

# Defect Action Sheet (Design)

*Defects in housing and how to avoid them*

CI/SIB 8(56)(L2)(H6)(A3u)

# 3958

## Domestic draughtproofing: balancing ventilation needs against heat losses

**FAILURE:** Boilers, fires not operating properly; airborne contaminants not clearing; condensation problems occurring.

**DEFECT:** Air flow through a particular room is not sufficient to vent that room; air flow is not sufficient for the safe operation of the heating appliance used in that room.

Action has been taken over recent years by house occupiers, community action groups such as Neighbourhood Energy Action and others to conserve heat in a room or dwelling by fixing simple draughtproofing around external doors and windows. Some house occupiers may seal room vents, fit replacement windows, or install secondary glazing further to reduce unwanted cold draughts and heating costs. These draughtproofing measures can improve the living conditions for the occupier provided there is still an adequate supply of fresh air to the room and its occupants. If *full draughtproofing* measures are taken *without consideration* for the *ventilation requirements* of that particular room, *fuel-burning appliances may not function properly, airborne contaminants may not clear, condensation* and subsequent *mould growth* may become a *problem*.

### PREVENTION

**Principle** — Draughtproofing of a dwelling should not be carried out in isolation; consideration should also be given to providing controllable ventilation. The air requirements of fuel burning appliances must be satisfied. Excess water vapour will need to be removed by ventilation to prevent condensation.

### Practice

- Ensure each room has provision for the necessary air changes:
  - Provision for natural ventilation must be made in all habitable rooms of dwellings; ventilation opening should be at least 1/20th of the floor area of room or space<sup>1</sup>; NOTE: The 1/20th requirement may be reduced to 1/30th under the Building Standards (Scotland) Regulations;
  - fine control of part of the above ventilation provision, or provision of additional controlled ventilation to give up to 4000 mm<sup>2</sup> free area of trickle ventilation in each room or space is normally adequate for achieving control of the air-borne contaminants and moisture without introducing unacceptable draughts, Figure 2;
  - existing permanent ventilation in a bedroom and in a living room may then safely be sealed provided no fuel-burning heat appliance is used in that room (see Table 1 for air requirements). Draughtproofing of

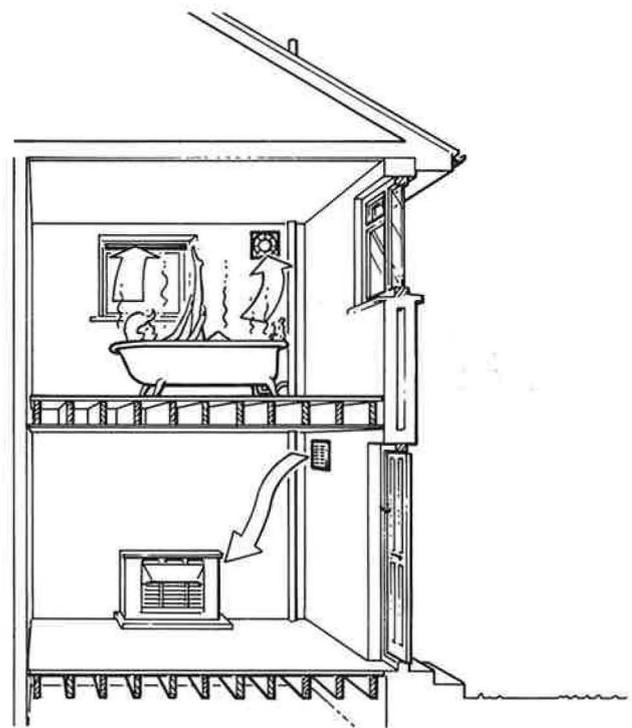


Figure 1 Maintain essential air flows

these rooms can proceed after checking for condensation problems and mould growth;

NOTE: Security against forced entry of any trickle venting should be checked. Purpose-provided ventilators are more suitable than partially open windows;

- Check rooms for condensation problems or mould growth<sup>2</sup>:
  - a room with a serious condensation problem or mould growth should not be draughtproofed. Identification of the cause of the mould should be ascertained and remedial measures taken<sup>3</sup>;
  - a living room or bedroom can be draughtproofed if the mould growth is light and easily removed and also if permanent ventilation is provided. If permanent ventilation is not provided, at least 2 m of window

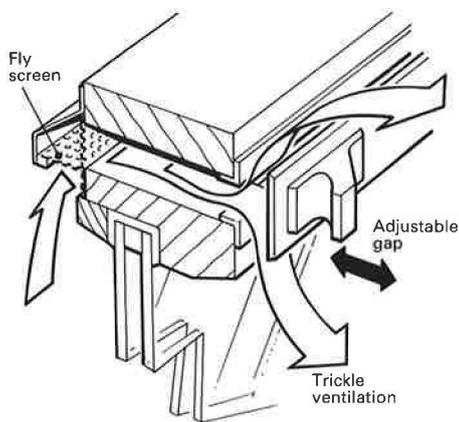


Figure 2 Example of an adjustable slot ventilator fitted into window head

opening perimeter should not be draughtproofed;

