any moisture from the wall core, especially from exposed weather facing gables where water often penetrates. Deposited combustion products within the chimney tend to be hydroscopic and will absorb moisture from the air; for this reason alone an airflow should be maintained. From the mid 19th C cast iron grates were fitted with a hinged iron plate that could be closed shut when the fire was not in use; where this is not available the common solution of a bung of newspaper or rags is sufficient to prevent draughts, but allows some air movement.

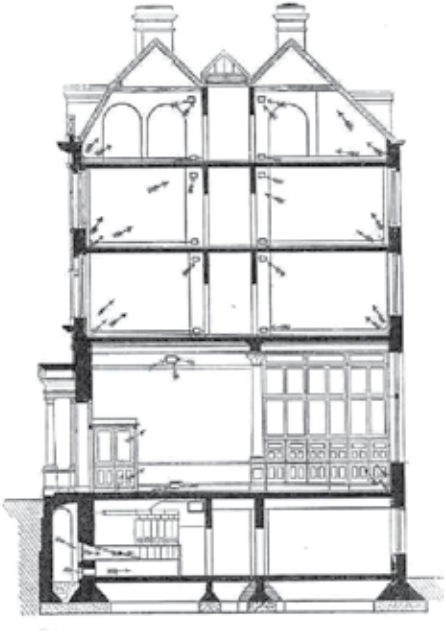
Hidden ventilation features in Randolph Crescent, Edinburgh – The pediment above the door admitted warmed air, and gaps in the cornice (now blocked) allowed it to be drawn away.

is advisable. Invariably condensation forms during the night due to the greater temperature difference.

Chimneys and flues

Although many households do not use wood or coal burning fires for heating, fireplaces and associated flues remain an important element in moisture control and ventilation generally. Regardless of status, most hearths and flues should be kept open, and if not in use, the chimney capped with a well ventilated cowl. Working chimneys assist in drawing out any moisture from the wall core, especially from exposed weather facing gables where water often penetrates. Deposited combustion products within the chimney tend to be hydroscopic and will absorb moisture from the air; for this reason alone an airflow should be maintained. From the mid 19th C cast iron grates were fitted with a hinged iron plate that could be closed shut when the fire was not in use; where this is not available the common solution of a bung of newspaper or rags is sufficient to prevent draughts, but allows some air movement.

Hidden ventilation features in Randolph Crescent, Edinburgh – The pediment above the door admitted warmed air, and gaps in the cornice (now blocked) allowed it to be drawn away.



Warm air circulation in a Late 19th C town house.

From the early 19th C many higher status structures were incorporating sophisticated passive air circulation techniques, mainly using the draw from hearths and flues (see cover illustration featuring a house in Randolph Crescent, Edinburgh, built in 1839) to allow warmed air to circulate through the building. Perforations in the cornice and door mouldings allowed warmed or "vitiated"" air to be drawn up through the floors by the hearths above.

In the later 19th C air circulation in houses became quite an advanced part of the design process, chimney flues incorporated foul air flues and other features, especially at the upper end of the residential market, with dedicated boilers heating the air, that ran in special ducts, terminating in decorative grilles in the principal rooms.

In rooms with fireplaces, provision was often made for through floor ventilation. Grilles or vents were fitted in the floor or skirting board either side of the fire place, or close to it. These were fitted to allow the airflow for the fire to come direct from the adjacent area, instead of causing draughts across the room or coming from under the door.

Patent ventilators from C1890.

Kitchens and bathrooms

Air management is especially important in areas with frequent hot water use, such as kitchens and bathrooms, where a lot of moisture is released into the air. It is important to realise that condensation (water vapour returned to liquid water) is largely the product of those using the building - water vapour from showers, bodies and domestic activity. It is in the poor management of this moisture that leads to condensation. Once the humidity reaches a certain point the water will condense on a colder surface, often on an outside window or metal fitting. Reducing the humidity by proper ventilation (window slightly open) and by air coming through from other parts of the house or flat can greatly assist in its reduction. In areas of poor insulation, especially those that are damp, condensation will form even at normal humidity levels, and the reason for this should be investigated and rectified. In addition to natural ventilation from windows, moisture laden air can be removed by active means such as mechanical extract, possibly using redundant chimney flues. In many traditional buildings, where moisture loading was high, such as kitchens, laundries and service areas, many roof spaces were fitted with ventilators, and by the 19th C there were many patented types available, often featuring devices for preventing downdraughts. Where there are encountered they should be maintained.