- mould growth in kitchens or bathrooms will usually be remedied only if moisture extraction at source is used. Other rooms, not affected in the dwelling, can be draughtproofed.
- Check that a means of increasing ventilation in the kitchen and bathroom during or immediately after the generation of water vapour is available to help prevent condensation problems:
  - windows in kitchens and bathrooms should not be draughtproofed unless extractor fans are installed;
  - internal doors from the kitchen and bathroom may be draughtproofed, to prevent spread of moisture to the rest of the dwelling. NOTE: If the kitchen/bathroom is made airtight, the extractor fan may not have an adequate air supply — it may stall or create a large negative pressure — which in RADON GAS<sup>4</sup> prone areas of the UK is unacceptable.
- Check with the Gas Area Office before installing an extractor fan in any room (including kitchens) containing an open flued gas fired appliance ie an appliance which draws air from the room for the combustion process and exhausts into the outside air:
  - extractor fans are **not permitted** in any room (including kitchens) containing open flued appliances burning solid fuel or oil.
- Check that the air flow for fuel burning space heating appliances is available according to Table 1 and that any original permanent ventilation provided has not been blocked or covered:
  - a room containing an open-flued gas fire (item 3, Table 1) should have 2.5 m of window opening perimeter left without draughtproofing to ensure that adventitious air is available otherwise provide permanent ventilator of open area greater than 3500 mm<sup>2</sup>.
- Ensure that a room containing a flueless space heater (ie one which draws air from the room and exhausts into the room (items 4 and Note, Table 1) is not draughtproofed unless 9500 mm<sup>2</sup> of permanent ventilation is provided. NOTE: Flueless space heaters should not be permanently fixed in a bedroom or bathroom.
- Check that the air flow for flueless domestic gas appliances is available according to DAS 91<sup>5</sup>:
  - draughtproofing of the room containing the appliance is not acceptable;

- other rooms in the dwelling can be draughtproofed;
- installation of an appliance listed in Reference 5 is not permitted in rooms with volume less than 6 m<sup>3</sup>.
- Check that any secondary glazing does not interfere with the opening of windows or permanent vents.
- Advise the occupier of the dwelling on the need for regular maintenance of all combustion appliances.
- Ensure that new construction has 4000 mm<sup>2</sup> of controllable trickle ventilation per room or space:
  - rooms or spaces, without trickle venting, incorporating minor construction works, should not be draughtproofed until that construction has substantially dried out.

Table 1 Air supply requirements for fuel burning space heating appliances

Type of appliance	Requirements for permanent opening to the outside air in the room or space containing the appliance as specified in British Standards
1 Balanced-flue heating appliance	None — air supply provided directly from outside
2 Open-flued gas appliance including gas fire with back boiler but excluding room gas fire	Permanent opening required: (i) for a decorative (solid fuel effect) appliance, an area of 1800 mm <sup>2</sup> for each kW of rated input over 2kW (ii) for any other appliance, an area of 450 mm <sup>2</sup> for every kW of input rating over 7 kW
3 Room gas fire, open-flued	No requirement for permanent openings; it is assumed that there is a minimum adventitious area of 3500 mm <sup>2</sup>
4 Flueless gas space heater (fixed)	Permanent opening of at least 9500 mm <sup>2</sup> and an openable window required. Appliance must NOT be fixed in a bedroom or bathroom
5 Open solid fuel fire	Permanent opening of at least 5500 mm <sup>2</sup> or 50% of the throat opening, whichever is the greater
6 Other solid fuel flued appliance	Permanent opening with total area equal to at least the combined areas of the primary and secondary air inlets to the appliance
7 Oil burning flued appliance	Permanent opening of at least 550 mm <sup>2</sup> per kW of appliance rated output

NOTE: In the case of flueless space heating appliances (LPG, paraffin), no requirement for permanent opening but adequate ventilation air is essential. Ventilation as in 4 above is recommended.

#### REFERENCES AND FURTHER READING

- 1 **The Building Regulations (England and Wales) 1985: Approved Document F**
- 2 **Defect Action Sheet DAS 16 Walls and ceiling: remedying recurrent mould growth**
- 3 **BRE Digest 297 Surface condensation and mould growth in traditionally-built dwellings**
- 4 **Department of the Environment The Householders' Guide to RADON**
- 5 **Defect Action Sheet DAS 91 Domestic gas appliances: air requirements.**  
**BRE Digest 306 Domestic draughtproofing ventilation considerations**  
**Department of the Environment Energy Efficient Renovation of Houses — A Design Guide**  
**The Building Standards (Scotland) Regulations Part K**  
**The Building Regulations (England and Wales) 1985 Approved Document J**  
**BRE Digest 319 Domestic draughtproofing : materials costs and benefits.**

**Defect Action Sheets** are produced by the BRE Defects Prevention Unit. They are intended to remind and inform designers and site supervisory staff of ways of avoiding some of the most troublesome defects which have beset Local Authority housing in recent years. The advice is based on the most authoritative information available at the date of issue and frequently also on field assessments, but it is inevitably generalised and users should ensure that it is relevant to the specific circumstances in which they seek to apply it. For technical enquiries arising from this sheet please contact the HDPU at the address overleaf.

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