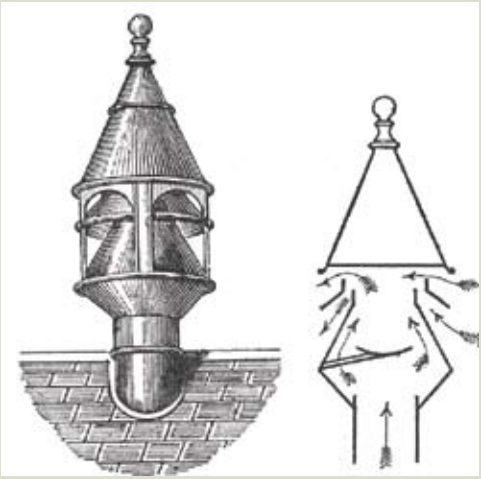


Fig 5. Loft insulation fitted, but the coombes are kept clear for air movement.

Ventilation grille in a late 19th C tenement door.

Stairwells and landings

In many older houses, tenements or flats, stairwells served as a ventilation pathway. Often at the top, opening onto the roof, were skylights and cupolas, sometimes with adjustable ventilation arrangements. This allowed what is called stack ventilation, whereby hot air rising up through the building was able to escape through the cupola or skylight opening. Cooler air was thus drawn in from other parts of the house, through windows or up through the floors and behind panelling. This natural ventilation feature is utilised extensively in modern low carbon buildings as an alternative to air conditioning or forced draught ventilation. Frequently during repair works these facilities are sealed or removed, causing moist air to accumulate; this moisture then condenses at night onto the glass and timber, causing progressive decay of the timber elements. Where possible such ventilation fittings

should be retained and kept working; a short term repair may cause more extensive problems with the cupola later on.

Attics and ceilings

Attics are often draughty spaces and where steps are understandably taken to improve insulation but at the cost of reducing air flow. Although this is unquestionably beneficial in energy terms, some thought must be given to ensuring adequate moisture dispersal. Insulation measures should ensure roof voids are adequately ventilated and ventilation from the lower parts of the building, mainly from the gaps between the inner face of masonry and lath and plaster framing and plaster finish, are not closed off. If additional ventilation is required, roof vents can be provided, located discreetly and formed in traditional materials with appropriate detailing. When insulation is applied to the joists in an attic space, avoid fully enclosing the insulation by maintaining an air gap above the insulation layer should attic boards be put down to assist with storage. When packing insulation over the laths over a combed ceiling avoid packing the space tight to the roof sarking, loose fill materials should also be applied in such a way as to allow air circulation.

Closed up air vent in public building.

A decorative air vent at the top of 19th C stair.

When planning re-slating works, ensure that there are gaps between the new sarking boards (traditionally referred to as a "penny gap") . These, gaps, when used in conjunction with a breathable roofing paper, will allow sufficient ventilation to prevent condensation in the roof space. Some manufacturers will provide calculations and guidance on roofing papers to ensure the humidity and dew point is designed properly.

Signs to look out for

Poor air circulation is fairly easy to detect - normally smell will alert a new visitor to a property where ventilation there is poor; regular users of a building may not notice. Cooking smells, for example, will always disperse in a well ventilated property. Some symptoms are closely linked to damp (see Damp INFORM) and again smell, especially in restricted areas such a cupboards, can indicate that air movement behind the framing has been obstructed.

Further reading

- SPAB Technical Information Sheet No 4 – The Need for Old Buildings to Breathe SPAB 1993
- Massarwi, I & P, Damp Buildings Old and New, ICROM 1997
- Loudon, JC, Encyclopaedia of Cottage, Farm and Villa Architecture and Furniture, Donhead 2000 (reprint)
- Jackson & Day, Period House, Harper Collins 2005
- Gilber. I, The Tenement Handbook, ISBN 978-1873 190 142

Contacts

Historic Scotland Technical Conservation Group
Longmore House, Salisbury Place, Edinburgh EH9 1SH
Tel 0131 668 8668
Email hs.technicalconservationgroup@scotland.gsi.gov.uk

Historic Scotland Investment and Projects Team
Historic Scotland, Longmore House, Salisbury Place, Edinburgh, EH9 1SH
Tel 0131 668 8801
Email hs.grants@scotland.gsi.gov

Historic Scotland Inspectorate
Historic Scotland, Longmore House, Salisbury Place, Edinburgh, EH9 1SH
Tel 0131 668 8716
Email hs.inspectorate@scotland.gsi.gov.uk

Principal author: Roger Curtis
Published by Technical Conservation Group, October 2008
Historic Scotland, Longmore House, Salisbury Place, Edinburgh EH91SH
Tel: 0131 668 8638 Fax: 0131 668 8669
www.historic-scotland.gov.uk email: hs.technicalconservationgroup@scotland.gsi.gov.uk